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Public Health Policy: An Ethical Analysis of Quarantine

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PUBLIC HEALTH POLICY: AN ETHICAL ANALYSIS OF QUARANTINE

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ABSTRACT

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Dissertation supervised by Henk ten Have, MD, PhD

As a public health measure quarantine has both historical and contemporary significance both in the United States and abroad. On the surface it represents a low-cost, low-tech way in which the spread of disease can be mitigated as its core requirement is that those who may have been exposed to an infectious agent are kept away from those who have not been exposed to that agent for enough time to determine whether or not infection has been spread. This has been utilized for centuries with both limited questions and scattered, inconsistent, or impossible to achieve oversight and goals. In understanding this situation, it is imperative for the global healthcare community to begin both asking and answering questions relative to both how ethical and how effective quarantine truly is in a world which has become, and will likely remain, globally connected. In providing answers to these questions there are several interrelated aspects which have been explored. The factors include the broad role of quarantine in a globalized world, the public policies and legislation which govern the implementation of quarantine the increased and increasing risk of global epidemics and pandemics, the ineffectiveness

of quarantines as they currently exist, and the ethical dilemmas which have been, and are currently, associated with quarantine implementation. This dissertation explores in depth the roles of each of these factors as they relate to both the previous and contemporary role of quarantine as well as its ethicality and efficacy. Utilizing extensive research in the fields of infectious disease, healthcare legislation and policies, bioethics, public and public health ethics, the researcher found that in exploring the nature of contemporary quarantine that it is neither wholly ethical or effective. As such there need to be significant changes made in order to ensure that future quarantines both in the United States and abroad are carried out in a manner that is both ethical for all participants as well as truly effective in working to mitigate the spread of infectious disease.

DEDICATION

To the memory of my parents.

I miss you every day, but I know you both saw this process though to its completion.

To my son, Naif. You made me stronger, better, and more fulfilled.

And to my sister, Khaloud. Your support is endless.

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Chapter One-The Problems Relative to Quarantine in an Increasingly Globalized World

In an increasingly globalized world public health concerns represent a threat level of a new magnitude, taking on a greater and graver meaning than they have before. This is especially true when addressing the interrelated topics of infectious disease as a public health concern, the debate which ranges between public health and public trust, and the role that quarantine can and does play in paradoxically fuelling and assuaging concern relative to public health and subsequent population safety. It is only in considering the way in which these subjects work both independently and together that it is possible to understand the full scope of the problems that surround quarantine in a world which is becoming more tangibly connected than it has ever been at any other point in history.

A. Infectious Disease as a Public Health concern

Before delving into the role of infectious disease as a public health concern, it is necessary to provide a clear understanding within the context of this work relative to the way in which infection and by extension infectious disease is being presented. Noting this, infection can be defined as what occurs when one organism is invaded by another, smaller, infecting organism. There is no singular type of infectious agent, nor is there a singular means by which infection can occur. However, all infectious diseases share the same chronology which is made up of three distinct time periods including the pre-infectious or latent period, the incubation period, and the infectious period. The pre-infectious period is the time from which the host is first infected until the time the host is able to infect someone else. The incubation period is the time from the infection until the onset of the clinical disease. The infectious period is the span of time from the end of the pre-infectious period to the point where it is impossible for the host to infect others.[1]

Essentially, infectious disease is both varied and variable. Based on this it can be presented as being particularly problematic from a medical standpoint. This is due to the fact that there is no one source point, multiple ways in which infection is possible, and while the general chronological nature of infectious diseases exists as a constant, what can, and does, fluctuate is the length of time that each of these distinct periods may take over the course of the particular disease lifetime based largely, if not wholly, on the disease itself.

As a health issue, infectious diseases are not just the concern of the individual or their immediate connections e.g. family, friends and co-workers. The very nature of such diseases, i.e. the rapid rate at which they can spread and in some cases, mutate means that as a whole they exist as a concern for the public at large. This is especially if true in instances where for whatever reason the diseases are not carefully, understood, monitored, treated or controlled.

One estimate projects that there are over 1,400 pathogens that can infect human beings.[2] Regardless of age, sex, lifestyle, or socioeconomic status infectious diseases exist as a continuing threat for all individuals. Such diseases are responsible for over 13 million deaths per year, and in developing countries count for one in two deaths. They are also the primary cause of death in developing countries.[3] Therefore in looking at infectious disease as a cause of public health concern it is not enough to be aware that they exist, or even to look at the ways in which they can be combatted. Instead there are more important factors which must be addressed. In this vein, it is imperative to consider why and how infectious disease persists.

In understanding how such diseases are spread as well as why they have not been eradicated, it is possible to gain a greater understanding of the overall affect which they can have on public health. Also, what must be addressed is how infectious disease is perceived. In looking at the manner in which infectious disease is viewed by the public at large it is possible to glean

insight relative to both the threat that such diseases are believed to pose, and the threat which they may actually pose. It is only in providing such a thorough analysis that it becomes possible to truly understand the relationship between infectious disease and public health.

Invariably the concept of quarantine needs to be considered as a prominent factor in this relationship. Noting this, it can be presented that while well intentioned the measure of implementing a quarantine can serve to cause more problems than it solves in the modern world. Problems which are ignored at the risk of a more significant peril.

1. The Persistence of Infectious Disease

The existence and spread of infectious disease is an undeniable issue within the contemporary global healthcare community. The question that looms large is "why?". Unfortunately, however there is no singular or simple answer.

Decades ago infectious disease was believed to be on the verge of eradication. With developments in sanitation, immunization, and antibiotics as well as other public health and scientific milestones it seemed as if the end of infectious disease was imminent. Bolstered by the elimination of smallpox, the near conquering of polio, and diseases such as diphtheria tetanus, and yellow fever largely under control, a new era in health care seemed to be dawning.[4] However in 2017 infectious disease still persists and in some cases is more virulent than ever.

It is plausible to present that the persistence of infectious disease can be rooted in several key factors which are both historical and contemporary in nature. These factors include the strides both past and present that have been made to combat infectious diseases, the intrinsic and extrinsic risk factors for infection, what is currently being done to combat infectious disease, and how migration, emerging and re-emerging infectious diseases, drug-resistant infections, and

global warming all serve to contribute to the persistence of infectious disease globally.

It would be remiss to attempt to engage in discourse relative to the contemporary nature of the persistence of infectious disease without addressing these types of diseases from a historical standpoint. In this vein, what must be considered is threefold. First, there is the matter of how infectious disease was dealt with before it was understood scientifically. Second, there has to be an understanding of the role the discovery of what caused infectious diseases served to play in how they were treated. Finally, what has to be addressed are the fallacies relative to the early infectious disease control measures.

Infectious disease was not always viewed in a scientific manner. Instead of understanding that there existed an underlying medical root cause many individuals attributed infection and by extension the sicknesses, and in some instances entire epidemics to superstitious beliefs or causal relationships. This was not a matter of wilful ignorance, but instead directly related to a lack of technology. For example, until the 17th century there was no instrument that was capable of sufficient magnification to make microorganisms visible to the eye, and even once such lenses were developed the research of the scientist who utilized them was not widespread and remained dormant for close to 200 years. As a result, individuals, including those in the scientific and medical communities had to rely on what they knew, or what they believed they knew about the manner in which disease was spread. In the beginning of the 19th century there was still a reliance on observation as a means of providing an answer to the question of how disease was spread. Almost simultaneously Hungarian physician Ignaz Semmelweiz and American Oliver Wendell Holmes came to similar conclusions regarding the way in which infectious agents were transferred. In terms of the former, in response to a high rate of puerperal fever in Europe, Semmelweiz believed the cause to be midwives inadvertently infecting patients. This was a

logical assessment after the additional observation of many physicians going from patient to patient or from an autopsy to a delivery without washing their hands in between the two actions. In seeking to combat the spread of infections he instituted methods for handwashing in a chlorinated solution for all physicians and nurses. Despite the fact that this did lead to a reduction in infections, Semmelweiz had an abrasive personality and was ridiculed by his colleagues. In terms of the latter Holmes observed that women who had home deliveries suffered from fewer infections than those who gave birth in hospitals. Similar to Semmelweiz he concluded that these infections were the result of person to person contact and specifically carried on the hands of physicians and midwives.[5] While the twinned thoughts of Semmelweiz and Holmes did serve to address the infection of individuals in part, they failed at being fully correct in terms of how infection worked.

Medical understanding of the relationship between microorganisms is fairly recent in nature, dating back only to the late 19th century. Specifically, during the second half of the second century there were two shifts in overall scientific thinking and inquiry. First, there was a great deal of discussion among scientists relative to the origin of living matter. This discussion turned into debate and it was ultimately settled by scientist Louis Pasteur who after conducting a series of experiments was able to demonstrate that microorganisms are present in air and in liquid. Second, it was during this same time period that there were a number of scientists and doctors who were working to address a variety of scientific and medical problems in Europe. Through the observations and contributions of these individuals it was possible for the first time to see the bigger picture of how microorganisms survive, reproduce, and cause disease.[6]

The discovery of microorganisms as the cause of many serious diseases in the 19th century was the impetus for disease control measures.[7] Medical texts from that era highlight both

what was known and what thought to be known about infectious agents. In that vein the information presented cautioned against practices such as allowing infectious material to be dried and pulverized for fear that it would be released into the air, and the need to take precautions by paying attention to things such as the water supply, the cleanliness of rooms, and the clothes and bodies of individuals.[8] This early medical advice is akin to much of what is known currently about the correlation between hygiene and the spread of infection in that it serves to focus on a separation of infectious materials and healthy individuals for fear of the disease being further spread. While such measures are well intentioned, they alone did not and do not serve to stop the spread of infection.

As the 19th century progressed and the 20th century dawned it was found that there were other factors not related to carelessness with infectious agents or poor hygienic practices that could lead to diseases being spread.[9] Instead, there are both intrinsic and extrinsic factors which have to be taken into account when considering both how infectious disease is spread, and what it is about those factors which allows infection to persist.

There are numerous intrinsic risk factors which serve to make a person more susceptible to infectious diseases. Such factors include but are not limited to nutrition and high risk behaviour.[10] In both instances it can be presented that increased susceptibility serves to directly correlate, at least in part, to an individual being less able to stave off an infection should they be introduced to an infectious agent based on compromised health, compromised mental capacity, or dangerous lifestyle choices.

Infection and nutrition have always been linked.[11] However this link has not always been clearly understood. The correlation between the two can be dated back to at least the seventeenth century within America. While historical data in this regard is scarce, it is possible to make some

generalized connections. For example, American colonists of this era are known to have suffered from frequent food shortages and malnutrition. This lack of a healthy diet, coupled with other risk factors at the time led to death from infectious diseases for many individuals.[12] In spite of limited historical data, contemporary science has served to prove causal links between nutrition and susceptibility to infection. In the 1950s while it was believed that there was a connection between infection and diet, the link was thought to be solely relative to protein deficiencies as opposed to the broader issue of malnutrition. Based on work done in Central America, South Africa, Mexico, and Chile, research after 1959 revealed a more significant connection between overall nutrition and infection. In 1968, the World Health Organization (WHO) published "Interactions of Nutrition and Infection" which suggested an synergistic relationship between malnutrition and infection. In the 1970s metabolic consequences of infection and the relationship between malnutrition and cell mediated immunity were first elucidated. Additional advances were made between 1970 and 1980 with improved tools and human studies along with better animal models that proved malnutrition was not unique to children.[13] Between 1990 and 2000 it became a widely-recognized fact that micronutrient deficiency existed as a conditioning factor in the response of a host to infection. Additionally, it was well documented that the deficiency of minerals such as iron and zinc served to impair immune functions in both experimental animals, and to some extent in humans as well.[14] What all of this serves to underscore is the correlation that exists between nutrition, or rather malnutrition, and infection, proving its potential impact, and by extension potential effect on individuals as an intrinsic risk factor for the susceptibility to illness.

While the relationship between nutrition and infection can be viewed as being singular e.g. poor nutrition/high infection risk versus good nutrition/lower infection risk, the relationship

between high risk behaviour and infection can be viewed via the lenses of two broad activities. These two activities include changing sexual practices/mores and intravenous drug use. These two behaviours are not the only high risk activities that an individual can engage in, however they may be the ones most likely to lead to the contraction of an infection. The rationale for this assessment stems from the intimacy of these two behaviours not on an emotional level, but rather on a physical one.

In understanding the transmission dynamics of infectious disease, particularly those that spread sexually, it is possible to gain great insight into how epidemiologic trends can be explained. This is due to the fact that specific behaviours can aid in the transmission of sexually transmitted infections (STIs), determine differences in risk, and help define the rates of disease in selected groups.[15] Essentially, such an understanding can provide insight into why and how STIs in particular persist. For example, in placing focus on the Internet as a new/newer medium via which sexual partners can be found it is revealed that while some individuals are able to decrease the spread of HIV, that they may actually be responsible in part for the spread of other STIs. Based on both the scope and virtual anonymity offered by the Internet what occurs are increased interactions between individuals who feel disenfranchised. Acting as a meeting place the Internet allows for them to approach each other without social stigma attached. While this is true for many groups, empirical evidence has highlighted it as being particularly true for men, both those who identify as homosexual and those who do not, who are seeking to engage in sexual activity with other men. Men seeking men in an Online environment have been found to be more likely to have more casual sexual partners, report higher rates of unprotected sex, utilize recreational drugs and/or medications meant to enhance sexual performance, and report sex with an HIV Positive individual at rates higher than those of their counterparts who seek sex offline. Even

among HIV Positive males who disclose their status Online and seek out HIV Positive partners as a means of decreasing the spread of infection can engage in sexual behaviour which increases it. Evidence suggests that among these men there is an increased risk of other STIs if they are engaging in unprotected sex.[16] The increased risk of STIs is a reality for anyone who engages in unprotected sex, however it can be suggested that among this particular group it can be particularly problematic if they are focused solely or primarily on not infecting others with HIV and therefore may lack situational awareness about their risk of other infections. Coupling this potential lack of knowledge with the fact that they may have more casual sexual partners suggests that the actions of this group, and similar groups, can contribute greatly to the persistence of infectious disease, specifically STIs.

High risk activity is not limited to certain sexual practices. Noting this, intravenous drug usage, as opposed to drug usage of other kinds is also a high risk behavior. As such intravenous drug users are also at an increased risk for infection. Of particular concern is the transmission of infections such as HIV and hepatitis. What must be understood is that it is not the drug usage itself that is inherently problematic in this regard, but rather the way in which the drugs are being used. Relative to the spread of infection the issue lies in the fact that injection devices are shared.[17] It can be posited that individuals who are so desperate to do drugs that they would share needles as opposed to procuring needles of their own are far more interested in the short term effects of the drug than they are in the potential long-term health implications. Based on this intravenous drug users who are infected with communicable disease(s) can be seen as unique vectors for infection who contribute either knowingly or unknowingly to the persistence of infectious disease not because of what they are doing per se, but rather because of how they are doing it.

Like intrinsic risk factors, extrinsic risk factors for infection are also varied in nature. These factors include, but are not limited to, the socioeconomic status and education of the individuals who may be affected.[18] In both instances it is possible to compare past epidemics with present concerns as a means of conveying the roles in which these extrinsic factors have on the persistence of infectious disease.

While infectious disease can impact individuals regardless of socioeconomic status, it would be remiss to ignore the causal link between a low socioeconomic status and an increased risk of infection. Empirical evidence has found that there are infections which are acquired as a result of factors such as crowded living situations, and that factors such as marital status can play a role in whether or not an individual is more susceptible to infection.[19]

When considering the role of socioeconomic status and infection, it would be remiss to view it solely as an issues which affects the individual. Instead, socioeconomic factors and the ways in which they impact infection, must also be considered within the broader framework of a community setting.

While there is a great deal which remains unknown about the exact ways in which social factors serve to affect different health outcomes, and greater consideration needs to be given to what causes risk prone behaviors, e.g. smoking and poor diet, to develop,[20] what cannot be denied is that while the infection of a single individual is problematic, that the same infection incapacitating a community can be catastrophic. Noting this careful focus needs to be placed on the relationship between socioeconomic factors and infections specifically as they exist on a community level. Empirical evidence presents numerous examples of this both in a historical and contemporary sense. While it would be implausible to address every instance in which socioeconomic factors served to influence infection and its spread, it is possible to take an in

depth look at selected instances as a means of illustrating the issue. By carefully considering the correlation between socioeconomic status and infection in both the past and present it is possible to see both how this issue occurs and why it continues to be as pervasive as it is. In this vein, it is crucial to look at two core socioeconomic issues: income and education. In terms of the former focus can be placed on both the 1918 influenza epidemic especially as it served to affect the Navajo population and present-day third world countries. In terms of the latter emphasis can be placed on empirical evidence which has found a correlation between a lack of education and infection in numerous countries. While these examples are from different continents and different periods in history, they are representative of the same problem.

In focusing on the role of low income and infection, attention can be turned to the 1918 influenza outbreak. In 1918 influenza existed as a new disease, as a result neither scientists or medical professionals had a cure. Initially the disease was considered to be socially neutral in that it seems to infect individuals regardless of their nationality, ethnic group, or social status. However, it was discovered that there were substantial social differentials relative to the lethality of the disease. In looking at the impact of the disease among Native Americans in particular it was discovered that lethality varied greatly based on tribe. For instance, based on case and mortality statistics compiled in 1919 by the US Public Health Service less than 1 percent of the Native Americans in Oklahoma, Wyoming, Kansas, and Michigan died from influenza. This is in stark contrast to the impact influenza had on other groups such as the Alaskan natives where entire communities were afflicted, and in one area the rate of infection was as high as 10 percent among females, and 30 percent among males. It has been determined that one of the key factors relative to these differences was socioeconomic status. Specifically, individuals who were poor were more likely to contract the illness and more likely to die from it. Individuals who were

more well off financially tended to be healthier overall and more well-travelled which contributed in part to prior exposure to illness, and if they became ill they had better access to medical care and where able to retain more assistance to aid in their recoveries. Additionally, they could literally afford to take time off from work in order to rest and recover, were better fed, and were better sheltered while they were ill. While rich individuals did die from influenza, those rates were lower because of the type of care they could receive.[21] This basic information regarding the effect of influenza based on socioeconomic status serves to provide the framework for addressing it in relation to the Navajo tribe.

In 1918, the Navajo tribe was not merely poor, it was essentially impoverished. Statistics from the mid to late 1900s showcase that of sixty-five Indian jurisdictions, the five Navajo agencies were consistently at or near the bottom. The tribe ranked 45th, 47th, 53rd, 57th, and 65th in individually owned property and 36th, 37th, 44th, 59th, and 64th in per capita individual income. While such indicators serve to ignore collective or familial property, they still service as a means of illustrating the overall socioeconomic position of the Navajos. Moreover, it is understood that even if collective resources were in place that they were not relevant to health care delivery or services in a manner that would have mirrored what was available to a wealthier tribe or more well off socioeconomic group. The effective delivery of medical services during this period was all but non-existent in nature as evidenced by a lack of medical resources and hospitals which were underfunded or otherwise inadequate. As a result, government health workers had to resort to utilizing the limited means available to them, an act which ultimately resulted in causing greater public health concerns for the reservation as a whole.[22] What must be understood is that while the impoverished nature of the Navajo tribe did not necessarily cause the influenza epidemic that it was a causal factor relative to why they were so susceptible to its

effects.

As a whole the Navajos were weakened because of decades of subpar medical care. Among the tribe there were frequent epidemics of childhood diseases, and widespread tuberculosis and trachoma. In the early 1900s the medical conditions of the community were especially problematic. This issue was further exacerbated by the onset of World War I as doctors and nurses on the reservation volunteered for military service.[23] The subpar medical care, the spread of disease, and even the choice of the doctors and nurses to leave the reservation in favour of serving in the war can all be linked back to the looming socioeconomic issue because proper medical care requires money, and those who are better educated are generally more likely to look for a way out of bad situation.

While socioeconomic factors were not the only factors which aided in the particular virulence of the 1918 influenza epidemic among the Navajos, their role can be viewed as critical. The poverty of the tribe served to make them more susceptible to becoming infected and once ill, their inferior medical infrastructure cause the illness to have a much greater impact than it did in other areas. The effect of socioeconomic status on infection is unfortunately one which remains in the 21st century.

As aforementioned infectious diseases are especially taxing on the developing world. This is related to income, or more accurately the lack thereof. In addition to the manner in which individual health is effected, the overall well-being of the community is at risk too. Just as infectious disease can cause a deterioration in health, it can also serve to adversely impact the socioeconomic status of a community, creating a cyclical effect in which poverty begets susceptibility to infection, infection begets poverty and so on ad infinimun. Far from being an unproven hypothesis, the 2002 Macroeconomics and Health Report to the WHO recognized the

synergistic relationship that exists between economic development and infectious disease, denoting that economic growth is not possible without a healthy population.[24] Healthy populations however do not occur in a vacuum. Without access to regular and competent care it cannot be expected for individuals to be able to either withstand infection, or to stave it off should they become infected. Therefore, in developing countries where healthcare may be limited or less than adequate it is implausible if not impossible for improvements to be made to socioeconomic conditions.

Having addressed the extrinsic risk factor of socioeconomic status via income, it can further be addressed in terms of education. This can be addressed in two key ways. First, there is the relationship that exists between low levels of education and infection. Second, there is the relationship between lack of information and infection. In both of these instances, just as the role of education is different, the risk for particular infections varies as well.

In looking at the ways in which low levels of education impact infection focus can be placed on Guatemala, the United States, and Africa. In looking at Guatemala and the United States, in each of these countries a relationship has been found between low levels of education and respiratory infections. [25] Noting that Guatemala is considered a developing country while the United States is viewed as a first world country, it can be posited that the role of education as an extrinsic risk factor for infection is especially powerful. In looking at the continent of Africa as a whole findings suggest that at least for women, those who are able to attain higher education levels i.e. secondary education and higher, have a lower risk for contracting HIV.[26]

Equally problematic to low levels of education is the outright lack of education as it relates to infection. Despite what is known about the spread of many infections, there are instances where this information is not made available to the populations that would most

directly benefit from it. A prime example is the manner in which HIV/AIDS education is handled in places like Africa. As already presented the mere act of a woman achieving a secondary education or higher may serve to decrease the risk of infection. The "why" behind this stems directly from the fact that at the level of education there is both a greater exposure to information about the manner in which HIV is prevented, as well as an increased understanding about the link between the sexual behavior(s) of an individual and the risk of HIV infection.[27]

Having addressed the manner in which infection spreads as well as both the intrinsic and extrinsic factors which increase susceptibility, attention must be placed on the strides which have been made relative to mitigation. In this vein it is necessary to look at core efforts of the 19th, 20th and 21st century. By exploring initiatives era by era, it is possible to more clearly showcase the dual roles of information as innovation as they directly related to working towards slowing the spread of infection.

In the 1890s the understanding surrounding infection was still in its infancy. However, this did not prevent medical professionals from attempting to take a proactive approach. In addition to the prior mentioned initiatives relative to hygiene i.e. more explicit handwashing and cleaning measures and methods, nursing care was also provided as an option in some instances. In both New York City and Chicago nurses did their work without the benefit of vaccines or antibiotics. Instead there was a reliance of a regimen of care which they either provided directly or provided instructions for so that the family of the infected could care for them. Nurses were instructed to avoid direct contact and explicit instructions were provided as a means of attempting to reduce the spread of infection. Additionally, it was during this era that the practices of isolation and quarantine were largely relied on as means of reducing the spread of infection.[28]

Isolation and quarantine were also viewed as important measures of reducing the spread

of infection in the early part of the 20th century. However, by this time they were not necessarily considered as progressive as they had been previously because of the fact that they could be biased based on race or class, and in some cases were seen as a defector means of dealing with segments of the population who were viewed as undesirable.[29] Despite this however, considerable progress towards curbing the spread of infection was made during this century, particularly in the 1970s and 1980s. During these two decades, additional vaccines were developed along with anti-infective, and additional methods for disease prevention and treatment. It was also during this time, in conjunction with the beginning of the HIV/AIDS epidemic on a global scale that the public collectively awakened as well relative to matters of infection transmission and prevention.[30]

In the midst of the 21st century the focus of infection control centers around efforts which can be classified as near all encompassing in nature. The goal of these strides is to reduce the global burden of infectious disease and as such they are practical efforts not rooted solely in the field of science or medicine, but which also address social situations and settings as well. Exemplary of this consideration can be given to The United Nations Millennium Development Goals (MDG). As a whole they serve to be representative of the effort to think globally about health and health related issues. Similarly, consideration can be given to The Gates Foundation's Grand Challenges in Global Health Initiative. The overarching goal of this initiative is to work towards and ultimately achieve the scientific breakthroughs that will provide solutions for the problem of diseases like tuberculosis and AIDS which can affect individuals everywhere while paying special attention to the infections and diseases that serve to disproportionately affect the poorest individuals on earth. Finally focus can be placed on The Council of Science Editors. Collectively they organized a global theme issue on poverty and human development. This issue

involved over 230 science and biomedical journals and served to focus on numerous issues relative to health and infections including interventions meant to improve health among the poor. These programs can be seen as being representative of a much larger sample of current century initiatives intent on looking squarely at the big picture and its overall impact relative to infection and the manner in which individuals are infected. [31] Just as the efforts of the 19th and 20th century served to influence the work being done relative to infection prevention currently, it is likely that the work being done currently will be foundational in terms of offering insight to the infection control measures which follow in coming years.

It is obvious that since the discovery of infectious agents, the manners in which they can be transmitted, and the steps that can be taken to mitigate infection, that the medical community has worked tirelessly to address this issue for the problem that it is. After over two centuries of work however infections still spread, and in fact do so more efficiently now than they have at any other point in human history. While this is not by design, it is also not entirely by accident either. As human beings continue to progress an unintended, and highly consequential side effect is that infection has served to persist as well. More disturbing though is the fact that infections have not as a whole been particularly weakened; instead they can on some level and in some instances be viewed as thriving. The fact that infectious agents continue to spread can be attributed to several core factors. These factors include migration, emerging infections, drug resistant infections and global warming. While these factors are all interrelated in that they serve to aid in the further existence and subsequent spread of infection, they are all unique in the manner in which they work and as such must be viewed and moreover understood individually.

The role of human mobility patterns relative to the spread of infectious disease and how to design control strategies to combat them cannot be understated. These patterns have been

responsible for introducing infectious agents into areas where they were previously non-existent e.g. the spread of HIV/AIDS which first emerged in the 1980s and is currently in numerous parts of the world.[32] In addition the world itself has become more accessible. In the wake of greater global transportation and connectedness it is possible for any location on earth to be reached in less than 36 hours. This time frame is significant because it is a time frame that is shorter than the incubation period of many diseases, which may need to be in the body for days or weeks before physical symptoms begin to make themselves manifest in an individual.[33] Such a reality cannot be ignored by rational thinkers as it is representative of one of the primary threats that exists in terms of effectively and efficiently working to curtail how infectious agents are spread.

Equally, if not more problematic that the threat potential represented by the relationship between migration and infectious agents, is the issue illustrated by emerging infections. Emerging infectious diseases can be sorted into one of several categories; 1. diseases that are truly new, 2. diseases that are newly recognized, 3. re-emerging diseases that represent well-known infectors which are reappearing after a decline, and 4. unexplained syndromes awaiting new insight.[34] There are several factors which can be seen as being directly linked to emerging infectious diseases. First, there are demographic factors. These include, but are not limited to population growth, and housing density. Second, there are social and behavioural changes such as more liberal sexual behavior, widespread travel for both professional and personal purposes, and the increased usage of child care. Third, there are advances in health care technology. Such advances which have been designed as a means of working to combat disease can in fact contribute to it especially in relation to the development of infections that are drug resistant. Next, there are changes in the manner in which foodstuff is prepared. Processes such as mass production, water processing, and antibiotics in animal feed can all be contributing factors. Also,

climatological changes e.g. the results of deforestation can increase the number of emerging infections. Additionally, microbial evolution plays a role. This is especially true in terms of cross-zoonotic transmission. The final two factors include war and/or natural disasters which can cause a subsequent breakdown in public health, and the intentional release of infectious agents.[35] It is imperative to note that many factors which serve to contribute to emerging infections have been, or will be, discussed individually, and at additional length, in other sections of this work. That additional focus serves to highlight the manner in which infection does not occur in a vacuum, but is instead an issue which can, and does, serve to present itself across a variety of boundaries and without a single or static set of parameters governing the manner in which they occur and/or who they serve to affect.

As a whole emerging infections can be categorized as representing particularly challenging microbial threats to global health. This is due in part to the fact that they have such a large variety of causal links. However, it is also due in part to the fact that the mere existence of these infections serves to disprove the predictions of the past century that claimed infectious disease would soon be eliminated as a public health issue. While many of these diseases appear in developing countries which lack proper sanitation, it should not be misunderstood or misrepresented that industrialized countries are somehow immune to these types of infectious agents – they are not.[36] This should be apparent from the many contributing factors that allow emerging infections to develop, it can however be more clearly illustrated by looking at information that serves to suggest that despite the numerous ways in which emerging infections can develop that ultimately their existence, especially within in industrialized countries can be traced back to two overarching issues.

While inadequate sanitation is often the cause for the prevalence of new and re-emerging

infections in the developing world, in industrialized countries it can be presented that the catalyst for the spread of these particular types of infections is different. In some cases, remerging infections are a matter of a break down in infrastructure. In other cases, the most likely culprit is a matter of ignorance.

In terms of the former consideration can be given to outbreaks of cryptosporidiosis. As an infectious agent, it is a gastrointestinal protozoan which was first described in 1907 with the first cases being identified and reported in 1976.[37] Since its first identification in the late 1970s it has been deemed responsible for a number of large outbreaks of diarrheal illness in communities.[38] In many of these instances there has been a failure of infrastructure on some level. Exemplary of this consider that the largest known outbreak of cryptosporidiosis which occurred in the spring of 1993 in Milwaukee, Wisconsin and impacted an estimated 403,000 individuals was the result of a waterborne outbreak that is believed to have originated at water treatment plants in the area.[39] In the event that there had not been an issue at these locations, or had the infectious agent been discovered sooner, it is likely that the outbreak would not have occurred, or that if it had occurred that it would have served to affect a significantly lower number of individuals. In terms of the latter focus can be placed on a refusal of parents and caregivers to vaccinate their children. On a global scale vaccination in general has been proven as a powerful and economical means of controlling infectious disease.[40] However, as evidenced by outbreaks of infections such as measles there are some particularly dangerous infectious agents and to say that they are public health threats is oversimplification of the issue. It is the most transmissible disease presently known to humans, and exists as one of the top causes of death in children globally. Despite these facts however, immunization rates for measles in certain areas of the United States and Western Europe have either plateaued or decreased.[41] Expert opinion links this phenomenon to a now-

debunked claim which erroneously alleged that there was a correlation between the measles vaccine and autism. The result of this claim was ultimately that a generation of parents were in many cases adversely influenced by information which was not scientifically or medically sound, and which failed at being ethically responsible. Couple the false autism link with the fact that many contemporary parents do not have any first hand experience with measles. Due to the fact that they have not had to deal with measles personally, they can make the choice to be unaware of its infective properties, and its morbidity and mortality rates. This lack of experience decreases the sense of urgency to vaccinate that may have been present in parents in the prior centuries which further serves to decrease the amount of parents who are choosing to vaccinate their children.[42] In the broadest sense parents and caregivers who choose not to vaccinate their children are not making personal health decisions, instead because of the nature of infection and the manner in which it is spread they are effectively making public health decisions. Such choices can be dangerous, if not deadly, for both their own children, as well as any individuals who those children may come into contact with who are either not yet immunized, e.g. newborns, or are otherwise immunocompromised, e.g. other children and the elderly.

Similar to the threat of emerging infections is the threat of drug resistant infections. There is a rapidly increasing number of bacteria, Para viruses, viruses, and fungi that are becoming resilient to a growing range of antibiotics. This poses a clear public health problem. If a microbe is resistant to a large number of drugs treating the infection it causes can be difficult if not impossible. Additionally, resistant infections are transmitted via the same means as non-resistant infections.[43]

In seeking to address why drug resistant infections are on the rise evidence points to two key causes. The first is scientific while the second is social. Neither bodes well for the future of

epidemiology. In looking at the relationship between science and drug resistant infections what is being addressed is the reaction of microbes to antibiotic usage. In introducing antibiotics as a means to combat infectious agents one consequence is the mutation of microbes. The mutated microbes and selection pressure from antibiotic usage serves to provide a competitive advantage to the mutated strains of infection. While antibiotic doses that are suboptimal serve as a means of providing a stepwise selection for resistance, this is not a feasible long term solution as evidenced by the fact that resistant microbes are rapidly being disseminated worldwide.[44] In addressing the social factor of drug resistant infections what must be understood is how antibiotics are used. The usages of antibiotics is the main driver of the selection process that contributes to drug resistance, yet they are the most commonly purchased drugs because many end consumers do not have an understanding of the larger problem at hand. Many of these antibiotics are used unnecessarily, a fact which is not solely the fault of individual consumers seeking to unilaterally cure infections, but also the result of physicians who may be uncertain of how to diagnose the issue or in the course of trying to treat self-limiting bacterial or viral infections. While patients with resistant infections who live in in high-income, industrialized countries have the option in many cases of turning towards new-generation antibiotics, which are more expensive to acquire, patients with the same infections in developing countries have a higher burden relative to finding a cure and in some cases may be able to afford, or even obtain, second-line treatments.[45]

While second-line treatments may be presently available for drug resistant infections, it would be erroneous to believe that this solution will always be a viable one, even among those who can access or afford this type of care. This is due to both the sheer pervasiveness of microbes, the manner in which they exist, and the state of research and development. Human

beings are undoubtedly diverse creatures; however, we lack the adaptability of microbes which are capable of inhabiting every possible climate and environment on the planet no matter how inhospitable it may be to other forms of life. From the perspective of a microbe, human beings exist as nothing more than another environment which to inhabit which is exhibited by the fact that there are 5-10 times more microbes living on and in human beings than there are human cells in our bodies. Additionally, microbes have had over 3 billion years to learn adaptation and so while a bacteria is able to replicate itself within 20-30 minutes it takes human beings 20-30 years in comparisons. In light of this information, it may be assumed that the process of researching and developing new antibiotics is ongoing, that assumption would be incorrect though. Pharmaceutical companies have been abandoning the development of anti-infectives, and there has been no additional measures on the part of the United States government relative to stimulating the research and development of new diagnostics, vaccines, or antibiotics.[46] Without the advancement of research and development an already perilous problem is likely only going to become much worse.

Up until this point much of the focus relative to the difficulty in fighting infection as been closely related to the nature of infectious agents itself e.g. the manner in which the travel, develop, and survive/thrive. However, another core issue is the current state of the environment as a whole. Specifically, attention must be given to the role of global warming. The relationship between climate and infection is one which is well-established. Throughout history climate has affected both the timing and intensity of disease outbreaks. Global warming in particular contributes to higher rates for conditions like malaria and arboviruses. This is due to the fact that the insect vectors for these diseases are nurtured by warmer climates.[47]

While malaria and arboviruses are impacted by global warming, it should not be

misconstrued that these are the only infections which serve to benefit from this type of climate change. Global warming does not only play a role in the increase and spread of infections with insect vectors, but also those that are water borne, and those that involve wind blown pathogens. As evidence of this consider the rise in global warming in conjunction with air pollution and the increasing frequency of global respiratory diseases.[48]

It may not be possible to eradicate infectious diseases in the manner which it was once viewed as possible, however that does not mean that every effort should not be made in order to help mitigate their spread. While strides in curbing the spread of infectious agents continue face both scientific and social challenges, it is imperative that those challenges are addressed head on. It may not be possible, or even plausible to consider, the reversal of the rise in emerging or drug resistant infections, or global warming, however in working with the information that is presently available, it may be feasible to move forward in a manner that is more intelligent in nature.

2. The Individual Perception of Infectious Disease

Having presented clear information relative to the manners of both why and how infectious disease serves to pose a public health concern, it is possible to address the way in which infectious disease is perceived by the individual. Individual perception is important because of the fact that it is in many ways based off of public information. While public reaction is equally, if not more important, and as such will be discussed in depth at other points in this work, it would be remiss not to address the manner in which individuals generally view disease, as well as what serves to influence those perceptions.

In looking at the individual perceptions relative to infectious disease it must be

acknowledged that such perceptions center primarily around feelings. Perceptions are rooted in what is immediately and instinctively believed and subsequently internalized. These feelings should not be dismissed as they may serve as a means of providing insight into individual actions towards those who they know to be, or who they believe to be, infected.

The emotions surrounding infectious disease are powerful to say the least. The forces behind them should not be discounted simply because they may be emotional as opposed to logical in nature. In fact it is the potential lack of rational processing that should take the forefront when considering this particular aspect of infectious disease perception. When considering infections individual thoughts can be fuelled by factors such as fear, popular stereotypes about who is susceptible to the disease or why that susceptibility exists, and even animosity. Additionally, in some instances those who are infected are blamed for the spread of epidemics and viewed as perpetrators as opposed to people who need care and support. This particular opinion as led to various points in history where disfavoured populations such as religious or ethnic minorities, or commercial sex workers were targeted, something which serves to illustrate the manner in which perceptions about infection can be intertwined with pre-existing and/or inherent prejudices about minority communities.[49] However, it is clear that not all infectious diseases serve to warrant the same emotional response. Exemplary of this consider that it can be posited that the more familiar an individual is with a particular disease, the more likely they are to react rationally to news of infection, especially when they or a loved one are not personally affected.

Individual perception relative to infectious disease does not occur in a vacuum. It has to be understood that just as all diseases are not equal, and as such the perception of all infections are not equal, that the manner in which they are presented is not equal either. This is incredibly

important to understand since in the broadest sense this presentation is linked to perception because it serves to shape the ways in which infections are viewed. It can be suggested that this serves to create a cyclical pattern in which the emotional response to infectious disease and by extension those who are infected may be subtly, but certainly specifically, manipulated. Such manipulation should not be considered as being either inherently altruistic or inherently divisive as it serves to have a much more complex purpose within the framework of long term public health initiatives.

In addressing the manner in which prioritization occurs, one only has to consider how aware the average person is of certain diseases versus their awareness of others. This can in many ways be viewed as being intentional based on how diseases are positioned to, for, and within the public. For example, there are some infections which have become a matter of common knowledge, and others which are largely only known to epidemiologists, other relevant members of the medical community, and those who have been, or have a good chance of becoming, personally affected by them. Note that

AIDS, Ebola and avian flu are all representative of infectious diseases which receive a great deal of international attention, however they are certainly not the only known infectious agents. In fact, there are other diseases that are actually more deadly e.g. infantile diarrhea which receive far less attention and far less funding. This is not an oversight, it is instead prioritization at work. Consider that there has been significant research energy directed towards finding a vaccine to ward off HIV with 30+ potential drugs being developed, however there has been no new vaccine for tuberculosis since the early 1920s. This is despite the fact that it is actually easier to target TB bacillus than it is to target the human immunodeficiency virus. Additionally in many developing countries the method used to diagnose tuberculosis has remained unchanged since the late

1840s.[50]

In looking at HIV in particular it is transmitted via well-identified and potentially manageable routes. Specifically, it is not transmitted casually or by routes such as aerosolization or intermediate vectors. Instead transmission occurs as the result of limited routes of exchange of bodily fluids normally subject to agent control. This serves to make HIV significantly different from other infectious diseases, and moreover it serves to make HIV an attractive draw for public health interventions.[51] It has effectively, for lack of a more fitting comparison, been relegated to the role of "poster child" within the infectious disease community as the core international concern, a position which it had held for over a decade. While this focus has been important in that it has allowed for conversation and initiatives surrounding other infections, this has not stopped it from being viewed as problematic, even if only in part. HIV/AIDS-exclusive research relative to infectious disease has caused some observers to speak of an internationally funded "AIDS industry" in Africa and other parts of the developing world.[52] The comment of an "AIDS industry" may be sarcastic, but it would be too simplistic to view it as being completely devoid of merit. The ability for observers to coin the term did/does stem from a place of priority in terms of which infectious diseases receive coverage and funding, and the way in which those diseases are ultimately presented to, and have information packaged for, the international community as a whole.

The rationale behind the prioritization of diseases is not entirely medical in nature, it is instead a matter of politics. As a whole Western states have a tendency to focus on the threat that infectious diseases may pose to their citizens, and their economies. This is done in lieu of looking at placing the infectious diseases which affect the poor and vulnerable of the world as being of a higher priority. Ultimately, while there is some level of collaboration, the countries

which fund the research and development of new drugs do so with a clear focus on what will be most favourable for them as a whole. While some co-operative efforts have been made on a global scale, it is a comparatively small effort with inconsistent results. In these instances, profit is being placed above public health. As an example of this consider that while millions die from malaria, it is unlikely that a new malaria drug would match the first year sales of Viagra which was $1billion USD.[53] Based on this pills that combat things like erectile dysfunction are prioritized for funding over drugs that could literally save lives.

As long as the perception of infectious disease is influenced by emotion and prioritization as opposed to being rooted in medical fact, fighting the manner in which they are viewed, and subsequently the manner in which they are treated, will remain an uphill battle. Moreover, this battle is likely to become increasingly difficult to win as threats relative to infectious disease continue to rise. Noting this it is more important than ever to engage in the process of reconciliation relative to the role of infectious diseases as a clear public health concern and the ways in which public health and public trust need to work together.

B. Public Health Threats vs. Public Trust

The mere existence of a public health threat, and initiatives toward addressing it do not serve as a means of engendering the necessary public trust to ensure that such initiatives have a chance at success. In fact, the broader and more widespread the threat it, the more important it is that public health officials work to gain the trust of the particular population that they are attempting to work with. Failure in this regard can be more than dangerous, it can be deadly.

In exploring the tenuous relationship that exists between the outbreak and announcement of a public health threat, and the need for public trust it is necessary to address two related

factors. First, it is important to understand the complex reality of what a public threat is, and what it may mean for a particular community, population, or in some extensive cases for society as a whole. This is a complex matter that requires an understanding of both the science, e.g. the potential for infection, and social implications. Second, consideration must be given to the reasons why there is a lack of public trust in regard to public health measures. Such distrust should not be construed as being conspiratorial in nature, but in many instances is the result of past actions which have been directly sanctioned by someone from within the medical community. It is only after fully addressing each of these factors that it becomes clear as to why a public health threat in and of itself may not be substantial enough on its own to gain public trust, and cooperation.

1. Public Health Threats

As the name suggests a public health threat is a medical issue which if left unacknowledged or untreated can serve to have an adverse impact on a large group of people. Noting this it is necessary to both understand what a public health threat is in a general sense, and to explore it on a deeper level by looking at a specific incident and the known actions and reactions. In terms of the former, a working definition for a public health threat must be provided. In terms of the latter focus can be placed on the 2014 Ebola outbreak and the impacts and implications of the manner in which the infection was perceived by the public as well as how public health was potentially threatened.

In the simplest terms a public health threat can be defined as any intrinsic or extrinsic factor that will serve to have an adverse effect on the well being of a population. However, it is the simplicity of this definition which serves to make it insufficient. This definition is far too

broad to address a public health threat as it relates to what is being discussed within the context of this work i.e. infectious disease.

In looking at the definition of a public health threat specifically as it relates to infectious agents what is being presented is a threat to the population where the threat to the public stems directly from the horizontal transmission of infection.[54] In this context the threat is not necessarily the infection itself, but rather the fact that there is the possibility that the infection can be spread. In this vein, it is not even the means of infection that are particularly relevant, just as long as they exist in such a way that the possibility exists for a significant number of individuals to ultimately be infected. Noting this the vectors can be human or insect and/or the pathogens can be waterborne or airborne in nature.

Whenever there is a public health threat what must also be considered is the way in which that threat is communicated to the public. Questions must be answered relative to both when and how such information should be disseminated as well as what if any precautions need to be taken. In these cases the overarching goal is ultimately not to scare the public by telling them about the potential for infection, but instead to inform them of how infection can be avoided, as well as advise them of what steps need to be taken in the event that they have been infected.

Within industrialized countries public health threats relative to infectious diseases are arguably more limited than they are in developing countries. However limited does not mean that they do not exist at all. Exemplary of this consider the most recent Ebola outbreak in West Africa and the global ramifications.

The Ebola virus was initially identified in 1976 in what is currently the Democratic Republic of Congo and South Sudan. It is a zoonotic pathogen and transmission among humans in a rarity which serves to explain why outbreaks of the virus have been both unpredictable and

intermittent although there is an unconfirmed link between it and the fruit bat as a reservoir. Typical symptoms include fever, profound weakness, and diarrhea. Additionally, a maculopapular rash has been described, and there are laboratory abnormalities including elevated transaminases, marked lymphopenia, and thrombocytopenia. In less than half of those infected bleeding complications occur, and heavy bleeding is fairly rare. The typical incubation period for Ebola is 5-7 days and health officials view it as essential to have a comprehensive travel history provided in an expedient manner. Prior to the 2014 outbreak, Ebola had been viewed as being responsible for less than 1,600 deaths, and in many of these cases the outbreak began in a rural area and was controlled utilizing public health measures such as the identification of cases, contact tracing, and isolation and quarantine of patients in order to halt transmission. Past experience with Ebola has shown that it is possible to control it without a vaccine or cure.[55] However, there was no precedent for dealing with the scope and scale of the Ebola outbreak in 2014.

The 2014 Ebola outbreak was the most recent. Noting past success relative to containment and control from a public health perspective, it can be posited that it should have been possible to address the epidemic with limited loss. However, this outbreak was fundamentally different from previously known cases. Based on the significant differences between the 2014 outbreak, and the outbreaks which came before it, it spiralled into a public health crisis unlike anything which had been seen in relation to the virus before. First, the 2014 outbreak was the first time that the disease originated in West Africa. This is of particular importance because of the socio-economic context of this particular region. The West African countries of Liberia, Sierra Leone, and Guinea are among 20 countries with the lowest index for human development, with more than half the population living below the poverty line. This is

significant because for the first time the epidemic spawned in an area where the health care system was already overwhelmed and unable to cope with the diseases that were known to exist in the region such as malaria and sleeping sickness.[56] Second, it was the first outbreak to involve several entire countries and capital cities. Third, it has the distinction of being the largest and longest Ebola outbreak ever recorded. Based on these factors this particular epidemic served to profoundly alter the manner in which the Ebola virus is infection is viewed in a global sense by transforming a rare event in Africa to a major public health and humanitarian crisis.[57]

The larger public health and humanitarian issues central to the 2014 Ebola outbreak stemmed from the fact that this particular epidemic extended far beyond the borders of the African continent. The migration of the disease to other parts of the world created questions and concerns that there existed little to no precedent for dealing with. This can be seen as being especially true in relation to non-native medical workers who had been treating patients in Africa and returned home afterward. The proximity of these individuals to the infection was troublesome in the sense that there was the belief that they may be acting an unintentional vectors. One case which garnered national attention in the Unites States for fear of transmission was that of nurse Kaci Hicox.

In October 2014 nurse Kaci Hicox returned to the United States from where she had been treating Ebola patients in Sierra Leone. Upon her arrival at Newark Liberty International Airport in Newark, New Jersey she was subjected to a quarantine. The quarantine was implemented as a dual action of New Jersey Governor Chris Christie and New York Governor Andrew Cuomo. Hicox was not singled out in this regard, instead the quarantine was set up as a mandatory public health measure for all health care workers returning from West Africa who had contact with Ebola patients. While this measure exceeded the recommendations of the CDC, the Governors

were within their power to do so. After New Jersey rescinded its quarantine Hicox returned to her home in Maine. Once Hicox arrived in Maine she was subjected to another quarantine, one which had been court-ordered and sought by the state commissioner of health which state officials in Maine initially defended as a public health necessity, but was subsequently dismissed by the Maine District Court. Instead Hicox was allowed to move about freely, asked to submit to self-monitoring, and report any upcoming travel plans. After a twenty-one day monitoring period, the limited restrictions were lifted. Since it occurred in late 2014, the Hicox case has been cited as one which illustrates the effects of the inconsistencies that exist between the state and federal level in terms of public health and the manner in which they may adversely impact quarantine measures.[58]

Hicox herself pointed out these inconsistencies. In this regard, specific attention can be focused on both the lack of a general travel advisory and her description of how she was transported from New Jersey to her home in Maine. In terms of the former, Hicox correctly notes that there had been no recommendations made regarding of American health care workers returning home from treating Ebola relative to the possible restriction of international travel which would have effectively served to keep them from returning home, or traveling anywhere else internationally if they were deemed to be a threat. Additionally, none of the other passengers who had been traveling on the same flight as Hicox from Brussels to Newark had either been notified of a health risk, or monitored for signs of Ebola.

In regards to the latter, in recounting the journey it is revealed that she rode in a car with three emergency medical technicians for the seven hour duration of the trip. No one involved with her transportation wore protective clothing of any kind, and the quartet stopped several times to put fuel in the car and to use the bathroom. It is especially important to note that these stops did not

occur solely within the borders of New Jersey where Hicox had been detained, but instead took place in several different states, suggesting that what was occurring was political as opposed to truly being carried out in the interest of public health as there was no logic that could be realistically applied to how she was being treated.[59]

The treatment of Hicox is reflective of the way in which illness can be unfortunately be viewed by the public at large. Mass response to a public health threat, whether real or perceived, can stem from a place of fear or other stereotypes. As a result of this individuals who are known to be, or thought to be, carriers of infectious disease can be unfairly maligned. As a means of maintaining or gaining public trust in regards to the subject of public health the actions and reactions of those in power e.g. government officials may be more reflective of public fear than it is of medical concern or common sense.[60] As such it is a fair assessment that the indignities and inconsistencies which were the hallmarks of the Hicox case can be seen as being more reflective of the rule in dealing with potential infectious agents as opposed to being a problematic exception.

2. Public Distrust

It would be remiss to attempt a discourse of public health without attempting to provide insight into the state of public trust, or more accurately the lack thereof. This is due to the fact that the two concepts by their very nature have to be linked. In seeking to understand why this is it is necessary to present a definition for trust within the context of this work as well as address in depth both why it matters and what is causing it to decline. In addition, as a matter of further presenting the point examples can be provided relative to why there is a distrust of medicine and general and public health specifically within certain communities within the United States inclusive to where it stems from and why it persists.

Traditionally trust has been viewed as both central and essential to effective doctor-patient relationships. While the ways in which doctors and patients interact in a contemporary context may differ from historical actions, trust remains integral to health care encounters. This is due to the fact that trust encourages the usage of services, serves to facilitate the disclosure of important medical information, and has an indirect influence on health outcomes based on factors inclusive of patient satisfaction, adherence, and continuity of the provider.[61] All patients who place their trust in doctors or other health care providers are inherently vulnerable, susceptible to intent and actions which can be harmful or beneficial. Based on this, patients who are trusting have the expectation that those who they trust will act in their best interest, however trust does not exist as either a universal or singular concept.[62] Yet, without the existence of trust it becomes improbable, if not entirely impossible, for health care professionals to do their jobs, and subsequently for the public to receive the level of care that may be required for their individual situations.

Despite the integral nature of trust in all health measures, it should not be assumed that trust from the public is immediate. In fact, it is possible that the public will be distrusting, and moreover that such distrust may be rational. Distrust is considered rational in nature if the individual or group feeling and/or exhibiting the distrust is enabled with the appropriate capacities to judge that there are sufficient reasons that trust is not warranted, and moreover that they understand those reasons. Noting this it is imperative for health professionals and institutions to be understanding of the fact that significant historical and contemporary reasons exist to justify the rational distrust of ethnic minorities relative to health care in general and public health and biomedical research specifically.[63] This is especially true when looking at the manner in which African Americans view the healthcare community and its provisions.

As a whole African Americans tend to be distrustful of the medical community. This distrust means that they are less likely than their White American counterparts to freely ask their healthcare providers questions. It also means that they are more likely to believe that they will be exposed to unnecessary risks, prescribed experimental medications, not be provided with the best care possible, and receive care that is motivated by possible profit as opposed to overall wellness.[64] The distrust felt by African Americans towards the healthcare system is rooted in unethical medical practices which have occurred in the past. These practices include, but are not limited to slaves being utilized for medical experimentation and as teaching tools, whereby African Americans contributed to scientific progress without reaping the benefits of it, The Tuskeegee Experiment in which 400 African American men participated in a government sponsored study about the effects of untreated syphilis without their explicit knowledge and in lieu of providing adequate treatment, and the involuntary sterilization of African American women who were on public assistance. Knowledge of such actions has led to real fears about the possibility of future medical abuses.[65]

3. Why Public Trust is Crucial to Public Health

While the provision of public health differs dramatically from the provision of one-on-one care, the need for trust in the former situation is equally, if not exponentially more, important. When looking at public health, along with community-based participatory research, the presence of trust is integral. Trust serves to foster and sustain collaborations within communities, and it it critical for the success of these endeavours.66 Noting this it becomes critical to look at in brief the basic nature of public health in relation to public trust.

Both the responsibility for public health and the infrastructure required to make it work

are divided among numerous agencies across all levels of government. Additionally, there is the involvement of many nongovernmental organizations, professional associations, and businesses. Ultimately however states have responsibility for public health except where specified by Federal law.67 This responsibility can be seen as being illustrated in the fact that every state in the nation has a board of health whose job it is to protect and promote public health[68].

It is under the auspice of the 10th Amendment to the U.S. Constitution that primary responsibility for public health is relegated to state jurisdiction. However, there is a great deal of variation among the 50 states relative to how public health authority and responsibility is defined and delegated. Building upon this schism, all state health departments are not even overseen in the same ways. In 2005, 29 states had freestanding public health departments and 21 states had public health departments that existed as bureaus in larger umbrella departments. This is important because the manner in which various health related programs are organized impacts the effectiveness of the activities such programs are meant to coordinate. Additionally, while states have over time enacted health statutes in response to specific diseases and health threats, such policies are at best fragmented and out of date. For example, some state laws specify separate reactions for specific communicable diseases. These sections exist in lieu of more standardise approaches for addressing infectious disease in general. The end result is that there is no clear policy, or in fact any policy at all regarding how to address new infections which may present themselves.[69]

Such issues inherent to the ways in which the boards operate serve to render them largely impotent in terms of be trusted to provide efficient and effective care in the event of an outbreak which centers around an infectious agent that there is no pre-determined protocol for dealing with. Even without widespread public awareness of this inability, the role of the board is

essentially rendered futile by its own policies or lack thereof. Failure to be prepared for these instances can be construed as a larger failure of providing adequate and accurate public health, and the lack of such provisions will only result in decreased public trust.

C. Quarantine as a Public Health Concern

In understanding the relationship between public trust and public health, it is possible to look at manners in which the latter concept in manifested and the potential outcome of such manifestations. Specifically, public health authorities are armed with several means of segregating contagious induvial from those that they may infect. These overlapping powers of detention include isolation, quarantine, and civil commitment.[70] There are instances where quarantine is sometimes used interchangeably with isolation and civil commitment, there are however major differences. Specifically, the U.S. Center for Disease Control and Prevention distinguishes quarantine from isolation.[71] Within the context of this work the focal point will be on quarantine and how it exists as a public health concern. This is key as quarantine is the first line of defense in a situation where public health is believed to be threatened. As a means of presenting this point it is necessary to define quarantine in a broad sense and present the specific facets of the act that serve to make it as hindrance to public health measures as opposed to being helpful.

1. Defining Quarantine

In the simplest terms the act of quarantine involves the separation or restriction of movement of individuals who appear to be well who may have been exposed to an infectious disease to see if they become sick.[72] It is a preventative measure that is intended to work in two

key ways. First, it allows for an individual to be monitored and potentially receive immediate treatment if they are actually sick. Second, it serves to limit the likelihood that an infectious disease will be spread unwittingly via person to person contact. As a public health tool quarantine is important, especially when there is a significant threat which stems from a highly infectious and potentially deadly disease. However, the efficacy, legality, ethicality, and logistical challenges of quarantine implementation are all critical factors which have to be taken into account.[73] Based on the fact that these challenges existence, it should not be misconstrued as being either failsafe or fool proof.

In delving deeper into the definition of quarantine there are several different types of quarantine that can be considered, each with its own set of benefits, drawbacks, and efficacy. First, there is home quarantine. Also, known as self-quarantine or sheltering in place this type of quarantine is the simplest from a logistical standpoint. It is also viewed as being socially and politically acceptable. However, it is difficult to monitor or enforce, can place family members at risk, and while it is simple logistically that simplicity must be put into context in the sense that it still requires support for things like medical care and food. Second, there is work quarantine. This type of quarantine is generally put in place for healthcare workers and while they are permitted to work they are restricted to their homes when they are not working. This type of quarantine is closely monitored and it serves to keep essential employees at their jobs. It does however pose a risk in that there could be a transmission of infection to vulnerable people who are all congregated together. Additionally, its efficacy is unknown. Next, there is travelers' quarantine which works to address the risk of transmission from areas with suspected disease, and may include individuals being quarantined to the transport vehicle. This type of quarantine can be especially problematic based on the fact that it confines the unexposed without

confirmation of the suspected disease, cohorting may expose those who are susceptible to the disease, and travelers may suffer from economic damage because of the quarantine. Similar to work quarantines the efficacy of this measure is unknown. Finally, there is institutional quarantine which applies to institutions or geographic areas. The primary benefit of this type of quarantine is that it allows for cohorting which is easier than doing individual assessments. However, there is a greater risk infection to be spread in the event that one is present due to the fact that the confined area may be crowded. Like both work quarantines and traveler's quarantines, the efficacy of this measure is unknown.[74]

2. Quarantine as a Public Health Concern

The definition of quarantine presents a practice that seems innocuous and even inherently helpful. This is true even in light of the fact that it is not always possible to gauge how effective quarantine measures may be. However, in practice the process is one which serves to pose, as opposed to preventing, a public health concern. While this has been illustrated in part relative to the aforementioned case of nurse Kaci Hicox, the issue is in fact more pervasive, and by extension more problematic.

The question of why quarantine is a public health is rooted in the fact that quarantines do not guarantee that an infectious agent will not be spread. Instead, the act of quarantine serves to present the illusions of safety and control while in actuality being both dangerous and difficult to effectively manage. In focusing on the fiction of what quarantine is meant to be, and possibly could be with some alterations, instead of addressing the reality of the danger that contemporary quarantine measures pose, public health officials potentially exacerbate the impact of the spread of infectious disease instead of working in a way that would mitigate them.

As a means of further exploring the ineffectiveness of quarantines it is necessary to

address several key factors. First, quarantines are inherently paradoxical, reliant on the willingness of an individual or group to conform to the will of those in charge of public health. Second, the implementation of quarantines is a largely subjective act. Finally, quarantines are reliant on a threat being detected in a timely manner. Alone each of these issues would pose a clear danger, and combined they are a formidable threat against public health.

While a quarantine order meant to minimize public health concerns, it cannot be understated that they present a medical paradox. The power to implement a quarantine is one of the most coercive powers available, yet not all quarantines are compulsory in nature. Additionally, while they serve to address the area that an individual may currently be in, they fail at providing a tangible safeguard for areas where a person may have been prior. At their core, when implemented a quarantine is an act which deprives an individual of some very basic liberties e.g. the ability to move freely. In a democratic society, there is an underlying need for this power, and powers like it to be carefully justified. It may be for this reason that the majority of quarantines are not compulsory in nature,[75] and this is where the problem develops. For the majority of quarantine types, the efficacy exists as an unknown, and the fact that such orders may be voluntary as opposed to compulsory can be seen as increasing the risk for the spread of disease. As an example of this consider once again the aforementioned case of Kaci Hicox. While it must be stressed that Hicox was not infected with the Ebola virus when she chose to ignore the quarantine order imposed on her, that the same may not be true for all individuals who are given quarantine orders. Without all quarantines being compulsory in nature individuals under quarantine pose a public health risk if they do not follow the quarantine order specifically. What is also evident when considering the Hicox case, especially when looking at it within the context of what is known of public health powers as a whole is that the implementation of those

powers lacks the type of rationale that would serve to make quarantine effective in that there is a lack of both coordination and standardization. Consider that had Hicox truly been infected with Ebola that the manner in which hse was transported from New Jersey to her home that she could have served as the vector for an epidemic level event.

In addition to highlighting the paradoxical nature of quarantines, the Kaci Hicox case serves to highlight the ways in which quarantines are subjective. As aforementioned there was no one else from her flight detained and held in the manner in which she was. In understanding the quarantine options that are available e.g. the ability to implement a traveler's quarantine, it can be argued that it would have been within the best interest of public health and safety to quarantine everyone who had traveled with Hicox on the flight as there existed the possibility, no matter how slim, that like her they had come into contact with Ebola patients, and as such may have also posed a similar risk.

3. **Quarantines are time sensitive**

Finally, quarantine can only limit the spread of disease if it is implemented properly and in a timely manner. As a prime example focus can be placed on the case of Andrew Speaker, an individual who was infected with multi-drug resistant TB (MDR-TB) and yet still managed to engage in international travel because while health officials had told him not to embark on his planned trip abroad, he made the choice to do so anyway. Between April 30, 2009 and May 9, 2009 susceptibility testing had found that Speaker was infected with MDR-TB, a diagnosis that was discussed with him, his family, his private physician, and the Fulton County Health Department. These individuals knew that Speaker had international travel plans which were scheduled for May 14, 2009 and during this meeting he was told not to travel. However, on May

12, 2009 Speaker left the United States to go to Europe, it was not until May 18, 2009 that any notification had been made of his travel plans, and not until May 22, 2009 that it was learned that he had extensively drug-resistant TB (XDR-TB) and a nation-wide border alert was issued for him by U.S. Customs and Border Protection. While the CDC was able to find Speaker in Rome on the same day to inform him of his updated XDR-TB diagnosis, telling him not to travel commercially because of the infection risk he posed, Speaker lied to CDC officials about his plans to stay in the country until he could be returned to the United States safely and instead flew to Prague on the morning of May 24, 2009 and later that day flew into Montreal. On May 25, 2009, Speaker finally re-entered the United States via car, and despite the border alert that had been issued for him, the guard let him through without detaining him. It was not until Speaker was located via his cell phone in New York State that he was ordered to drive to Bellevue hospital in New York City for clinical evaluation and federally mandated isolation. When Speaker arrived at Bellevue, the CDC served him with a provisional federal quarantine order, the first since 1963.[76]

From a public health standpoint, the timeline of the Speaker case should be seen as appalling. Knowing that Speaker was infected with MDR-TB, he should have been immediately quarantined to see if he developed XDR-TB. Additionally, noting that he had prior plans to travel there should have been some level of CDC monitoring/safeguards to prevent him from leaving the country, however as illustrated by the way in which he was able to re-enter the United States there is no guarantee that even that would have been successful.

Due to the fact that a quarantine, federally mandated or otherwise was not immediately implemented, countless additional individuals may be exposed to MDR-TB or XDR-TB based on when they came into contact with Speaker. Such exposure was not because quarantine

measures where ignored or were not stringent enough, but simply because of a failure to communicate the order at all. This serves to showcase the time sensitive nature of quarantines because while one was ultimately implemented in the Speaker case it is possible that the measure was the very essence of something that was both too little and too late.

Conclusion

Public health is consistently threatened by infectious disease. Noting this it is more important than ever to consider public health in tandem with public trust and to understand the limitations of quarantine. This chapter has provided specific examples of public health concerns and noted the fact that quarantine has severe limitations both in terms of being erroneously implemented and in terms of action not being taken at the proper times. This discussion serves to pave the way for a more in depth look at public health policy and quarantine measures. Chapter two will focus specifically on the roles of public health, public health policy and quarantine in both a historical and contemporary context. Additionally, emphasis will be placed on practical implementations of quarantine around the world.

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Chapter Two- Public Health Policy and Quarantine

Chapter one served to address the broad issues associated with quarantine in a world which is globally connected in a way that it has never been before. Building upon that it becomes necessary to address the role that public health policy has played and continues to play. This is due to the fact that public policy measures are what serve to govern how and when quarantine is implemented. Noting this focus must be placed on three key factors: the role of public health and public health policy, public health policy and quarantine, and examples of quarantine implementation across the world. It is only in considering both the broad and specific implications of public health and the ways in which it relations to policy in general and quarantine specifically, that it is possible to logically consider the conversation relative to the ineffectiveness of quarantine.

A. The Role of Public Health and Public Health Policy

The role of public health and by extension public health policy is best understood by considering it in three different, but still interconnected, ways. First, focus must be placed on what public health is, or more accurately on how it can be defined. Such a definition is fundamental as it serves to provide a foundation on which further understanding of the subject can be built. Second, what must be understood is the way in which public health was framed in the past. This particular perspective is important because it is only in considering the way in which public health existed in a historical context that it becomes possible to truly understand the nuances of "why" public health measures exist at all, "what" forces serve to assist them in evolving, "how" they can have changed and continue to change, and "who" is most affected by them. Finally, what must be addressed are the current parameters of public health policy. It would be impossible within the scope of this work to discuss every facet of such policies and as

such focus is placed on the years 1999-2016 as a means of providing a time period that is both clear and manageable to present.

1. Defining Public Health

While seemingly simple in nature, the act of defining public health is not an easy task. This is due to the fact that there does not exist a single definition of the term. Instead, public health has been, and can be presented in numerous ways, and it is necessary to consider the various definitions as a means of finding one, or a combination of several, which can serve as the guiding force within this work.

Early attempts at defining public health offered numerous options. As expected such options were aligned with various beliefs about what disease was and what role should/could be played by the government in relation to it. For example, according to John Duffy in his work *The Sanitarians*, in the nineteenth century J.M. Toner asserted that it was the right of communities to use "organized medical police" under the law based on the fact that disease was extremely harmful to the individual and could also cause a substantial loss for the state. This view of public health served to perfectly align with the tone of the century which focused public health advocacy on the elimination of contagious disease. In comparison to this viewpoint focus can be placed on a definition which was provided nearly five decades later by C.-E. A. Winslow. Winslow presented that public health was defined as both an art and a science, and that as such its roles were to prevent disease, prolong life, and promote physical health. To this definition, he added the caveat that in order to ensure public health there would need to be social systems in place which guaranteed that every individual had a standard of living that would allow them to maintain their health.[1] Neither of these early definitions of public health should be viewed as being either wholly right or completely wrong, instead they must be considered within the

sociopolitical context of the times in which they were formulated.

Noting the fact that early definitions exist, it may understandably be asked why it is presently so difficult to provide a unified definition for public health. The answer to that is based primarily upon two premises. First, the term public is one which is so widely used that the assumption is made that it is clearly understood. Second, any definition of public health which has previously been presented has been altered along with the prevailing public perception of what constitutes disease or ill health[2]. Essentially, there exists both an expectation that the term is universally understood as well as a fluidity of the concepts that the term is rooted in. Coupled together this serves to create a paradox which is not readily demystified. Even in a contemporary sense defining public health is not easy because not everyone who works in the field agrees on a single definition[3]. Additionally, there are secondary considerations which also need to be accounted for in addressing both what public health is as well as what public health measures are capable of. Specifically, focus must be placed on whatever the prevailing medical concepts and constructs of a particular time period are, social attitudes, and economics.[4] In this vein it becomes necessary when seeking to shape a definition of public health to understand that there will likely not be a definition that is universally accepted or accessible, but that there may be one or more commonalities among the various definitions which can be used to construct a better understanding of the term.

One broad definition of public health supplied from “Defining Public Health: Historical and Contemporary Developments”, asserts that it is organized efforts meant to improve the health of communities as opposed to the health of individuals. Building upon this public health is not meant to rely on a specific body of knowledge, but is instead meant to rely on a combination of scientific and social approaches. Under the auspice of this definition the central goal of public

health measures is reflected in that it serves to focus on the reduction of disease within the community by looking at population-based strategies such as ensuring clean water and food and working to control the spread of epidemics.[5] The benefit of this broad definition is that it focuses the aim of public health around a goal that is easily applicable. However, this definition does serve to have some failings in that it may rely too heavily on subjective, and therefore malleable forces, which can be particularly problematic from a social standpoint when considering past medical measures such as negative eugenics both in the United States and in Europe, programs which at one point were deemed socially acceptable, despite their lack of morality.

Another broad way to define broad health is to look at the role which it is meant to play. In that vein, public health can be defined in terms of both health promotion, and disease prevention. The former of these concepts is self-explanatory at face value, however the latter must be explored further in order to be understood. When looking at what disease prevention is within the context of public health, all potential preventative initiatives can be placed into one of three categories. These categories include primary prevention, secondary prevention, and tertiary prevention. Primary prevention focuses on helping individuals avoid the onset of health problems which is accomplished via measures such as the implementation of smoking cessation programs, and the elimination of chemicals such as trans fats from food. Secondary prevention works to identify and treat individuals who have either risk factors or preclinical disease, work in this regard is seen via practices such as the creation and distribution of public service campaigns which center around awareness and prevention. Tertiary prevention is what is provided for individuals who are known to have diseases, care at this level is meant to prevent complications, minimize adverse impacts, and restore the maximum functionality possible such as the provision of CPR training or the availability of patient support groups.[6] While it may not be common to do

so, it is feasible to define public health based on these actions, or more accurately on how well those actions can be, or have been, implemented, and their success, or lack thereof, in terms of service to whatever population is being studied.

In contrast to broader, all-encompassing definitions which serve to present public health as a single entity or singular series of actions, it is possible to look at public health as something which by its very nature must mean multiple things. This should not be misconstrued as public health being defined in divergent, and therefore potentially conflicting ways, but instead by should be understood that the complexity of public health requires it to be simultaneously linked to various concepts. In taking this stance it can be presented that when considered in its entirety public health is at once the science and art of preventing disease, the body of knowledge that can be applied to health related problems, and the fulfillment of societal interest in assuring that conditions are present for a healthy population.[7]

When compared it would initially seem that the definition which asserts the innate multiplicity of public health would be correct. However, it is imperative to understand that both of these definitions are useful, and moreover that they are both in their own way correct. Public health is about the organized effort of society to promote, protect, and restore public health, and in order for it to be truly effective it has to adopt and adapt to an approach that allows for it to take a multidisciplinary approach, and to engage a number of organizations.[8] Therefore there are logically situations in which a broad definition will be applicable, just as there are likely situations that will call for a more nuanced approach to the matter.

In seeking to understand whether something can truly be defined as a public health measure, what can also be done is a brief review to see if it meets the criteria to fulfill one of the core functions of public health. In presenting this idea, it is first necessary to present both the

what the core functions of public health are and how they are defined as working. The core functions of public health include assessment, policy development, and assurance.[9] First, focus can be placed on assessment in the specific context of public health works to fulfill tasks such as monitoring health status to identify community health problems. [10] This is directly related to the fact that assessment as it relates to public health problems involves needing to understand how prevalent they are as well as how severe they are and what causes them. This is accomplished using an array of statistical tools including, but not limited to electronic health records, and shared databases. Improvements in this area allow for more rapid response time to outbreaks, better analysis of threats, and the ability to contain new infections.[11] Second, attention can be turned to the role of policy development within public health. Policy development encompasses several key areas in that it informs, educates and empowers people about health issues, it mobilizes community partnerships in order to identify and provide solutions for health problems, and it develops policies and plans which serve to support individual and community health efforts. The combined role of each of these individual facets is to act as both creator and advocate for the solutions which are necessary to achieve public health goals. In a formal capacity, this is made manifest in numerous ways, for example policy development is what is at work when standards and guidelines are set for things such as laboratory testing for infectious diseases. Finally, attention can be placed on the role of assurance within public health. Assurance works by enforcing the laws and regulations that protect public health and ensure safety, connects people to necessary personal health services and ensures that health care will be provided in situations where it would otherwise be unavailable, assures an overall health care workforce that is competent, and evaluates effectiveness, accessibility, and quality of personal and population-based health services. Assurance works in numerous ways and is present in

aspects of public health care such as sanitation and safety inspections of places such as restaurants and nursing homes, and in ensuring the proper implementation of necessary public health services e.g. supervised visits to the homes of new mothers in disadvantaged neighborhoods. Additionally, assurance is the public health function that is at work in instances of adequate crisis response in instances such as when there is an earthquake, hurricane, or other natural disaster which requires an intervention at a public health level. It should be noted that this is a speculative measure on the part of the author of this work, and does not necessarily align with any formal process of creating a definition for public health. However, it is rooted is sound thought and as such can and should be considered at least within the context of this work as being at least partially valid for exploratory purposes.

Regardless of the definition being utilized the question that must be asked and answered relative to the provision of public health is whether or not the actions being taken are those which fulfill the functions that such measures are meant to serve. In the event that the answer is yes, then it can be presumed that the actions, no matter how they are presented, are public health measures. In contrast, if the answer is no, then it must be assumed that no matter what the actions are called, that they are in fact not public health measures because of their failure to conform to the basic parameters of what such measures are meant to be and/or do.

2. Historical Context of Public Health

In addition to the numerous ways in which public health can be defined, there are also numerous prevailing images of public health. Similar to the way in which the definitions of public health are all useful and correct, the various images of public health can be presented as subjective and by extension all correct as well. As a means of best understanding this concept it can be helpful to look at the ways in which public health has evolved. Specifically, this will be

addressed from an administrative perspective.

In providing a historical context which addresses the numerous roles of public health as it has previously existed, it becomes possible to gain a better understanding of contemporary public health systems. As there are extensive volumes of work which address the history of public health in depth, within the context of this work focus will be placed on several periods during which key changes were made. Specifically, it is necessary to look at the contributions of the Greco-Roman world, and the setbacks faced during the Middle Ages. Additionally, insight will be provided relative to the development of the public health system within the United States and the role which that played as it was fine tuned.

Even without a clear definition of public health, public health measures have always existed to some degree. Throughout the course of human history wherever there have been communities there have been concerns relative to public health. While these concerns did not present themselves under the auspice of any official administration or system, they were present in other ways such as attempts at controlling the spread of communicable diseases, the understanding that there was a need for good quality food and water, and the development of sanitary environments. Study of both the ancient Egyptian and the pre-Christian era Cretan-Mycenan culture has revealed evidence of early public health measures including designated bathroom areas found in excavated homes of the former, and the remains of a sewer system found in connection with the latter. It is worth noting that while the cleanliness of ancient individuals was more closely correlated with their religious beliefs, namely the idea that cleanliness was next to Godliness, as opposed to a desire to be hygienic or even an understanding of hygiene, that there has always been an underlying concern with sick individuals and their symptoms. Initial concern centered around the idea that these individuals had somehow

displeased their God(s), however greater scientific understanding of, and by extension treatment for, disease can be traced back to 4th and 5th century B.C.[12] Noting that this period can be seen as existing as foundational for contemporary public health. It is the first time in recorded history that there is the emergence of a scientific approach to disease, and therefore to health.

Just as 4th and 5th century B.C. offer a starting place for the relationship between science and health, classical Greece is where public health began to be intentionally explored. From this time period there exist two key innovations. First, the literature of classical Greece seems to provide the first clear accounts of communicable disease.[13] Such records are important as they suggest an understanding that outside intervention may be necessary to address the issues surrounding such ailments, or at the very least they were an attempt to document what was occurring and possibly extrapolate a pattern of occurrences. Second, within early Greek cities there existed the first concrete examples of a comprehensive public health administration. While the services which were provided for the inhabitants of these cities varied in both scope and magnitude based on the size and wealth of the area, what is important is that they existed at all.[14]

The concept of a comprehensive public health system can be traced back to ancient Rome; however, this would not have been possible without the Greek model in place. When Rome conquered the Mediterranean world one of the aspects of Greek culture which was assimilated was related to medicine and ideas of health. These ideas were infused with Roman character for Roman purposes.[15]

As a whole the Romans were more concerned with public health than they were with private health[16]. This is made most clear by the fact that many of important advances made by Rome were not related to the treatment of disease, but were instead concentrated on the prevention of disease via sanitation and public health measures.[17] The Romans greatly appreciated hygiene as

evidenced by the remains of water-supply and sewage systems, as well as both public and private baths. Additionally, their overarching attention to public health and disease prevention manifested itself in numerous ways. For example, by 2nd century A.D. there was a public medical system in Rome. Public physicians were appointed to towns and institutions and their primary job was the provision of medical care for poor citizens. In a similar vein, Rome also had hospitals. While the Greeks had surgeries, which were in fact the offices of individual physicians as well as temples for those who sought the aid of their Gods over the assistance of doctors, there is evidence in Rome of infirmaries for slaves which were also utilized by free Romans. Additionally, excavations at Pompeii seem to indicate the existence of institutions akin to modern day convalescent homes while the work of Galen has passages which may imply the existence of private establishments that were ultimately developed into hospitals with the aid of public funding.[18] Such a measure may seem minor when framed in a contemporary context, but they were likely literal life savers in ancient Rome. Additionally, in ancient Rome there were other public health measures such as public toilets, aqueducts for water, underground sewers, paved main roads, and systems for disposing of water. These amenities were not universally adopted within the Roman Empire, but their existence was key as it proved that the practical application of such technologies was possible.[19] The prevailing legacy of Rome lies in the development and organization of public health services as implemented in the time of Augustus. Key developments under Augustinian reign include a water board which dealt with the water supply, supervision of the public baths, and the control of the food supply. Additionally, there is evidence from this period of the existence of a health commission for special purposes.[20] In looking at these advantages relative to public health it may be believed that from an administrative standpoint at least that there was a legitimate desire to ensure public safety in this

regard, and more importantly that clear actions were being taken to do so.

The time frame that comprises the Middle Ages can be looked at as the period between the years 500 and 1500. There are conflicting accounts regarding the role and influence of public health during this period with some discounting under the auspice of it being the Dark ages as it is commonly referred to. As may be imagined though the actual situation was more nuanced than that. It is however important to give voice to both positions as both serve to contribute to the overall narrative relative to public health.

In defense of the position that the Middle Ages failed to offer anything significant to the field of public health there is no denying that it was divergent from the eras which preceded it for two key reasons. First, many of the advancements of the Greco-Roman era were reversed during this time.[21] This was not a literal reversal but instead a figurative one reflective of the fact that previous advances in the field of health were ignored or forgotten for most of the period. Additionally, both public and private sanitation measures were virtually nonexistent. It is only thanks to a handful of universities that encouraged learning that any early knowledge regarding health and medicine were maintained during this time.[22] That viewpoint, while valid, serves to ignore that in the Middle Ages there was eventually a distinct focus on the implementation of public health measures.

In taking a broader view of the Middle Ages as opposed to focusing solely on the early part of the era, it is necessary to understand that if there were not some significant public health measures at some point during this period then it is possible that the diseases of the period may have done much more damage. During the Middle Ages disease was rampant, this includes the outbreak of two major epidemics. The first was the bubonic plague, also known as the Plague of Justinian in 543. The second was the Black Death in 1348. These epidemics served as a catalyst

for collective activities by communities in order to promote public health.[23] However, whether or not those actions can be viewed as public health measures in the way in which the concept would be understood today is debatable. What is not debatable though is that during the Middle Ages religious and social considerations were paramount in the development of hospitals. These hospitals had little in common with contemporary institutions of the same name, yet those in Muslim countries especially can be viewed as being well organized and respectful of medical advances. One example that can be referenced is a hospital founded in Cairo in 1283 that had special rooms for women and separate sections for patients with febrile diseases and the wounded, as well as those with eye diseases. Similarly, during the late Middle Ages, largely via the intercession of guilds, cities were active in the founding of both hospitals and other social welfare institutions. Wealthy citizens in these areas were instrumental in the creation of even more expansive hospitals and health services, and guilds developed funds to assist those who were ill.[24] In addition to hospitals and social welfare systems the Middle Ages can also be credited with the creation of important administrative measures in regards to public health. Specifically, it is during this period that quarantine was developed.[25] Noting the nature and scope of this work, that development is particular is one which will be addressed in depth later in this chapter.

Moving well beyond the Middle Ages and looking specifically at the concept of public health in the United States focus will be placed solely on advancements in the field as opposed to the provision of a more exhaustive history. Noting this focus will be placed on two separate centuries. Specifically, it is necessary to look at changes made within both the nineteenth and twentieth centuries.

In looking at the nineteenth century what it being reviewed is the formation, spread and

growth of the sanitary movement and its impact on the provision of public health care in the United States. The nascence of the sanitary movement in the United States was the work which had previously been done in Europe. While Great Britain saw an emergence of the movement in the eighteenth century, there were uniquely American factors which attributed to the delay in similar initiatives stateside including less industrialized cities and focus on other socio-cultural movements such as the abolition of slavery and women's rights. The health and diet issues in the United States which took precedent at the time were those which focused on personal as opposed to public health. Noting this the question can be asked as to what caused a shift in the American way of thinking. The simple answer is the overall quality of health of the American people. This is due to the fact that the rise of the American sanitary movement has been attributed, at least in part, to efforts which were made to account for the omnipresence of epidemics which repeatedly affected the population. In order to best understand this, it must be noted that while the American physicians of this period had adequate medical theories which served to provide them with rational explanations for individual bouts of illness that they had no way of accounting for either the appearance or the rapid spread of certain diseases or disorders. There were attempts made at discovering and proving correlations between disease and factors which seemed to be related. One particularly popular belief was that there was a link between epidemics and the weather. Eventually however physicians in America began to reconsider their views, specifically those who were observant notices that it was clear that not all diseases were being transmitted from person to person directly.[26] Keeping in line with this observation for the majority of the nineteenth century there were three schools of thought that prevailed relative to the transmission of disease: the miasmatic theory, the contagionist position, and limited or contingent contagionism. Miasmatic theory centered around the belief that epidemic outbreaks were the

caused by the condition of the atmosphere, as such by extension the belief was that epidemics were caused by pollutants in the air. Conversely, the contagionist position was one which presented that specific contagia, and not atmospheric conditions served to cause infections and epidemics. Finally, contingent contagionism sought to reconcile miasmatic theory with the contagionist position by presenting that while contagia where responsible for diseases that they could not act unless they were in concert with other elements. While the contagionist position would serve to gain traction during the late twentieth century as bacteriological discoveries were made, the miasmatic theory was the one which served to usher in the sanitary movement. It is important to understand that from a purely scientific standpoint that based on the available evidence at the time that the two viewpoints were evenly balanced from a scientific standpoint.[27] To a contemporary audience the idea of pollutants being the cause of an epidemic is almost laughable in nature because of the current understanding of the way in which infectious agents exist, replicate, and spread, at the time however it provided a reasonable explanation for a problem that the medical community was desperately trying to solve.

It would be remiss to assume that once sanitary measures became linked to epidemics that there was an instant change in the way in which the public acted relative to generating pollutants and waste.

The advances of the public health system within the United States during the twentieth century are more nuanced than those made in previous eras. As presented by the Centers for Disease Control (CDC) the twentieth century was a time during which the United States can be cited as having made ten major accomplishments in this field. First, there was the elimination of several infectious diseases thanks to the widespread usage of vaccines. Second, there was a decrease in death due to motor vehicle accidents. Third, safer workplaces led to a decline in fatal

workplace accidents. Fourth, further strides in the field of sanitation led to better control of infectious diseases. Fifth, there were fewer coronary and stroke deaths. Sixth, the food supply was safer and more healthy. Seventh, there was a dramatic decrease in infant and maternal mortality rates. Eighth, there was better family planning. Ninth, there was a significant decline in tooth loss and tooth decay due to the addition fluoride in the water. Finally, there was the prevention of millions of smoking deaths due to increased recognition of the hazards of smoking.[28] It would be remiss to present these as the only changes, however they are the ones which are seen within at least one sector of the medical community, namely the CDC, as having made the greatest impact.

3. Contemporary Parameters of Public Health and Public Health Policy

Having looked at public health from a historical perspective, the next logical step is to look at the contemporary parameters of public health and public health policy. The addition of policy to the discussion is crucial because much more is presently understood about both why and how public health changes are made in relation to more modern times. Specific consideration is being given to the period that spans from 1999 to 2016. One stark distinction between this section and the one which preceded it is that the focus is on the limitations of public health in the 21st century.

Continued progress is not guaranteed and there is a myriad of issues as well as constraints on traditional public health efforts that will need to be addressed during this current century. In addition to the unsolved health problems that remain in place from the last century, there is also concern relative to global environmental threats, the disruption of vital ecosystems, global population overload, social injustice and health inequality that is both persistent and widening,

and a lack of access to care that is effective[29]. While each of these factors comes from outside of the public health system their impact would wreak havoc inside of it. For example, while a localized disease outbreak can be deadly on a small scale, killing dozens of people, an epidemic that crosses from one country into another has the potential to be crippling or fatal for the individuals who contract it and catastrophic for several public health systems instead of just one. Moreover, with increased travel and immigration the probability of such a scenario increases as well.

In addition to the external threats what cannot be ignored are the internal issues which exist. These issues center primarily around the relationship of public health with/to the private sector and general issues with the provision of care. In terms of the former, there exists within the public health field a noted fear and suspicion of the private health sector; this results in missed opportunities especially in relation to securing additional employment and resources. In terms of the latter, the approach to providing care is often isolated and fragmented by nature largely because of outmoded and cumbersome administration processes. Additionally, there is a repeated inability to prioritize and focus efforts despite having available information which shows what the largest risks are creating a clear inconsistency between what presented public health goals and what is actually implemented by public health programs.[30] All of these issues contribute to decreasing the efficiency of public health initiatives and by extension decreasing their effectiveness.

Of note is the fact that public health concerns are being broached and considered as a global as opposed to a national matter. This is important and it serves to showcase the connectivity of health even if healthcare systems remain more nationalized and localized. Such connectivity is impossible to ignore in a world where all citizens are becoming global citizens

even if only by virtue of their interactions with people from other parts of the world.

B. Public Health Policy and Quarantine

Quarantine is inextricably linked to public health measures. As evidence of this fact consider that quarantine is one of the oldest known powers afforded to administrators of public health.[31] Additionally, as an intervention, quarantine as a policy is indicative of the extent to which a state wants to intervene into the lives of its citizens. It also serves to play a key role in the regulations that control the ways in which foreign people or foreign products are able to move across borders.[32] While knowledge of this provides a basic understanding of the ways in which public health policy and quarantine can work together, in seeking to best understand this relationship it is necessary to consider the ways in which quarantine has evolved. The clearest way to accomplish this is to consider it via both a historical and contemporary lens. In comparing and contrasting the subject in such a way what is revealed is whether or not the intended purpose of quarantine can be seen in its current incarnation.

1. Historical Overview of Quarantine

It is imperative to understand that the initial acts of quarantine were not solely about health. Due to the widespread impact that disease could have before the advent of modern medicine it can be argued that the issue at stake centered around broader communal well-being e.g. a need for trade to move freely through a particular area or region. Understanding this is imperative as it serves to put into context why quarantines first occurred, and the rationale behind the methodology. This framing is also helpful as a means of providing another layer of distinction between modern quarantines and their historical predecessors.

Quarantine measures have been implemented as far back in history as the Byzantine Empire, 549 A.D. and seventh-century China. In these early instances the practice was

rudimentary at best because without walled or patrolled boundaries they were difficult to enforce.[33] Without adequate enforcement measures in place these early attempts are often not even considered as a part of quarantine history, however they serve to showcase that it is not only necessary to have an idea but also to have the ability to effectively implement it.

As public health policy advanced so did the abilities of public health administrators. This is evident via the more stringent attempts at quarantine that started to emerge during the 14th century. As the plague spread from Eastern countries into European ones a key fear centered around what would become of commerce in the area as the presence, and potential spread of, disease, was a major hindrance to free movement.[34]

One of the first attempts at quarantine occurred in Venice in 1300s. While there does not exist a way to pinpoint the source of the pandemic plague of the 14th century, there exists a great likelihood that it originated in the hinterlands of Central Asia with wild rodents. From that point the disease spread westward and by 1346 it had reached the shores of the Black Sea and from there was able to spread into European ports, included but not limited to, those in Constantinople, Genoa, and Venice and by 1348 the plague reached Europe and spread inland. In an estimated timespan of three years plague had spread all over Europe, and would continue to spread with varying levels of severity until 1388.[35] In exploring the role of the plague in 14th century Europe what is also being explored is the evolution of quarantine and the necessity of its symbiotic relationship with public health and by extension with public health policy.

It must be understood that quarantine was not the first reaction to the spread of the plague. Faced with a disease that was both deadly and rapidly spreading initial reactions beyond panic included evacuation and exclusion. In looking at the act of evacuation there are three groups of people who need to be considered: those who had the means and opportunity to leave

and did so, those who based on circumstances were not able to flee, and those who made the choice to stay. While the first two groups engaged in acts that are self-explanatory, it needs to be understood that those in the third group were likely viewing disease as spiritual as opposed to medical, which in line with the socio-cultural context of the time presented the idea that sickness was an act of divine retribution. In looking at the act of exclusion, there were entire communities that refused to allow those who had come from areas where the plague was rampant to enter. Similarly, anyone who was believed to have the plague were reported to the authorities and isolated. This practice of isolating the ill was what had been done to combat leprosy and as such many of the provisions and protocols were the same with the hope that by engaging in precautionary acts such as placing every house with a plague victim under a ban, and following death airing and fumigating the rooms of plague patient and burning their personal effects that they would be able to ward off the plague.[36] While it is possible that some communities may have felt as if they were successful at least in the short term, the continual re-emergence of the plague over the course of several decades shows that the chose methodology was not as efficient or as effective as they hoped that it would be.

The concept of a contemporary, preventative quarantine is however strictly related to the plague, or rather to actions taken to combat its spread. Specifically, the idea can be linked to actions taken in 1377. It was during that year that the Rector of the seaport of Ragusa, which is now known as Dubrovnik in Croatia, officially issued a 'trentina'. Derived from the Italian word 'trenta' which translates to the number 30, the purpose of the 'trentina' was to isolate ships for a period of 30 days. Any ship seeking to enter the port that was arriving from an area that was known, or even suspected to be, infected, was made to remain anchored at sea for 30 days before being allowed to dock. More restrictive than these provisions were the ones which were imposed

for those who were traveling by land instead of sea. Likely due to the fact that 30 days was not considered a sufficient length of time to prevent the spread of disease, individuals who were traveling by land were kept isolated for a period of 40 days.

It is from this latter provision that the word quarantine is actually derived, stemming from the Italian word 'quaranta' which translates to 40. This isolation period was deemed necessary for both health and economic reasons and it was meant to both protect the inhabitants of the city and the trade network that had been established so that the city could continue to function, and based on this there were two central laws governing isolation. First, anyone who refused to follow the law was fined and then placed into compulsory isolation. Second, no one from the area was allowed into the area unless they had been assigned to care for those in isolation. The attention dedicated to the practice of keeping the city plague free has been credited as the creation of the first official usage of quarantine as a legal system with the direct goal of defending health and commerce[37]. The importance of these early quarantine measures is that they served to create public health policies that were immediately implemented and enforced. It can be presented that this was only possible because of what quarantine is, how it works, and how it can work from an administration or governing body.

The advent of more modernized, controlled quarantine methods in 14th century Venice were foundational for such measures and methods throughout Europe. Over the course of the following century similar laws were introduced into both the Italian port at Pisa and the French port as Marseilles. In addition to retaining much of the original intent the laws also expanded and adapted. By the 16th century the quarantine system bills of health were introduced, this was a measure that would allow a ship to pass freely into a new port without quarantine provided that the last port visited provided a certification that it was free from disease.[38] The acknowledgment

of such a seemingly minor development is important because it highlights that not all growth of the quarantine system was about limiting power, but that by aligning it with duties that may more typically be associated with broader public health goals that it would also serve to make a situation more convenient.

However, this should not be mistaken for the assumption that quarantine was always viewed as a viable option when faced with epidemic or pandemic levels of disease or even that when it was deemed necessary that there was universal agreement relative to its implementation. It would be remiss to present information relative to the historical nature of quarantine without also presenting at least one instance in which the idea was challenged, controversial, or required compromise. In that vein focus can be placed on the role of quarantine in the 19th century in both Europe and the United States.

While comprehensive quarantine methods and measures may have arisen in Europe it should not be assumed that the implementation of quarantine occurred without issue in the 19th century. The practice of quarantine during this time was reflected in part by what was understood about the transmission of disease at the time which resulted in quarantines that were much more rigid and severe than anything that would generally occur in the present. The origin, transmission, and control of communicable diseases existed as heated political and public health issues, tempered by large epidemics which spurred practical actions to be carried out. As an example of this in 1848 England, a cholera epidemic, or more accurately the propaganda surrounding it, has been credited with leading to the creation of the General Board of Health.[39] However the health care administration of the period was not equipped to be naturally responsive to every epidemic outbreak in Europe. Additionally, there was a lack of uniformity across international borders, and so while more universal standards for quarantine were proposed as

early as 1834 it was not until 1851 that a meeting between nations actually occurred. Attempting to collaborate at such a level was no easy task as quarantine policies were not solely a matter of health but were also linked to national trade protection issues which varied from country to country. Even as late as an 1885 meeting on the subject there was still difficulty making concessions as economic and political agendas hindered negotiations.[40] The inability to come to an immediate or even timely consensus regarding uniform quarantine standards acts as a means of highlighting how integrated the practice of quarantine is into overall public health policy. While the debates about potential standards were centered around political and economic differences it would be naive to assume that the individual public health policies of the countries did not play a role. This information is not expressly presented in the history however it can be eluded to by considering the contemporary differences that our common knowledge to anyone in the health care field who understands that while there are ethical guidelines which govern care that there is no single way in which they are either interpreted or implemented.

The issues surrounding the development of universal quarantine standards in Europe were mirrored by the struggles associated with state-level versus national-level quarantine control in America. Within the United States the subject of quarantine, especially as it could be related to diseases brought into the country from abroad, was an issue that was left for individual states to deal with as they saw fit. Additionally, infrequent attempts had been made in the past to actually impose quarantine requirements. What served to alter the matter of quarantine from a state to a federal issue was repeated outbreaks of yellow fever.[41] Similar to the way in which the fear of plague infection led to the development of modernized quarantine measures in 14th century Europe, yellow fever epidemics in the 19th century showcased the need for more centralized and refined quarantine measures within America. However, necessity does not always translate into

action and as such the development of these measures were not immediate or without argument.

The 1870s existed as a distinct period for health reform in the United States. During this period factors such as the emergence of the American Public Health Association and increased effectiveness within the American Medical Association were integral in paving the way for the changes that would ultimately come relative to the way in which quarantine was handled. In seeking to understand these changes it is necessary to explore the events of 1873 and 1878.[42] These two years are of particular significance because they showcase the ways in which national events inspired action.

In 1873, the United States experienced outbreaks of cholera and yellow fever. Beginning this same year several bills were introduced to Congress with the aims of establishing a national sanitary bureau and a national quarantine system. Despite separate introductions being made on the subject in both the House of Representatives and the Senate, little headway was made. The one national quarantine bill that did manage to get past the House was able to do so only after a clause granting the national board control over state and local quarantine officials was removed. While this was a political issue, it was not one that was contested along party lines, instead it was one that can be viewed as being divided along the Mason-Dixon line. Representatives from Southern states, generally proponents of the individual rights of states, were those that favored a national quarantine, whereas northern representatives were opposed to it. The rationale for this divide was rooted in where the diseases were doing the most damage, yellow fever remained a serious threat in the south, but was less of an issue in the north.[43] It can be presented that if the disease had been equally devastating to both the north and the south, or equally benign, that there would have been no debate surrounding if or how quarantine should be addressed at a national level.

In 1878, there was a major yellow fever epidemic in the southern city of Savannah. This outbreak led to nearly all of the delegates from the southeastern ports of the Atlantic to come together at a meeting in Jacksonville, Florida that spring. The presented consensus of the group was that they were no longer content with petitioning Congress for a national quarantine system. As an alternative, the group, along with a noted physician of the time worked on a bill to create the system. The bill was met with opposition and while some argued against it on the basis that quarantine was a police power which belonged to the states, others voiced the argument that a uniform quarantine law would fail at meeting any special local circumstances and conditions. However, the underlying rationale for opposing a universal set of laws was relative to the economic and political power associated with quarantines. While the bill ultimately passed through both the House and the Senate, it did so only with the addition of two amendments that stated that any quarantine regulations implemented by the federal government could not impair or conflict with the laws or regulations of individual states or municipalities, and that the federal government could not interfere with any state or local quarantine agencies.[44] Essentially, the passage of the bill was a Pyrrhic victory as it made the provision for a national quarantine system where the federal government could not exercise any unilateral power or supersede state protocol thus making it national in name only. Regardless of the limitations of the national quarantine bill it can be posited that these early measures set the precedent that would allow the development of organizations such as the Center for Disease Control and eventual increases in federal power in certain instances.

2. Contemporary Quarantine Policies

In looking at contemporary quarantine policies, what is specifically being considered are

measures that have been implemented in the 20th and 21st century. Limiting the definition of contemporary in such a manner allows for a view of what would be considered more standardized quarantine practices of the present day. This view is necessary as it illustrates what a quarantine situation is most likely to resemble in both the present and the immediate future.

As presented in the previous chapter in depth, quarantine can take various forms. Typically, it will include an individual being sequestered either in their home or in a designated quarantine facility. However, it can also be implemented in other ways including the implementation of a home curfew, the restriction of group assembly, the cancellation of public events, the closing of public places, or restrictions relative to travel in or out of a particular area. While these measures are varied, they all have the same end goal in that they are meant to isolate an individual who may be infected so that their contact with others is limited in case they are sick.[45]

It is important to note that because there is no singular form of quarantine that it can be implemented in numerous ways. The basic policy of isolating a potentially infected individual remains the same, but how that individual is identified, treated and sequestered may vary wildly based on who ultimately orders the quarantine. In this way, modern quarantine policies can be seen as being even more lax than historical ones.

C. Examples of Quarantine Implementation Across the World

In a world where there are increasing global connections it can be presented as a necessity to have at least a baseline understanding on how public health threats are dealt with across the globe. Noting that it is necessary to look at the ways in which contemporary quarantines have been undertaken in various parts of the world, it would be implausible, and

beyond the scope of this work to look at quarantine measures in every country as such the focus has been placed on several specific countries/regions all of which have implemented large scale quarantines in the 21st century.

The United States is notably absent from this list as large-scale quarantine measures have not been implemented in recent decades. While American officials frequently utilized quarantines in the 17th through early 20th century factors including modern medicine and sanitation methods have worked to curb the spread of epidemics in developed countries.[46] However, it should not be misconstrued that the United States is not at risk. It has been projected that despite prevention knowledge, vaccines, antiviral and antibacterial drugs that in the event of a pandemic outbreak on par with the 1918 flu pandemic that roughly 100 million people could die worldwide. Moreover, in the event that there was a pandemic virus that was akin to the alleged pathological potential of some previous H5N1 outbreaks the worldwide death toll to be even higher than 100 million people.[47] The United States would not be spared in either instance, and as such there exists a need for an in depth understanding of how preventative public health measures such as quarantine have been implemented in other countries and what lessons can be learned from them.

1. West Africa (Ebola)

In focusing on the Ebola epidemic in West Africa, careful consideration must be given to three key factors. First, what must be understood is the exact nature of the disease. Second, what has to be addressed is how the region sought to combat the epidemic. Finally, what can be viewed are the ways in which public health and quarantine interacted in this instance, and what lessons can be learned.

The Ebola virus has been a known contagion since 1976, and past outbreaks have been contained in both Uganda and the Democratic Republic of Congo. However, there are a great deal of people who are ignorant about the way in which the disease is contracted and spread, a reality which means that myths about the disease are allowed to flourish. While such ignorance is problematic with any disease, Ebola is not just any disease, it has a 90% fatality rate. Additionally, it has no known vaccine or treatment. As a result, the disease greatly alarms the global health community.[48] Noting these factors, it can be deduced that Ebola could potentially strain any health care system, especially in a situation where it was not immediately identified or properly contained.

In December 2013, there were reports of an unknown, contagious and lethal illness which began with a young boy in the Republic of Guinea. The area in which the disease emerged was of particular significance due to the fact that the exact town, is one which is well known for being a place where West African traders from several countries converge. When the disease initially appeared, medical officials were not immediately certain as to what it was, however quickly identified as the Ebola virus. That singular event served to shape the next several months, and made it impossible to ignore the state of healthcare in sub-Saharan Africa and beyond.[49]

During the Ebola crisis in West Africa the terms isolation and quarantine were often used as if they were synonymous of each other instead of being representative of two different public health measures. While quarantine did occur, isolation was the principle method being utilized to control the outbreak.[50] Within the context of this work however focus will be placed solely on quarantine measures as that is the focal point of this piece. During 2014 and 2015 as the Ebola epidemic continued in West Africa attempts at quarantine were largely failures. In addition to

public distrust of the measure there were also insufficient supplies. Coupled together, these factors led to many individuals breaking the quarantine. In this way, the Ebola quarantines in West Africa during this period can be likened to the earliest known quarantine measures which ultimately failed because of the inability to properly maintain the measures that had been put into place.

The correlation that can be made between the failed Ebola quarantines and the failed quarantines during the Byzantine empire is not the only similarity that can be presented. Just as there was little to no public health administration in place in the Byzantine era, within the sub-Saharan African region where Ebola was most prevalent the public health infrastructure is lacking. Countries in this region were ill-equipped to handle complex medical issues such as the rapid spread of epidemics because they lacked the resources to do so. At the time of the Ebola outbreak all three of the countries in this region were emerging from civil wars. This served to impact their readiness as the health care systems were dysfunctional, there was a lack of medical supplies, and there were not enough trained health care workers who were available. As a matter of putting this into a more focused perspective note that while this region of Africa bears almost a quarter of the global burden of disease that it has less than 5% of the available health workforce in the world. Based on this, even without the Ebola epidemic the region was constrained in terms of how effective its public health measures could be.[51]

In addition to needing to attempt to control Ebola with a fragmented and failing public health system, there were also cultural norms at work which can be viewed as having aided to the spread of infection. In stark contrast to Western understandings of disease there are still those in West Africa who view disease in a spiritual as opposed to scientific manner. It is common among many in this region to believe in witchcraft, religion, and ancestral spirits as the reason

behind why a person becomes sick. This belief was made evident in part by news stories that presented Ebola deaths being the result of factors such as sorcery or curses.[52] Without seeking to discount the right of individuals to express religious freedom, this type of thinking may have been directly correlated to why there were those in the region who chose to disobey quarantine rules. It is not beyond reason to think that if a person believes that a disease is caused by a supernatural force and therefore may only have specific targets that they will not comply with measures designed for public health the same way they would if they believed that the disease was caused by a contagion and as such could sicken anyone it came into contact with.

It can be presented that the Ebola epidemic in West Africa became an international issue because of the inability for it to be properly contained within sub-Saharan Africa. However, that does not account for the fact that the challenges of containing the disease with quarantine measures were evident in the international response as well.[53] As a clear example of this consideration can be given to the case of nurse Kaci Hicox which was explored in depth in chapter one of this work. Noting the alarming rate at which the disease spread, as well as the fact that it crossed national borders, it is clear that quarantine was not an effective public health measure in this instance. Additionally, it can be presented that quarantine was never a viable option in this situation and that it will never be able to be a viable option unless the underlying socio-medical, socio-cultural and political issues are addressed first.

2. China (H1N1)

In addressing the pandemic of H1N1 in China focus can be placed on the conflicting reports regarding how quarantine measures were carried out. This information is of particular importance because it serves to highlight a lack of uniformity in public health administration within the country even as it pertains to the implementation of the same public health measure.

By exploring this concept in particular what is revealed are the ways in which different populations can be effected by public health measures and the influence that such divergent treatment can ultimately have both during and after an epidemic.

Pandemic (H1N1) was initially identified in April 2009 in both the United States and Mexico and began to spread rapidly. By June of 2009 the World Health Organization (WHO) raised the pandemic level to 6, the highest level for pandemic alerts. The high rates of illness and death among the initial patients who were infected with H1N1 led to the decision of the Chinese government to attempt to limit the spread of the disease with both the tracing and quarantining of individuals who were known to have close contacts with those who were infected with H1N1. Specifically, in Beijing which is the capital of China there were strict containment and control measures that were put into place through October of 2009. In regards to these containment and control measures, border entry screenings, screenings in hospitals and health follow-ups of travelers from overseas. Quarantine measures in particular included the quarantine and testing of close contacts as a means of identifying the new introduction of cases and local transmission and the tracing and quarantining of all individuals who had been identified by public health workers during an epidemiologic investigation of all index-case patients provided those individuals resided in Beijing.[54] Based on the extensive nature of these measures it may be assumed that the H1N1 quarantines were largely successful, however research presents that while the Chinese government may have engaged in extensive actions that the implementation was not always either effective or well received by the public.

It must be noted that the Chinese government did engage in some important preliminary actions. The Chinese government has been credited with acting decisively and quickly as a means of mitigating the spread of H1N1 when the disease first emerged. For example, as early as

late April of 2009 there were national instructions for the population to safeguard themselves against contracting the flu and the Politburo Standing Committee met to discuss flu containment measures. Additionally, within that same time frame the State Council meeting decided on several measures to prevent H1N1 viruses including, but not limited to cooperation between Hong Kong, Macao, and the international community, a collaboration between the Ministries of Health and Agriculture and the General Administration of Quality Supervision to prevent the epidemic, and the stocking of anti-epidemic equipment including drug and medical resources.[55] These combined actions suggest quick thinking and planning on the part of public health officials who hoped to prevent the spread of an epidemic. However, this forethought did not necessarily translate as would likely be expected.

One way in which Chinese quarantine measures can be considered is in relation to the way in which travelers who were in China at the time of the epidemic were treated. There are conflicting accounts regarding the accommodations that these individuals were provided with. The Chinese media reported that those who were quarantined were placed in five-star hotels, however firsthand accounts of the situation tell a different story which states that travelers were instead placed in distant motels. Additionally, in regards to its treatments of foreigners in particular there have been accusations that the actions of the Chinese were xenophobic, rooted in fear, and not compliant with international norms relative to how individuals in quarantine should be treated. In response, the Chinese government stated that their actions and reactions in light of the outbreak were aligned with internationally accepted norms.[56] Regardless of whether an individual believes the travelers or the government officials the conflicting accounts serve to highlight one of the underlying issues with quarantine in that what may be acceptable and safe from a legal and medical standpoint may not seem that way to the person who is being

quarantined. Similarly, measures that are not acceptable medically may be those that quarantined individuals would prefer based on comfort levels or as a matter of retaining personal liberty. Additionally, it is unlikely that in an epidemic or pandemic situation that everyone who is being subjected to a quarantine will be apprised of the most recent laws which are meant to govern such measures; this is especially true in a setting that is not local or familiar for the person.

Addressing Chinese quarantine measures as they pertained to a group of native individuals focus can be placed on one northern Chinese university and the ways in which it implemented quarantine among its students. In this instance, there were 152 students who did not have the virus but who did have fever or influenza-like symptoms. Of these 152 individuals there were 20 who were exposed to someone who was known to have the virus during the quarantine period. 19 of these students shared a bedroom and a toilet with an individual who had the virus, and the remaining student shared a toilet but not a bedroom with someone who had the virus. The remaining 132 individuals who did not have the virus where not quarantined in quarters with someone who was infected. However, in all cases every room was disinfected by a member of the university staff once a day, staff supervised behavior between contacts, and it is noted that there was a high level of compliance relative to personal hygiene regulations that had been provided. In studying the quarantine it was found that among the 20 virus-negative students who were quarantined with students with confirmed cases of the virus that the attack rate of suspected cases increased significantly and as such while the results support quarantine as an effective measure against a secondary outbreak, they also support quarantining two individuals who are virus-negative in the same room.[57] Despite stringent attempts to stop the spread of H1N1, in the case of these university students Chinese public health officials engaged in a public health measure that could have increased the risk for infection for two key reasons. First, by solely

utilizing quarantine, instead of implementing isolation procedures as well, students who had already come into contact with a confirmed case of H1N1 were in some cases further exposed to the disease by being quarantined in rooms with those who were known to be infected. This incident served to completely ignore that quarantine and isolation are not synonymous and that those with H1N1 should have been isolated. Second, it can be presented that all of the students who were virus-negative should have been quarantined together and monitored even if that meant placing them in non-traditional quarters such as classrooms to decrease their risk for contracting the pandemic.

3. Canada (SARS)

In addressing the outbreak of Severe Acute Respiratory Syndrome (SARS) in Canada consideration is being given not to quarantine in particular, but instead to the public health system as a whole. This viewpoint is necessary because of the role that quarantine does, or rather can, play in relation to public health as a whole. Noting this it can be presented that the failures which existed in Canada were not solely or even specifically related to quarantine, but instead indicative of a larger issue.

SARS emerged in February of 2003, and was quickly identified as a disease which warranted international concern. While the disease was first documented in Vietnam it rapidly spread to other countries including Singapore, Taiwan, and Canada. Just one month after its initial emergence SARS was in 20 countries with over 3,000 documented cases and 100 deaths. As the months passed these numbers continued to multiply and by June of 2003 SARS was in 29 countries, there were reports of 8,500 cases, and over 800 reported deaths.[58]

When the SARS epidemic reached Canada, it served to highlight deficiencies within the Canadian public health system. Specifically, the outbreak made it clear that there were issues

relative to the infrastructure, policies, procedures, and legislation which are all meant to be in place in order to support urgent public health actions as they arise. In this instance there were entire jurisdictions which needed to improvise by creating impromptu structures because well-developed pandemic plans were not already in place. Additionally, this was not an issue that only served to plague rural areas or those with smaller populations, even the province of Ontario faced problems relative to its ability to efficiently and effectively respond to the outbreak.[59]

It must be noted however that following the outbreak Canadian officials worked to make legislative changes which should prove beneficial in the event that the country is faced with another epidemic. Specifically, amendments were made to the Quarantine Act and Quarantine Regulations with the addition of SARS to the Quarantine Act's schedule of infectious and contagious diseases with a quarantine period that is double the length of the ten days which are required by the World Health Organization as an extra measure of precaution and health literature related to SARS can now be disseminated on Canadian flights.[60] What is most telling about these amendments is that they specifically focus on SARS. It can be presented that is this exact type of disease specific thinking that was a large part of the problem during the 2003 epidemic. Despite the fact that the disease had been identified, and that it was known to be both contagious and deadly, there was no clear way for Canadian health officials to deal with it because it was not explicitly named in their Quarantine Act and/or Quarantine regulations. Action, or more aptly inaction, such as this only serves to further strengthen the link between quarantine and public health policy in the sense that the former has little to no effectiveness in instances where it is not bolstered by the latter.

Conclusion

It is imperative to understand the exact nature of public health as it is only via that

understanding that it is possible to make sense of public health policy and the role of quarantine. This chapter has provided an extensive look at the role of public health public health policy and also addressed both it and quarantine from both a historical and contemporary perspective. Additionally, in looking at the implementations of contemporary quarantines in several countries, it has laid the framework for the following chapter. Chapter three will focus specifically on how living in an increasingly globalized world increases the risk for the spread of epidemics and pandemics both accidentally and intentionally.

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Chapter Three- Globalization and Increased Risk of Epidemic/Pandemic Spread

Chapter two provided an in depth look at the relationship between public health policy and quarantine. It looked at the ways in which the quality of the latter is dependent upon the quality of the former, and considered the concept as illustrated via several global examples. This information served as foundational for the understanding that while health care decisions are made locally that they have global impacts. Noting this it is imperative to understand the role that globalization can play in terms of an increased risk for the spread of epidemic and pandemic disease, and what role, if any, quarantine can truly play in this regard.

A. Globalization as a Public Health Concern

In the twenty-first century, it is irresponsible to consider public health without also giving careful consideration to the unique way in which the world is currently connected. The global nature of travel, commerce, and medicine demands a solid contextualization of global health. This requires not only a working definition of what that presently means and what it may entail in the future, but also requires an understanding of both the relationship between globalization and infection as well as the impact of the international laws and regulations which are presently in place to control infectious disease.

1. Defining Global Health

Seeking to define global health presents the same quandary as attempting to define public health in that there is no singular or universally accepted definition of what it is or what it is meant to accomplish. Additionally, the definitions that do exist all serve as a means into offering some insight relative to what global health can be, if not necessarily being an accurate depiction of what it presently is. For the reason, consideration must be given to the numerous ways in which the idea and ideals of global health have been expressed with the end goal, at least within

the context of this work, of providing a working definition which further discourse can accurately be built up around.

The difficulty of defining global health stems from two sources. First, it is a relatively new concept medically as evidenced in part by the fact that it is only within the twenty-first century that there has been expansive research into the field.[1] Based on this there is a limited pool of resources from which to pull critical information about the way in which global health initiatives actually work versus the way that assumed to idealized versions of global health operate. Moreover, it can be argued that there is a lack of truly distinct or unique perspectives as there is a great deal of similarity in what has currently been produced and published. Second, there is the issue that some researchers assert that global health and public health are interchangeable concepts for three reasons. First, both consider health to be more than the absence of disease, but instead look at physical, mental, and social well being, Second, both consider individual approaches to health and population-level policies. Third, both address the core causes of poor health via scientific, social, cultural, and economic strategies.[2] On the surface such a definition seems rational, however it fails to address the nuances that serve to differentiate global health from public health. Exemplary of this is the consideration that while public health serves to focus on issues that impact the health of a population in a particular community or nation, that in contrast the focus of global health is one that transcends national borders. Similarly, while public health is geared towards developing and implementing programs and processes that generally do not necessitate global cooperation, global health solutions often require global cooperation for development and implementation.[3] These differences mean that global health cannot be adequately presented as being indistinguishable from public health without ignoring the discrepancies that exist in who public health is meant to cover and how

public health is meant to function verses those same function in global health.

Having addressed what global health is not, it is possible to present what global health is. It would be too simplistic to present it as a series of health measures with global impact because that does not serve to encompass either why global health is important or what its overarching goal is meant to be.

Global health and public health are essentially one in the same. Both global health and public health view the subject of health as being comprised of several key components including physical, mental and social well-being as opposed to looking at health solely as the absence of disease in an individual or population. However global health is in many ways still perceived and presented in a much narrower context. Specifically, there is the prevailing idea that global health is transactional in nature and as such refers to international aid, technology, and intervention being sent from wealthier countries into poorer ones. However true global health is not about the dependence of poorer nations on richer ones for the provision of healthcare, but rather a more critical interdependence which serves to look at contributions and commonalities as they pertain to all nations.[4] In understanding this it becomes easier to understand that global health is about equity. However, as we are learning such equity can represent both benefits and dire consequences because in the same way that healthcare has become global so has the spread of disease.

2. The Connection Between Globalization and Infection

There exists a clear correlation between global health, or more aptly a lack thereof, and infection. This connection centers around the fact that when people move what is also transported are elements of their larger, surrounding environment. While some of these elements are physical such as their genetic and biological make-up, some of these elements are linked to

the socioeconomic background and status of the traveler. It is these aspects of travel and mobility that serve to influence and impact the incidence, prevalence and spread of infection. Combined, the relationship between human mobility and disease-causing organisms creates a pattern of disease presence and epidemiology that is not only fluid, but is also evolving.[5] In this vein it should be understood as an inevitability that as human beings continue to migrate that what will also travel are potential health care risks.

By both its inherent nature and core definition the goal of global health is to assist individuals living in vastly divergent locations on all areas of the socioeconomic spectrum. Noting this any proposed, anticipated, or plausible solutions to global health problems have to consider the possible long-term ramifications rather than simply seeking to solve whatever immediate crisis may exist.[6] Such consideration and careful action exist as central to the provision of global health initiatives and efforts. In understanding this as foundational it is possible to delve deeper into the causal linkage which exists between globalization and infection.

By extension that same link that is present between global health and infection exists between globalization and infection. In order to best understand this link, it is necessary to first engage in two key exercises. First, there must be the provision of a working definition of the term 'globalization.' Second, what must be considered is the broad linkage between globalization and health.

In seeking to define globalization it can be presented as follows: essentially, globalization is a form of connectivity which has been defined as a change in the ways in which human interact across a variety of spheres including those that are economic, social, political, technological and environmental.[7] Additionally, it must be understood that globalization is neither inherently positive or inherently negative. Instead in looking at how globalization works

and what aspects of society it interacts with and impacts what has to be accepted is that while it can create possibilities that it can also increase risks.[8] Noting all of this what is revealed is twofold. First, globalization is an ongoing process. Moreover, it is a process which will plausibly continue as human beings find newer and more innovative ways to connect to each other. Second, there is no universal outcome relative to how globalization will ultimately affect varied aspects of societies or individuals. This information is imperative as it serves to underscore the nature of globalization which is both persistent and unpredictable.

Initially, globalization may not seem directly related to healthcare. However, what have been identified are several key ways in which globalization acts as a means of directly impacting public health. First, as global change occurs what occurs in tandem is a shaping of the parameters which are viewed as the general definitions of health. This is due to the fact that globalization serves to shape and influence both individual and societal factors across the world thereby impacting health on both of those levels as well. Second, while the impacts differ based on specific individuals and populations there has been evidence to support that health status and outcomes are being influenced by globalization. One salient argument is that along with the global restructuring of human societies what is also emerging are new patterns of health and diseases. In addition to reconfiguring existing health challenges, this also includes the spread of both new and emerging infections. Finally, globalization serves to play a significant role in terms of how health needs are and can be met. Specifically, globalization has an impact on healthcare financing as well as which health services are provided where and when.[9] Noting the myriad of ways in which globalization and healthcare are related, it is possible to take an even deeper look at the impact that globalization has relative to the potential spread of infection.

While globalization is not inherently bad for the healthcare sector, it is also not inherently

good and it may be posited that the consequences of globalization serve to greatly outweigh the benefits which do exist. In the broadest sense globalization provided, and continues to provide, increased access to preventative health options, information, diagnosis and care.[10] These provisions do serve to solve known problems, yet those solutions are not enough to adequately combat the adverse effects of globalization. For example, it has been argued that globalization acts as a means of reducing the ability of states to care for the health of their domestic populations, in turn this inability also serves to limit inter-governmental cooperation in the healthcare sector. Essentially, what this means is that globalization can be seen as weakening both local and international healthcare efforts, and in an increasingly globalized world public health is more dependent on these systems than it has been at any other point in history. Noting the interconnected nature of healthcare systems in both the United States and abroad this dependence is not just a minor hindrance but should instead be viewed as a major potential public health concern.

3. International Law and the Control of Infectious Disease

While global health advocates often focus on medicine and science as a means of mitigating health risks, what can also be utilized in an effective manner is the law. When there is a health threat that spans national borders no single state or country is equipped to ward it off, instead focus must be placed on solutions which are designed as a means of providing an international response.[11] Such laws are meant to be both preventative and proactive, however they are only viable if they are followed properly. In seeking to better understand focus must be placed on both the past and the present. In terms of the former it is necessary to address the origins of international laws which pertain to health. In terms of the latter it is important to look at current international health laws. As it would extend beyond the scope of this work to consider

every law of this kind, specific consideration will be given to both The International Health Regulations and the UNESCO Declaration on Bioethics and Human Rights. In looking at the language and application of these normative instruments it becomes possible to extrapolate their pros and cons relative to their effectiveness.

It would be remiss to believe that international health law is a product of the current century. Instead, the basis for contemporary international health laws can be traced back to the nineteenth century and the International Sanitary Conferences of the era. Initially convened in France in 1851 the inaugural International Sanitary Conference was attended by eleven European States. Between the time of this first convention and the end of the nineteenth century there were a total of ten of these conventions, eight of which were utilized as a means of focusing on the spread of cholera, plague and yellow fever across national borders. In looking at these conferences, what history shows is that while many of the sanitary measures that were negotiated were never actually ratified by the participating countries, and therefore never wholly enforceable, that they were still utilized as a means of creating a functional disease surveillance network which allowed for information sharing.[12] In this vein these Conferences can be seen as being foundational for the myriad of current internationally focused health measures which are in place currently and which continue to be developed. This is due to the fact that the International Sanitary Conferences showcased both the feasibility of cross-border disease surveillance and communication as well as the importance of such measures relative to the mitigation of communicable disease spread.

The origination of the International Health Regulations can be directly traced back to the International Sanitary Conferences which were held from 1851 until 1926. However, it was not until 1948 that the World Health Organization (WHO) developed the first set of International

Sanitary Regulations. Utilizing its broad powers these 1948 regulations were binding on all member states unless as specified in Articles 21, 22, panel 1, a member state took the necessary actions to affirmatively opt out. These initial regulations were amended several times by the World Health Assembly and the treaty was officially renamed the International Health Regulations in 1969.[13] The 1969 origin point served as a definitive name change but did not signal a final change in what the regulations where meant to encompass.

While the International Health Regulations were officially renamed in 1969, significant changes were still necessary. The need for these changes can be viewed as centering around the fact that the 1969 version of the regulations was only applicable to three diseases: cholera, plague and yellow fever. This meant that there was not a framework in place to address the cross-border spread of any other communicable diseases. As a result, these regulations were essentially useless when a Severe Acute Respiratory Syndrome (SARS) epidemic began in 2005, yet the WHO was still tasked with providing leadership and did so via the provision of its first global travel alert, its first emergency travel advisory and a series of travel recommendations until the epidemic was declared at an end.[14] It was in direct response to the SARS outbreak that there were significant transformational reforms which were deemed necessary. These reforms included the addition of an all-hazards strategy, early state reporting, the ability to utilize unofficial e.g. non-state data sources, and the building of health-system capacities to prevent, detect, and respond to potential public health emergencies of international concern (PHEIC).[15] The revisions, which were officially put into effect in June 2007 exist as a legally binding international agreement which provides a framework for coordinating the management of events that may be viewed as a public health emergency of international concern. This framework was designed as a means of improving the capability of countries relative to the detection,

assessment, notification, and response to public health threats. The core aspect of the revised regulations centers around the need for individual countries to strengthen their surveillance and response capacities in order to best facilitate the reporting of disease to WHO which will then allow for a coordinated global response effort utilizing the power of WHO.[16]

The importance of the 2005 revisions to the International Health Regulations cannot be understated. First, instead of being applicable only to named diseases, the application of this new framework hinges instead upon reporting of anything that is considered to be a public health emergency of international concern to the National Focal Point Office.[17] This allows for greater flexibility which may in turn serve to mitigate the number of individuals who are impacted, or who may be impacted, by the cross-border spread of a communicable disease. Additionally, these revisions allowed for the WHO to better coordinate with their requisite stakeholders while at the same time making recommendations that balanced both health and trade. Finally, these revisions proved helpful as PHEIC's were declared several times in 2009 in response to influenza (H1N1), twice in 2014, once in response to Ebola and once in response to Polio, and once in 2016 in response to the Zika virus and co-morbid neurological conditions.[18] Such numbers may seem low, however consideration has to be given to the countless individuals who may have been spared exposure to these diseases and/or saved from death because of the ability for the PHEIC's to be implemented in the first place.

The ideas behind this are sound, but they are also rooted in a false idealism that is not fully reflective of what it currently occurring in healthcare, or what it possibilities exist in healthcare in the near future. As aforementioned globalization is serving to strain healthcare resources both nationally and internationally. Such a strain serves to inevitably impact the effectiveness of both individual nations and their ability to quickly identify the spread of

infection as well as potential international cooperation. Exemplary of this consider the known gaps which exist between the PHEIC's norms and its real-world impacts as evidenced by the most recent Ebola epidemic. In addition to the specific deficits that can be associated with the PHEIC, there are also systemic deficiencies which threaten the whole of the International Health Regulations. These issues stem directly from both state non-compliance as well as the inability of the WHO to coordinate stakeholders and make decisive responses, both of which are integral for effectiveness. However, the WHO has at its disposal limited enforcement tools which in turn limit its ability to hold states accountable in instances of weak IHR core capacities or when they utilize/employ travel and trade restrictions that are counterproductive in nature.[19] What this serves to illustrate is that while WHO is clearly preparing for the inevitable spread of epidemics, that such efforts are being hampered by a framework in which preparation rests heavily on the decentralized efforts of individual nations and their ability, as opposed to simply their desire, to adequately create and maintain their own disease surveillance infrastructure. Until and unless this can be adequately addressed the International Health Regulations will be limited in terms of its ability to act both uniformly and comprehensively in varied and various international settings.

In the same year that the International Health Regulations were substantially revised the United Nations Educational, Scientific, and Cultural Organization (UNESCO) General Conference accepted the Universal Declaration on Bioethics and Human Rights[20] (hereafter referred to as the UNESCO declaration). While the document as a whole is meant to be beneficial to the international community, there are three articles in particular which are relevant to this work. The pertinent articles include Article 12, Article 14, and Article 22. It must be noted that none of these articles directly address the subject of the spread of infection or epidemic control, however this does not mean that they are not pertinent when considering those concepts

in relation to globalization based on what it is that they do serve to explicitly address and govern. In addition to these the three aforementioned Articles what must also be taken into account relative to the UNESCO declaration as a whole is its legitimacy or lack thereof and the impact which that serves to have on follow through of any kind.

Article 12 of the UNESCO declaration focuses on the respect for cultural diversity and pluralism with the caveat that in considering these dual concepts that they should not be invoked in order to infringe upon the constructs of human dignity, human rights and fundamental freedom, or upon the principles of the declaration itself, nor should they be utilized as a means of limiting the scope of the principles of the declaration. Essentially, what this article seeks to do is to provide a preemptive answer to the question of why respect for cultural diversity and pluralism is important. It does this by deeming such respect necessary the basis of a changing bioethical landscape where the progress of biomedical innovation and intervention serves to create new ethical dilemmas which must be both assessed and addressed. [21]

It is the language of this article that serves to make it problematic in that it requires a broad respect for cultural diversity and pluralism and does not serve to offer any provisions to the rule relative to the existence of a potential epidemic or pandemic threat. Specifically, it does not call for cultural norms to be suspended in favor of evidence based best medical practices when the former would serve to contribute to the spread of infection. Without dismissing the importance of cultural diversity as a cornerstone of patient-centered healthcare, it can be presented that epidemics and pandemics represent extreme circumstances and as such require divergent handling than what would be deemed appropriate or desirable in a one-on-one setting. While it is understandable that the authors of the UNESCO declaration were working to create a document to promote broad global health initiatives with an emphasis on ensuring equity in the

practice of bioethics, this particular oversight seems to place politically correct behavior over behavior which is medically sound. In this vein, the framing of the article seems more focused on ensuring that individual cultural beliefs are respected over broader human health and by extension human life itself. In a more insulated society such actions would literally not be able to have the same potential ramifications that are possible in the society in which we currently exist. In a globalized world all health decisions are possible global health decisions and as such laws with global reach need to be reflective of this reality.

Article 14 of the UNESCO declaration addresses the subject of social responsibility and health. Essentially, it serves to act as an outline for what individual nations need to be accountable for in terms of the provision of health. However, as aforementioned, global health serves as a means of straining these systems. To add to this statement, it must be noted that in addition to the strain there are also growing inequities drawn largely across class lines. This division is put into perspective when it is acknowledged that over one sixth of the global population, over a billion people, reside in abject poverty, conditions where they are not only without basic health and social services, but also where they cannot access even more fundamental necessities such as safe drinking water. Such information is not new, in fact it is over thirty years old.[22]

In light of this information, Article 14 can be viewed as presenting an ideal that cannot exist without addressing underlying issues that have less to do with healthcare and more to do with broader international infrastructures that UNESCO has no governance over and moreover cannot hope to ever actually control. Additionally, it cannot be ignored that similar to the definition of health, the definition of social responsibility is not universal in nature. While this is in and of itself problematic, the matter becomes more complex when inevitably it must be

identified exactly who is responsible for what. This process in one which has been shown to be easier conceived than carried out as there exist inherent tensions and challenges which face first a government and its people and then the global stage at large.[23] Once again this seems to exemplify an over-extension of idealism on the part of those who framed the UNESCO declaration in that it serves to willfully ignore the instability that can and does exist within individual nations relative to overseeing the health of their populations. This should not be misconstrued to mean that a provision of this type e.g. one relative to social responsibility and health at the national level as a means of better addressing it on an international level should be excluded from international health discussion. Instead what is being suggested is that in order for it to best serve as a tool for adequate infection control in a globalized world that it needs to use more specific language in conjunction with attainable benchmarks and goals based on various socioeconomic and sociopolitical scenarios.

In a similar vein to Article 14 of the UNESCO declaration is Article 22, the latter of which serves to outline the role of states. It notes the needs for appropriate actions to be taken to ensure that the declaration is carried out and encourages the establishment of ethics committees as outlined in Article 19. The need to promote of the Declaration as significant is not in question, instead the issue once again lies with a lack of definitive parameters, in that while this may serve to invite conversation it fails at being a traditional impetus.[24] It also fails at providing a more useful mandate for possible state action in that it once again actively ignores matters of infections and their spread and what entities should be viewed as responsible for that.

Having addressed the Articles of the UNESCO declaration which may prove most relevant relative to the spread of infection and epidemic and/or pandemic situations, it is possible to take a broader look at the organization behind the declaration. Such a step is prudent as doing

so can serve to offer greater insight relative to the manner in which both the declaration as a whole and the articles in particular may ultimately be viewed. Without seeking to disparage or discount the work of the WHO it would be remiss not to take a critical look, especially as such a viewpoint can prove to be constructive in serving to better contextualize current views toward attempts at international health regulation. In this regard, specific focus can be placed on the size and scope of the WHO which based on both their revolutionary classification and mission are in a position where they can expect only perfunctory support, and perhaps little else, from the masses who look at their policies and consider them to be problematic from one standpoint or another and by extension believe them to be misconceived, erroneous, biased, or objectionable for some other reason. Noting this, the question that must be asked is how the WHO can acquire the legitimate authority to act as the director of world policy.[25] It is not within the scope of this work to attempt to provide an answer to that question or to present answers which have been provided as they have not be actively implemented. Instead, it falls to this work to present that while internationally focused healthcare laws are well-intentioned that they do not exist as a clear solution to the problems posed in the medical community by increased globalization and its impact. Without the full cooperation, if not full support, of the entire international community, such efforts on the part of the WHO, while in no way wasted, can still be viewed as lacking the full viability that they are intended to have when developed.

Internationally developed and recognized healthcare laws could be effective tools for mitigating the spread of infectious agents. However, present laws are too limited in scope to address global health needs. Therefore, in noting the present need to lie on measures which may serve to fall short it serves as a wise course of action to be especially familiar with the way by which infectious agents are spread as well as the likelihood of such a risk in society the way in

which it is currently shaped and will plausibly continue to be set up.

B. The Accidental Spread of Contagions

Having addressed the nature of global health, its general role in the spread of infection and the existence of international laws which are meant to, but may fail to, mitigate the impact of illness, it is possible to begin to focus on the specifics of what may occur when a contagion is spread. In this vein consideration can be given first to the accidental spread of contagion. In a globalized world the accidental spread of contagions poses a grave risk to public health. In addition to infected individuals who may not be aware that they are carrying diseases, and as such are inadvertently exposing others to illness, there are four key factors which may play a large role in the accidental spread of contagions. These factors include migration, trade and commerce, food processing and handling and zoonosis. In each of these instances the potential for the spread of infection is proximate to the amount of potential contact with intention being an irrelevant factor.

1. Migration

Migration is what occurs when people go from one country or region and stay for an extended period of time.[26] Migration clearly does not exist as a new concept, in fact it would be implausible to consider writing out a comprehensive history of the world without the inclusion of human migratory patterns. Over two thousand years ago land-based migrations worked to change the culture of two major subcontinents as people speaking Indo-European languages migrated from Central Asia into both Iran and Northern India while people who spoke the Bantu language migrated from modern day Nigeria and Cameroon into many of the regions that comprise Central, eastern, and southern Africa. Similarly in the era that is generally referred to as “early

modern times" and spans the three centuries following the 1492 voyage of Christopher Columbus, an estimated total of ten million people migrated to the Americas. Two million of these people were settlers who were migrating from Europe while eight million of these people were Africans who were brought to the Americas largely as a means of providing bodies for the slave trade. Within the nineteenth and early twentieth centuries as transportation improved, as well as for economic reasons eighty million migrants moved across East and South Asia leading to the re-population of regions from the Indian Ocean to Manchuria and Central Asian, fifty million European moved from their home continent to both the Americas and beyond, and four million Africans also engaged in long distance migration. Recent estimates present that about 2% of the total world population currently resides in a country other than the one they were born in. This equates to over 200 million people which is the same size as many large nations. This information is significant from a public health standpoint because as human beings migrate from one region to another they bring with them divergent skills, beliefs and cultural norms. However, they may also bring with them something much more insidious: infectious disease. This is due to the fact that human beings exist as some of the most common vectors of epidemic disease. By extension as humans travel what also travels are any infections that we may be harboring as well. As a result of factors including international travel, social upheaval, and even globalization in general, we are now all potential residents of the so-called hot-zone, an area which poses extreme danger because of the high risk of infection.[27] In order to explore the role of migration in terms of the spread of accidental contagions in depth it is necessary to consider it from two distinct angles. First, consideration can be given to the general correlation between migration and infection. Second, focus can be placed on the manner in which specific infections are spread via migration. Within the context of this work specific focus will be placed on migration and the

spread of both Chagas disease and HIV/AIDS.

The correlation that exists between the introduction of disease and migration is one that has been recognized for centuries. Both border health and quarantine were developed as a means of controlling the import of infection, and such measures can be dated back to seventh-century China. However, it is important to understand that the correlation is getting worse and not better. The reason for this is complex and goes well beyond the sheer number of current migrants. First, there exists the fact that migrants are currently settling not only in populous areas but also in parts of the world where there were no previous human inhabitants. Second, there is a rising rate of deadly infectious diseases around the world. Third, there have been rising numbers of illegal and undocumented immigrants, particularly within the United States, and regardless of any personal feelings which may exist central to the welcoming of newcomers what cannot be denied is that this particular subset of immigrants may be unlikely to seek medical care based on the fear of legal repercussions as well as financial constraints. In addition to these current shifts relative to migratory patterns, possible threats, and migrant populations the infections that we are faced with in the twenty-first century are also something which must be considered carefully as well. On one hand, we are faced with diseases such as SARS and Ebola which are capable of widespread damage in a relatively short amount of time. On the other hand, we are also faced with diseases such as tuberculosis which still kills millions of people each year even if it is not widely covered in the news. What is also not the topic of widespread news are the specific infections which can be directly correlated with disease. As a means of exploring a sampling of those diseases within the context of this work what will be presented is the spread of Chagas.

Chagas disease is caused by the infection with Trypanosoma cruzi, and is regularly found in Latin America where it affects over 13 million people and puts millions more at the risk

for infection. Despite the fact that many of those who are chronically infected remain asymptomatic despite infection, approximately 30% of those with Chagas will develop cardiomyopathy which can potentially lead to death. Increased population migration has caused the disease to spread beyond Latin America and presently it is considered a worldwide health issue. This is due to the fact that while public health programs located in Latin American countries have served as an effective means of mitigating the disease within this region that in recent decades there has been an increase of infections in both the United States and non-endemic countries in Europe and the Western Pacific Region. This exists as particularly problematic as there is neither a vaccine for a cure that is highly effective to combat the disease. While this information is inherently troublesome, what is even more problematic is the manner in which Chagas is spread. Within human beings the spread of the disease exists as a something which occurs solely as the result of accidental infection. While Chagas disease is transmitted via oral infection and infection of the blood it is necessary to also consider the role that globalization as it relates to migration also has in terms of the prevalence of this contagion.

First, consideration can be given to the way in which Chagas is spread orally. The oral transmission of the contagion that causes Chagas disease usually occurs when an individual ingests either fresh sugar cane or acai berry juice that has been made from plants which are home to infected triatomime bugs. It is via this manner that over 1000 new cases of Chagas disease has emerged in Latin America since the year 2000. Moreover, this method of transmission is considered to be an emerging threat due to the fact that outbreaks are sporadic, not easy to predict and have not shown any signs of declining in either their frequency or severity. For those who live outside of the region this method of transmission poses a primary threat to those who travel to areas where the consumption of contaminated food or drink is a likelihood. It can be

presented that it is precisely because of the difficulty of gauging when or where an individual may consume food or drink that has been contaminated by this contagion that it is especially problematic for both those who live in as well as those who visit the region. Additionally, it would serve as an overreaction, as well as a strain on the local economy to eliminate both fresh sugar cane an acai berry juice in an attempt to stop this particular method of transmission especially because it is not the sole method of transmission.

What occurs more often than the oral transmission of Chagas disease is the vectorial transmission by a triatomine which is also referred to as a "kissing bug". These bugs are nocturnal feeders who are known to live in a myriad of environments that may be present in human homes. For example, they may live in cracks and holes in the walls, ceilings and floors of substandard housing structures. In an instance when an individual is infected in this manner what occurs is that an infected bug bites an individual and then they may excrete feces that is contaminated with the contagion onto their host. When this occurs, there are two ways in which the contagion can enter the blood stream. Specifically, it is possible for the contagion to enter directly via the bite wound or it may be introduced into the body via other nearby mucosol surface after a victim has unknowingly rubbed the contagion across their skin. [28] Noting these specific conditions what is underscored is the truly accidental nature in which Chagas disease is spread because clearly not every bug of this type e.g. a nocturnal feeder, is infected with disease, and it is possible even for standard and/or nice homes to have cracks that may allow these and other bugs in. It must also be noted that being bitten by an infected bug is not the only way in which the Chagas micro-organism may enter, or has previously been known to enter into the blood stream. Additionally, infection may occur via the transfusion of infected blood, organ donation from an infected donor, or even via accidental exposure such as an accident in a

laboratory.[29]

Having addressed the manner in which individuals become infected with Chagas it becomes necessary to address the role that globalization, and by extension migration, can and do play in the spread of the contagion. As an example of this consider that in Brazil the impact of globalization has had both positive and negative effects on the spread of Chagas disease. In terms of the former, globalization has allowed for increased medical attention for Chagas patients in areas endemic to the disease. However, in terms of the latter it must also be noted that all of the changes spurred by globalization e.g. the expansion in some areas of the agricultural sector have actually served to contribute to the spread of Chagas via the migration of infected individuals and even some of the other vectors.[30] It is important to note that this is not an isolated incident. Similarly, in Arequipa, Peru it was found that the prevalence of Chagas disease can vary widely between long established communities and communities that have been founded by migrants in search of better opportunities. Specifically, in well- established communities there exists almost no Chagas infection among children, whereas in newer communities there are high infection rates among children which serve to be reflective of a recent infection. This serves as a means of illustrating in part the role that migration in this area acts as a contributor to the conditions which promote infection. In this particular case, it was found that while many migrants come from villages where infection rates are low and therefore are unlikely to have acted as vectors themselves or brought vectors with them that in making short-term or temporary moves in order to work to areas other than where they had settled that they may have become infected themselves or carried vectors back with their belongings. This type of circular migration which includes either one time or continued movement between an area where individuals have settled to live and an area where they need to travel for work can be seen as being especially

problematic in terms of infection. This is due to the fact, that as in the case of Chagas vectors, it serves to introduce a contagion into an area where it may not presently and/or naturally exist serving to create greater risk factors for those who live in the community regardless of whether or not they are directly engaged in circular migration themselves.

While the spread of Chagas disease serves as only a single example of the manner in which a specific contagion can be spread via migration, it exists as a particularly important one to understand especially within the broader scope of this overall work. This is true for two key reasons. First, it can be viewed as being representative of both the best and worst aspects of globalization in that while instances of infection have been lowered in some regions that other in other regions the disease continues to spread and even flourish because of inadequate understanding and/or medical intervention. Second, it serves to showcase the severely limited benefit of quarantine measures as they may be related to the spread of accidental contagions as a whole, particularly those which can be directly related to migratory actions.

2. Trade and commerce

International trade and commerce can be viewed as an integral function of globalized society. However, the very imports, exports and outsourcing which may serve as economic boons can also be healthcare deficits. As a means of best understanding this it is necessary to explore the causal relationship between this action and the accidental spread of contagion in two distinct contexts, that of the fourteenth century in Eurasia and in the present with respect to the entirety of the world. These two divergent viewpoints are key as they allow for both the historical and contemporary context of the relationship between trade, commerce, and contagions to be explored.

Prior to the fourteenth century the majority of Eurasia was without epidemic barring two

plagues, however it is the potential origin of a third plague, namely the Black Death, which serves to call into question whether or not transcontinental expansion and the subsequent trade that came along with it served to aid in the spread of infectious diseases. The answer to this question cannot be presented as a definitive "yes" or "no", instead there are clues which serve to suggest that trade may have served to play a role. This role is evident in terms of both the speculations and events of the time period. In terms of the former it has been reported that once the Black Death began to spread that there were individuals who refused to buy goods from certain areas out of fear that such a purchase would lead to contracting the illness. In terms of the latter it cannot be refuted that within two years of the initial European outbreaks merchant vessels had proven themselves to be carriers of the plague spreading it along the Atlantic coast and into both the Baltic sea and North Sea. While it is less easy to determine whether or not trade played a role in spreading the plague to other parts of the world, it is plausible that it may have.[31] Even without incontrovertible proof, the existence of even a tenuous connection between trade and commerce and the spread of infectious agents should serve to give individuals pause as it presents the idea that economic interaction, something which exists as a necessity for a society to survive and thrive, can literally be killing us. A counterargument may be made that Eurasia in the fourteenth century is far different from many of the societies in the twenty-first relative to our understanding of the ways in which diseases are spread and the conditions under which they need to flourish. However, such societies are alike in one potentially deadly way in that trade and commerce can still serve as potential causal links to the spread of infectious agents.

Proponents of globalization will often point to the diversity of the present marketplace as a point of pride, however as it has been extensively mentioned within this chapter globalization also serves to present health risks. Concern about these risks can manifest itself in relation to

trade and commerce in two key ways. First, there is a fear about the goods themselves and whether or not they are safe or if they pose a risk to individual or societal health and welfare. Second, there is the rate at which disease is able to spread based on the accelerated movement of both individuals and commodities. In this vein, it cannot be ignored that global cities have been linked by numerous chains of infections including but not limited to multi-drug resistant tuberculosis and SARS. These exist as legitimate concerns but they are not the most pressing. Instead focus must be placed on the relationship between global trade and sanitation. Of specific concern is the role that more powerful countries play in convincing weaker ones in some instances to lower sanitary barriers to trade, such acts have aided in the introduction of greater and greater health hazards. For example, the emergence of Bovine Spongiform Encephalopathy (BSE) in the late 1980s and early 1990s was a direct result of reduced sanitary measures. Specifically, in this case it was relative to what it was and was not safe to feed cattle that were raised for slaughter and human consumption.[32]

The question of why this matters may be posed. After all in considering the sheer volume of trade completed globally relative to how much of that trade can be directly linked to the spread of infection, it can be assumed that while the causal relationship does exist that it is fairly low. However, a low number of instances is not the same as a null threat and where commerce is concerned this risk is not solely medical but also economical in nature. As a means of illustrating this consider first that both travel restrictions as well as formal quarantine measures can serve as a means of severely and adversely impacting commerce both into and out of any area that has been identified as being affected. As a result of this, it was shown with the SARS epidemic that countries that were concerned with the commercial impact of travel warnings demonstrated a reluctance in accurate reporting relative to the progress of the disease.[33]

In this instance the health of the economy was clearly prioritized over the health of the individuals who may be impacted. In continuing to look at SARS, the first pandemic event of the twenty-first century, it can be noted that around $50-$100 billion US was lost. This total amount reflects both the cost of suppressing the disease as well as the business that was lost by both travel restrictions and capital flight. For as undeniably high as this amount is, it is a fraction of the cost that could be associated with a pandemic which was extremely harmful. As an example of this the World Bank estimated that in the event of an avian influenza pandemic that the losses could total $3 trillion US, and this number would only increase if the pandemic was at the scope and scale of the 1918-19 influenza outbreak. Essentially, what this serves to showcase is that a pandemic event could have catastrophic repercussions on the global economy, and the potential impact that disease may have in this regard has not gone either unnoticed or unaddressed. However, it is how countries are making the choice to address this possibility that can be seen in part as being problematic. Specifically, what has been shown to occur in instances of epidemic outbreak is that the country or origin takes drastic measures is a desperate attempt at disease eradication while their neighbors and trading partners do the same which oftentimes results in sanitary precautions that are seen as being unjustified in nature [34] While quarantine is not named specifically in this regard, its overall impact should not be understated. It has been well-documented that in general infectious disease control powers are known to be some of the most coercive measures that a society can take, and that both isolation and quarantine can be used as a means of denying individuals their civil liberties.[35] What this serves to suggest is that from a trade and commerce standpoint there are two extremes relative to dealing with possible epidemic and pandemic events. On one end of the spectrum there exists the desire to maintain an uninterrupted flow of trade which in turn assists with maintaining the stability and status quo of

the economy. On the other end of the spectrum though there exists a desire to immediately eradicate the spread of disease and as a result the measures taken in this regard may not align perfectly, if at all, with the appropriate protocol that should be taken which also presumes that a clear framework exists in the first place. While both of these aims are important they are also inherently at odds with each other in that the former takes little to no steps toward protecting public health in the name of commerce, whereas the latter seeks to protect public health at the risk of eroding individual freedoms.

3. Food Processing and Handling

As evidenced by the information provided relative to the introduction of BSE into the food chain it should serve as clear that comprehensive biosecurity measures have to include consideration of what is consumed worldwide. This is due to the fact that throughout the world food-borne diseases are a major cause of public health concern. In the United States alone the estimated cost of food-borne diseases in 2001 was between $10 billion and $83 billion.[36] This is an astronomical amount especially when it is recognized that the consumption of food is an integral aspect of human life. Exploring food-borne illness as a public health concern it can most accurately be addressed from a variety of viewpoints. Within the scope of this work focus will be placed on several key facets including where food-borne pathogens stem from, the manner in which globalization contributes to their rise, and the steps that have been, and are being, taken as a means of mitigating the spread of illness relative to food processing and handling.

First, the most complex question to address is where food-borne pathogens come from. In this regard, what is being considered is not what serves to cause the diseases themselves as exploration of such a broad subject would fall well outside the scope of this work. Instead what is being considered are where such diseases may originate. It is nearly impossible to collect

accurate estimates of the annual instances of food-borne disease. The reason for this is that while statistics originating in Europe and the Americas are fairly reliable in nature that all regions do not have reliable reporting systems.[37] What also fails at being wholly reliable are the regulations which have been out into place as a means of regulating that what is imported and exported is safe. There have been, and more importantly continue to be, difficulties relative to reaching a consensus on what constitutes a risk assessment which is particularly problematic when it is understood that disease environments, technical capacities and resources can vary from nation to nation.[38] Essentially, what this serves to mean is that a food item may be deemed safe in its country of origin based on factors such as the conditions under which the item is kept and/or prepared, the ability to test for certain pathogens, or even knowledge that specific pathogens exist. In this way, without intending to do so, infected food products can be introduced into a variety of food chains both nationally and internationally.

As the globalization of food increases so does the likelihood that a food-borne illness will be the cause of an epidemic or pandemic event. There are a number of unique factors which serve to make such a scenario plausible. While there are obvious correlations such an increased travel, and a food supply which is international as opposed to national in nature, there are also some causal factors which individuals may not initially consider as being harmful. For example, with globalization comes increased opportunities to introduce new foods into our diets and such foods may carry with them unintended health risks.[39] As a prime example of this consideration can be given once again to the manner in which Chagas disease is transmitted orally. As aforementioned there exist two known vectors for such transmission which include fresh sugarcane and acai berry juice, both of which are currently accessible to individuals who travel to Latin America in addition to being accessible in other parts of the world as a result of

globalization. It is highly unlikely to presume that any individual who is trying one or both of these foods for the first time, especially in or from a controlled setting such as a restaurant or supermarket, is doing so fully aware that such an experience can pose a severe health risk due to the fact that neither of these foods is viewed as being inherently dangerous.

Understanding the risks of infections stemming from the current food supply there are biosecurity measures which can be taken as a means of preventing the development of food-borne infections. One such measure is a "field to fork" approach where the entirety of food production is taken into account as a means of weaning out and eliminating any infectious agents.[40] Such an approach can certainly work on a national level but in a globalized society it may be viewed as little more than idealism as it has already been proven that different countries have divergent means and measures relative to the safety and sanity of the food that they produce and export. In understanding this it can be posited that a more viable means of prevention of food-borne illnesses must begin with a greater awareness of where the food comes from and what threats may exist there, however the difficulty of this has already been expressed as well. Therefore, the issue surrounding the spread of illness from food serves to underscore a need for effective outside measures to mitigate the spread of disease from this source since it is more likely a matter of "when" then a matter of "if" such an outbreak will occur.

4. Zoonotic Diseases

It has been established that approximately one-quarter of human deaths occur as the result of infectious disease, and of all infectious diseases, the majority of them, nearly 60% are zoonotic diseases. These are diseases which originate in animals before jumping to humans. Out of these types of infections 70% of them originate with wildlife. In looking at such diseases from a historical standpoint such events were generally localized, and in some instances even went

undetected based on natural, cultural, and geographic barriers. However, modern transportation allows for the spread of disease across globally connected networks.[41] Additionally, as global trade increases, what also increases is the number of individuals who are brought into contact with zoonotic diseases. Over 35 of the most recent emerging diseases, including West Nile virus and SARS have zoonotic origins. Additionally, more than 200 diseases that can occur in humans are known to have originated in animals. Experts attribute the increased worldwide emergence of these types of diseases to several factors: population displacement, urbanization and crowding, deforestation, and globalization of the food supply.[42] It can also be presented that the animal trade itself can be seen as a source of problems as well. As a means of exploring this in full, focus should be placed on each of these factors individually which will assist in illustrating their collective impact.

First, focus can be placed on the role of population displacement and zoonotic diseases. While it may seem counter-intuitive, the displacement of a group of people from one area to another can serve as a means of exacerbating the conditions and parameters for the transmission of disease. In this vein consideration can be given to both the spread of Leishmaniasis and Malaria. It is imperative to understand that leishmaniasis and malaria are not the only zoonotic diseases which can be spread as a result of population displacement. Instead, within this work, they are being presented as representative of the causal relationship that can, and does, exist between these types of pathogens and this type of human activity.

Leishmaniasis is transmitted via the bites of infected sandflies and is a disease caused by a group of intracellular parasites. These parasites can cause a spectrum of disease which can range from chronic ulcerating skin lesions, known as cutaneous leishmaniasis to a disease that effects the internal organs of the body, known as visceral leishmaniasis. Visceral leishmaniasis is

fatal if it is not treated, and treatment exists as complex and can involve the usage of medication with known toxic side effects. While there are both promising new treatment regimens as well as known ways to control the disease it cannot be dismissed that conflict and civil unrest serve to fuel the spread of leishmaniasis epidemics on a global scale. This is due to the fact that the disease thrives in such situations, one where there is a clear breakdown of the health infrastructure along with forced migration, the destruction of human habitats and food insecurity. Under these conditions there exist limited disease control measures. Additionally, inadequate housing along with a mobile refugee population as well as internally displaced individuals increase the likelihood of exposure to the sand fly vector. While these factors alone exist as problematic they are only further exacerbated by the fact that without a stable healthcare system in place that patients who are known to be, or who fear that they may be, infected, do not have any access to treatment.[43] As a result an already traumatic situation, e.g. being made to move from their homes, can literally become a deadly one, if a person is inadvertently infected.

For as devastating as leishmaniasis exposure can be, it pales in comparison to that of malaria. Malaria is caused by mosquito-borne parasites and while it is often viewed as being a single disease it is more aptly viewed as numerous diseases, each one of which is shaped in part by interactions between biological, ecological, social, and economic factors. The rationale behind this line of thinking centers around the understanding that the intensity of disease transmission, who becomes infected, who gets sick, and who dies, are all greatly and gravely influenced by the exact species of the parasite, the behavior of the mosquito host, the immune status of the individual, the climate, a broad array of human activities, and access to healthcare.[44] Almost half, 41% of the total world population is at risk for a malaria infection and each year anywhere between 300 million and 500 million cases of clinical malaria are reported. This

information comes into focus when it is noted that malaria is found in 100 countries, and in 92 of them the disease is endemic, this serves to make malaria the most prevalent vector-borne disease in the entire world. One group that may be particularly susceptible to malaria infection is refugees because the displacement and circulation of large numbers of people can favor transmission of the disease. In these instances, transmission is generally understood to occur in one of two scenarios. In one scenario individuals who are not immune to the disease are displaced and in traveling to or through a region where malaria is prevalent they may become infected. In another scenario, a displaced individual who is already infected may act as the vector and spread the disease to other individuals and other areas. Based on the likelihood of one or both of these scenarios occurring what should be readily understood is that malaria exists as one of the most commonly reported causes of death among refugees and is especially severe among refugees and displaced individuals in countries where the disease is endemic.[45] It can be presented that for displaced populations malaria, which is already understood to be deadly, becomes an even more pernicious adversary, one which they may not have encountered, or in some cases had the opportunity to help spread, if they were not made to move from their homes.

The spread of both leishmaniasis and malaria based on population displacement helps to illustrate how ineffective quarantine can be in certain situations. Note that with no healthcare infrastructure in place to identify or treat the infected that there is also no healthcare infrastructure in place to implement or enforce quarantine measures. Noting this, we are once again faced with a situation of "when" and not "if" relative to epidemic levels of one or both of these diseases.

Having addressed the impact that population displacement can have on the spread of zoonotic diseases, focus can be placed on the role that urbanization and crowding play in this

regard as well. Before delving into the correlations that can be found, it is first imperative that there is a basic understanding relative to what urbanization is, why it is important, and who exactly it impacts. This information will serve as foundational when exploring the issue in full as a means of helping to underscore who is impacted and why that impact occurs.

In the most basic sense of the word, urbanization refers to the process of both increased movement toward, and settlement within, urban areas. However, there does not exist a universal definition when seeking to define the word "urban" itself, instead what exists are a myriad of definitions that come from various countries and which, as a result, do not have the same understanding or connotations. As an example, in some instances living in an urban setting is defined by living in the capital, whereas in other instances urban can refer to the economic activities of a particular region, the size of the population of even the population density. Regardless of exactly how it is defined, urbanization does not exist as a new concept, instead it can be traced back to the 18th century and the Industrial Revolution. Initial urbanization came as the result that there are clear benefits which can be associated with city dwelling. Specifically, living in a city can lead to the ability to access higher education, new jobs with better income potential, the safety that is associated with social services, and, germane to this work, the security that is associated with better healthcare.[46] As the population of the world has grown what has also expanded has been the urban population and as of 2009 half of the entire world population lived in what could be classified as an urban area, by the year 2030 this number is estimated to be at or around 60%.[47] Noting this, urbanization and crowding, and by extension the zoonotic diseases which can be exacerbated because of it, is something which everyone should be concerned with. While concern may come from a number of vectors, within this work focus will be placed on the role that rats have in terms of the spread of zoonotic diseases in urban

settings. The reason for this focus is directly correlated to the fact that as a member of the rodent family, rats exists as particularly problematic in terms of the spread of disease to humans.

Rats in general, but specifically the Norway rat (Rattus norvegicus), and the roof rat (Rattus Rattus), are generally considered to be commensal rodents based on their close association to human activity, and by extension their close proximity to humans. As a result of this rats benefit in that they are able to share dwellings with humans, albeit this is often done without human consent and in some instances without human knowledge, while humans can suffer harm as a result of this same association. As a whole rodents can be both carriers of and vectors of disease. In the former capacity, the rodent may show either no symptoms or limited symptoms all while being capable of spreading infection. In the latter capacity rodents can aid in the mechanical transmission of disease in instances where their fur and/or their feet come into contact with a contaminated substance that is then carried with them to wherever they travel.[48] Within urban areas the rat population finds favorable conditions in which they can both breed and spread disease when they come into contact with humans. Rats are known vectors for a variety of pathogens including, but not limited to Yersinia pestis, Leptospira spp.,Rickettsia typhi, Streptobacillus moniliformis, Bartonella spp., Seoul hantavirus, and Angiostrogylus cantonensis, all of which are zoonotic in nature. Wherever large megacities exist, so do large rat populations, and in these areas it has been found that factors such as proximity to open public spaces and subway lines, the existence of vacant housing units, and a poorly educated populace can all lead to humans encountering rats.[49] Specifically, rodents exist as a hazard because of their ability to both amplify pathogens from the environment as well as their ability to form reservoirs of zoonotic diseases, and in addition to being able to spread these disease directly e.g. via a bite, they also serve to aid in the indirect spread of disease as well e.g. via food products

which are ingested after they have been contaminated with rodent feces or urine.[50]

While this type of information could prove helpful for public health officials in terms of launching specific control initiatives, the reality exists that both surveillance of, and local knowledge pertaining to, the issue can be most accurately described as being inadequate.[51] The inadequacy of such information only serves to make this problem more difficult to address. By extension the more difficult a problem is to address the more difficult it will likely be to solve.

In a similar vein of population displacement and urbanization and crowding is the act of deforestation. While there exists a consensus that both tropical deforestation is a serious problem, and that the scale of human impact is significant, what is less complete is the overall understanding of where and when forest disturbances occur. The challenge of determining deforestation rates is tied to several factors. One factor is the massive size of tropical forests worldwide which make it difficult to determine exactly what impacts are occurring were, especially when considering areas that are geographically isolated. Another factor is the rising cost associated with the completion of ground surveys which makes continuous monitoring difficult, this is especially true when noting that the countries that contain tropical forests are often poor. Yet another factor is the debate about what deforestation actually means. Comparing estimates of forest disturbances, especially those completed by different researchers poses a challenge when there is no agreed upon definition about what constitutes deforestation. A final factor is that there exists limited baseline data about the state of these forests prior to significant human occupation of these areas. Due to the fact that this data is either inadequate or unknown based on the particular area it limits what researchers can accurately claim about human impact.[52] What can accurately be conveyed however is that deforestation is the causal relationship between deforestation and zoonotic diseases.

Regardless of how a researcher chooses to define deforestation, the basic effect is the same in that it leads to a lack of biodiversity in a particular area or region. This loss of biodiversity has an adverse impact relative to zoonotic disease in that the result is a "dilution effect". In explaining this it must be noted it has been reasoned that in areas where there exists a high level of biodiversity that there are more species which can sustain vectors and the disease is diluted. However, in areas where there are fewer species, the burden of disease is higher.[53] Noting this, it becomes less important to look at specific vectors and more important to understand the magnitude of what is occurring. In considering this another way consider that you are given a cup of salt to pour into a container of water. If you pour the salt into a gallon of water, the water will look and feel less salinated than if you took that same amount of salt and poured it into a half gallon or even a quart of water. In this scenario the salt, which represents the pathogens that can cause disease, does not change, instead what is altered is the amount of water, which represents the forest and the various species which live there. Every time the amount of water is decreased the salination levels of the water the salt is added to rise, even though there is no change in the salt. This is precisely what occurs with zoonotic diseases and deforestation in that the amount of contagions remains level and the number of infections only increases because there are fewer viable hosts. In many ways this can be viewed as a largely ecological problem which while causing medical repercussions does not have clear medical solutions. Consider that while public health measures may offer opportunities for intervention in ideal scenarios where infection is detected early, the exact vectors are well-known, and there is a stable and well equipped healthcare infrastructure in place either to address the issue before it spreads or properly contain it in the event that it does, that such scenarios do not exist as the norm and become even less likely when the issue arises within a country that has limited overall resources.

Thus far in looking at the relationship between globalization and the increase of zoonotic diseases focus has been placed on negative situations. However, it should not be misunderstood that situations and scenarios which may be viewed as positive are also not capable of having an adverse effect. In that vein consideration can be given to both the connection between zoonotic diseases and the globalization of the food supply and the connection between zoonotic diseases and the animal trade as a whole.

In terms of the former, evidence of a globalized food supply readily present themselves within developed countries. In addition to restaurants that feature non-native dishes, supermarkets also offer both fresh and processed food from across the globe. With expanded choices though, there is also the risk of additional contagions.

The act of exchanging foodstuffs and animal products across regions, nations, and even continents is one which has been occurring for centuries. However with this international circulation of food products as commodities coupled with the transnational expansion of food-based cooperation what has also occurred is the need for global governance of both food safety and quality.[54] Despite technological advances which include, but are not limited to, both proper canning techniques and pasteurization which have been utilized as a means of controlling or eliminating some food-borne illnesses, there are new causes which are being identified. In this vein, consideration can be given in part to the role that eating habits serve to play in the spread of food-borne pathogens. For example, consuming raw or undercooked meat or fish used to be solely associated with certain cultures and dietary practices however this is no longer the case. Factors such as increased levels of international travel and more divergent eating habits have served to contribute to a rise in once rare diseases becoming more recognizable in nature.[55] It would however be remiss to assume that the ability to recognize a rise in disease is the same as

being able to adequately contain them and control their spread because that it simply not the case.

In addition to a rise in infection rates relative to rare(r) food-borne diseases what must also be acknowledged is that there exist well-known threats that have the possibility of emerging with an increased potency. For example, consideration can be given to the threat posed by Avian Influenza which is an infectious viral disease of birds. It is caused by type A viruses of the Orthomyxoviridae family, and was first officially documented in Italy in 1878 though there exists a belief that it has been a threat since ancient times. In addition to being hugely consequential for the poultry industry, the greatest threat associated with Avian Influenza centers around the fact that it is largely a zoonotic disease and as such poses a major potential threat to human beings. What is evidenced by both the frequent outbreaks of Avian Influenza in poultry and the transmission of the virus to humans is the potential for a pandemic event. Exemplary of this consideration can be given to a 1997 outbreak of Avian Influenza in Hong Kong. The particular strain, H5N1 was highly pathogenic in nature and upon crossing the species barrier killed six out of the eighteen humans who were infected. Since that 1997 outbreak there have been over 500 cases of Avian Influenza infections in humans with a fatality rate of 60%.[56] Such numbers exist as particularly daunting since the mortality rate for humans is over half, suggesting that the possibility of a pandemic is more probable than not.

Having addressed the spread of zoonotic disease relative to the global nature of the food supply it is possible to take a broader look at the animal trade as a whole. In the four-year period between 2000 and 2004 alone 37,858,159 million live amphibians, birds, mammals and reptiles were legally imported into the United States from 163 countries. The sheer scope of this trade centers around the myriad uses for animals imported in this manner. In addition to food these

uses include exhibitions at zoos, scientific research, education, and conservation, tourism and immigration which is relative to companion animals only, and the exotic pet trade. It is the importing of animals for the exotic pet trade that poses a particularly significant risk. Many shipments which include animals of this nature feature high numbers of animals that have been caught in the wild as opposed to having been raised in captivity, and for most of these animals there exist no requirements for them to be screened for zoonotic diseases either in their country or origin, during transport, or once they arrive in the United States. Instead what information is available is anecdotal in nature and it reflects a high number of deaths in these particular shipments. What further serves to exacerbate matters is the ease at which an individual can become an exotic pet owner. Access to the Internet is essentially all that is required to find an exotic pet for sale and purchase from a private seller as opposed to from a pet store allows both parties to circumvent the licensing and inspection requirements of the latter.[57] The implications of this are bleak in that they serve to present an loophole in what is meant to be a legally regulated industry which could have ramifications that are literally deadly and moreover incredibly difficult to trace in terms of origin.

What is even more problematic from a diseases standpoint that the legal trade of animals is the illegal trade. The purpose of such trade varies by region and country. Exemplary of this consideration can be given to the primary illegal imports in China contrasted with those brought into the United States. In China, the illegal animal trade primarily involves exotic foods, traditional medicines, and trophies whereas within the United States the illegal trade of animals centers around exotic pets, souvenir items, and hunting products. In putting this into perspective focus can be placed on the travel and trade routes. Specifically, much of the trade that enters North America does so via flight patterns from Africa and Asia via the European Union which

also has its own issues with illegal animal trade. As a means of highlighting this consider that between 2003 and 2004 there were over 7000 seizures of illicitly imported animals or animal products within the European Union and during the annual seizure rate in the United States is a number which is similar based on analysis.[58] What this serves to suggest is that while there are clearly enforcement efforts which are meant to both curb and control the illicit importation of unregulated animals and animal products, that similar to the loopholes surrounding the legal trade of these products, that there is still significant work that must be done in order to protect individuals from the potential pathogens that may be transported as a result of this trade.

Having looked at each of the individual factors which contribute to the spread of zoonotic disease separately, it is possible to consider the collective implications. With the clear exception of the illegal animal trade, the other methods are either those which are already regulated to a certain extent e.g. the global food supply or those which cannot be regulated e.g. the spread of infection by population displacement or commensal rodents. This serves to present a unique problem for the medical community as it is difficult, if not impossible, to develop a comprehensive plan to address every possible epidemic or pandemic event that may occur as a result of the accidental spread of contagions. This is a problem which is not fixed either in whole or in part by the power to implement a quarantine as such a measure requires both careful coordination and cooperation which lacks effectiveness across state lines as illustrated by the Kaci Hicox case presented in chapter 2 of this work. If that case can be utilized as any indication, attempts to implement an effective quarantine internationally would be nothing short of disastrous.

C. The Intentional Spread of Contagions

Noting the potentially catastrophic results associated with the accidental spread of

contagions, it is also necessary to give careful consideration to the intentional spread of contagions. In this regard there are several key points which must be considered. First, what must be understood is the fact that biological warfare is not a modern concept and that biological attacks have occurred in the past. Second, what must be addressed is the possibility of biological warfare occurring in either the present or the future. Third, what has to be addressed is the preparedness of the United States in particular. Finally, what must be considered is the role that quarantine would play in such a situation.

1. A Brief History of Biowarfare

In seeking to defining bioterrorism, it literally means the usage of microorganisms or infected samples as a means of causing terror in populations. Prior to the microbiology era there were examples of this type of warfare as far back as 14th century B.C. during which time the Hittites sent rams infected with tularaemia to their enemies [59]. Similarly, crude yet effective examples of bio warfare are present throughout early history. For example, in the 6th century B.C. the Assyrians poisoned the wells of their enemies with a fungus, rye ergot, and Scythian archers in 4th century BC tipped their arrows with manure, blood, and tissue from decomposing bodies.[60] With each of these examples the reach was relatively small in scope; however, the development of biological warfare was not limited in nature and as such historical examples of more widespread attempts can be traced back to the early 20th century.

One early example of biological weapons with a broader scope comes from as early as 1939. During this period, the Japanese were testing ways in which to spread deadly pathogens such as the plague, cholera, and typhus biologically. Working in secret labs in Nanking, China the Japanese bred fleas by the hundreds using gasoline cans. These fleas which were infected with the plague, along with grains of wheat and cotton seeds were dropped over the area of Ning-

bo in 1940. This served to cause devastating epidemics of plague in the region. During this same time Japanese soldiers also dropped Vibrio Cholerae into bodies of water including wells, lakes, and ponds. The result of these combined attacks led to many deaths despite the seemingly simplistic tactics used.[61] Additionally, Imperial Japan also sprayed anthrax spores on Chinese cities both before and during World War II. Official casualty records do not exist for any of these attacks, however in total 10,000 people were killed.[62] All of these attacks by the Japanese and the earlier attacks carried out serve to showcase that the technology used to mass produce biological agents is relatively inexpensive and easy to acquire. Moreover, it is difficult to gauge the extent of biological weapons development in other countries because production facilities require limited space, and are difficult to identify.[63] Therefore even in being optimistic about what may potentially be done to combat a biological attack, it cannot be ignored that such an attack may be difficult, if not impossible to predict and/or discover the origin of.

In seeking to put the idea of a biological attack into a more modern context for can be placed on two biological attacks which have occurred in the United States in the span of less than twenty years prior. For example, in 2001 there was an incident in which the biological agent anthrax was mailed anonymously to members of Congress.[64] While such attacks targeted specific individuals, careful consideration must be given to context. Specifically, what must be noted was the fact that a deadly pathogen was sent via the United States postal system, a system which is accessible to anyone who pays the appropriate fees to send a package and has access to a post office or mailbox. This only serves to underscore the ease, even in the twenty-first century, of carrying out a biological attack.

2. The Possibility of Biological Warfare

What exists as more troubling than the amount of money being spent on bio-defense is the fact that the money may ultimately be being wasted. In order to best understand this, it is necessary to underscore exactly how easy it would be to begin a war with biological weapons. In this vein consideration must be given to several interrelated factors. First, focus can be placed on who has access to biological weapons. Second, consideration can be given to the ease of such weapons broaching any defense systems. Finally, what can be presented is are areas of vulnerability. Individually considered this information is bleak, combined however it serves to be representative of all a small fraction of the mayhem and death that terrorists with biological weapons could inflict on an unsuspecting populace.

One of the first things which must be considered when looking at the probability of biological warfare is who has access to biological weapons. There is unfortunately no clear or concise answer to that question. Officially it is suspected that China, Cuba, Egypt, Israel, Japan, North Korea, Syria, Taiwan, the former Soviet States and the United States all have biological weapons programs. It is also believed that Iran may have a program as well, though one that is currently without offensive capabilities. Additionally, it is documented that both Russia and Iraq had biological weapons programs into the 1990s, and in the case of the latter there are experts who believe that the Russian program did not actually end.[65] In choosing to take this information at face value, e.g. in assuming that the only countries that have access to biological weapons are those on this list, then it may further be assumed that the probability of biological warfare is relatively low. However, such a thought process can be viewed as logically fallacious for two reasons. First, while there are indeed a limited number of countries on this list, it should not be ignored that the countries are either world powers such as China, Japan, and the United States, or

that they are known for measurable levels of instability e.g. Cuba, North Korea and Syria. If this in and of itself does not present itself as problematic consideration can once again be given to the earliest biological attacks which required limited resources to be implemented. What this means is that it is highly plausible that an individual or group not affiliated with an official, state sanctioned, biological weapons program, could potentially start a biological war.

It may seem like fear mongering to present biological warfare as such a causal possibility. However, there does exist a factual basis for this. As a means of exploring this consideration must be given to the sheer ease at which biological weapons can be utilized as a means of breaching defense systems. Unlike other weapons of mass destruction, pathogens exist as being virtually undetectable in nature. This is due to three key facts. First, they can be transported with relative ease by a single individual across both local and national borders. Second, in the event that an individual using such weapons was trying to trigger an epidemic it may feasibly take days for symptoms to manifest and once they do it is plausible that the mistake could be taken as a natural outbreak. Finally, disseminating pathogens does not leave identifying markers that can be traced back to the individual deploying the weapon.[66] In this vein it is possible that a nation could be under biological attack and initially not even know that was the case.

It would be remiss to assume that the only route that terrorists would take in terms of deploying biological weapons would be direct attacks on human life. In fact, such an attack would be difficult because despite the ease at which biological pathogens could pass through systems that have been set up for defense purposes, the development of an effective bioweapon represents a daunting task in all but the most specialized of circumstances, and even in those instances the infection rate would likely be low.[67] Instead it must be understood that there are other avenues that those seeking to deploy biological weapons could take. Specifically,

biological attacks could be made on both the agricultural sector and/or on the water supply of an unsuspecting country. It would be impossible to explore the ramifications of this on every possible nation within the scope of this work and as such focus will be placed on the impact that this could have within the United States.

The general vulnerability of the agricultural sector is rooted in both its economic importance and its sheer scope. In terms of the former, agriculture within the United States represents 13% of the Gross Domestic Product, and accounts for 17% of overall employment. In terms of the latter, surveillance is virtually impossible based on how much land is utilized as growing space e.g. in looking at the growth of soybeans their total crop output spans over 30 million hectares.[68] Additionally, what cannot be understated is the ease at which such an attack could be carried out. The requisite material to initiate an outbreak of either a plant or animal disease does not need to be prepared in large quantities, be grown in a lab, or even manipulated based on the desired intent. For example, something as minute as the blood from a animal already sick with disease or a handful of an already infected plant can provide enough of a pathogen to trigger an epidemic. Moreover, such material is both readily available in any area where the disease already exists, can be generally be transported without risk of detection, and can be disseminated without special equipment.[69] Noting this, the role of any potential public health measure would be severely limited at best.

Of equal concern to the threat of biological attack against the agricultural sector, is the possibility of such an attack against the water supply. In addition to the fact that modern scientific advances have allowed for the improvement of mechanisms which allow for the dispersal of biological agents, such agents may be difficult to identify quickly and reliably. The identification of potential pathogens would be further hampered in instances where it was

odorless, colorless or tasteless since it would be imperceptible to human senses. While attempts have been made to make water supplies within the United States more physically secure, there are still areas which may be vulnerable to intentional contamination.[70] As long as such areas remain penetrable, the water supply remains at risk and whereas an attack on the agricultural sector could be devastating economically, an attack on the water system could cause even greater havoc.

3. The Preparedness Level of the United States in regards to Biowarfare

Considering the ease at which a biological attack could be carried out, it is prudent to question how prepared a nation may be relative to facing such an attack. It would be impossible within the scope of this work to consider this preparedness level for every nation in existence and as such the United States is being used as a litmus in this regard. The rationale stems from the fact that while the United States is an industrialized nation and as such it can be surmised that it may be more prepared than a developing country, it is not necessarily the undisputed leader in world healthcare. What this means is that its preparedness level can be utilized as an informal average.

Presented simply, the United States has a severe problem relative to biodefense, or more aptly a lack thereof. While there have been advancements in biotech there has not been the production or implementation of a comprehensive biodefense preparedness and response planning.[71] The question that may be asked in this regard is “why?” and unfortunately there is no clear answer other than sheer ineptitude on the part of those who should be responsible for ensuring such an infrastructure is both in place and effective. Exemplary of the type of ineffective action that keeps the United States unprepared consider the program BioShield.

BioShield was conceived as a means of providing the United States with new medical interventions such as vaccines and treatments for diseases that originated with biothreats. In theory such a program is sound, in practice however it resulted in the squandering of a little over $5 billion in taxpayer funds with the development of no new products or services to mitigate the threats it was designed to combat. Similarly, the United States postal service spent over $800 million in order to develop and deploy the Biohazard Detection System (BDS) which costs an additional $70 million to operate annually. However, the BDS was only designed to detect a single pathogen: anthrax and only looks at around 17% of the mail. While upgrades have been added to look at more mail as well as discover the presence of two additional pathogens: the plague and tularaemia, such upgrades increased the annual operating costs to an $120 million, and as of 2007 not a single piece of contaminated mail was found.[72] Both of these examples serve to highlight that the expenditure of large amounts of money is not automatically equivalent to the development of systems that work well, or even work at all.

4. The Role of Quarantine in the Event of a Biological Attack

In the event of a biological attack, quarantine may be presented as the most viable option available. This is especially true noting the aforementioned failure of BioShield which did not work to produce alternative means of prevention, or treatment. Additionally, other medical interventions may not be feasible. However, the viability of an option is not the same as the success of that option.

While quarantine may serve as the best chance for survival, but that does not necessarily serve to make it the best option overall based on the fact that there is no real manner in which to gauge how well coordination and collaboration efforts will ultimately go.

Large-scale quarantines, such as those that may be necessary following a biological attack come with equally large-scale requirements and responsibilities on the part of public health officials. In the event that a quarantine is deemed necessary there is also the need to provide for those who are quarantined, and careful considerations must also be given to the ways in which such measures are going to be enforced.[73] This can be difficult enough to consider when dealing with individuals who are all from the same city or state, but the matter will undoubtedly be exacerbated in instances where quarantined individuals do not reside or work in the areas in which they are being quarantined, and may become even more of a challenge if some of those individuals are international visitors.

A better approach would be one which was representative of better biodefense as a whole. Such an approach needs to view bioterrorism and the associated preparedness and response activities as a complex system versus viewing it as a series of programs. Additionally, it would need to understand the links that can and do exist across a variety of disciplines and stakeholders while taking into account all levels of government by locally and internationally. Finally, for such an approach to actually work it would need to be incredibly thorough in nature accounting not solely for the responses that could or should be taken in the event of a biological attack, but also accounting for all of the steps that would or could be taken by the bioterrorist.[74] Presently however, quarantine as it currently exists cannot have a place in such an elaborate system noting its many inherent flaws as such flaws would only serve to undermine the system as a whole.

Conclusion

While there are clear benefits to globalization, the increased exposure to disease is not

one of them. Noting that exposure is not likely to be mitigated it is imperative to understand the primary ways in which diseases may be spread across national borders, and to note that in some instances the spread may be intentional. What must also be understood is that without the precedent of previous widespread attacks that it is impossible to adequately gauge how effective quarantine will be in the event of a biological attack. Chapter four will serve to take a more in depth look at the concept and construct of quarantine as a whole, focusing squarely on the overall inadequacy of quarantine as a modern medical intervention.

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Chapter Four- The Inadequacy of Current Quarantine Measures

Chapter three explored globalization as a public health concern looking at both the inefficacy of international health regulations as well as how easy it is for contagions to be spread both accidentally and intentionally. This information exists as foundational for addressing the fact that contemporary quarantines are ineffectual. In understanding both how this claim can be made as well as bolstering its veracity it becomes necessary to consider in depth how quarantines are implemented, what it is that quarantines are meant to do, what it is that quarantines actually do both intentionally and unintentionally to the individuals and communities who are impacted by them, and the pitfalls associated with the process of implementation.

A. How Quarantines are Implemented

Chapter Two of this work explored at length the relationship that exists between public health policy and quarantine by addressing it from both a historical and contemporary standpoint and served to explore the manner in which quarantines have been implemented across the world in relation to disease outbreaks. What was missing from that discourse however was a look at how the implementation of a quarantine is meant to be carried out in practice While the difference may seem semantic in nature it is important to understand that there do exist clear protocols which have been put into place which are meant to be used. It is only in exploring these broad guidelines free from the context of an actual medical emergency that it becomes possible to both assess and address what can be retained of this process and what may need to be adjusted.

While this is a globally focused work, it would be impossible within its scope to include this information for every single country. Noting this, focus will instead be placed on the countries and regions which have already been discussed at length in previous chapters: The

United States, West Africa, China, and Canada. Additionally, consideration will be given to the role of global healthcare as it relates to quarantine as well as the role of physicians.

1. **The United States**

In looking at quarantine implementation within the United States there are three interrelated factors which must be addressed. These include exploring what types of outbreaks, or more aptly threats of outbreaks, serve to trigger quarantines, what power is held by individual states in terms of quarantine implementation, and what power is held by the federal government in terms of quarantine implementation. The exploration of each of these aspects is necessary because they serve to showcase the complexities that can be associated with this process.

First, consideration can be given to the types of outbreaks that can trigger an order for quarantine. As of 2012 there were a total of seventy-two nationally notifiable diseases which had been presented by the CDC. Some of the diseases which have been discussed in previous chapters i.e. Plague, Tuberculosis, and Severe Acute Respiratory Syndrome (SARS) are all present on this list as is the biological agent anthrax.[1] Despite this however it cannot and should not be misconstrued as a comprehensive listing of all infectious diseases which are known to pose threats. Such an absence of other infectious agents serves to beg the question of why some diseases are included and others are not. However, the answer is not one which is readily or even clearly available. Note that as early as 1904, there existed documented confusion about why certain diseases were included on this list while others, even those that were known to be rampant at the time e.g. Gonorrhea, were excluded.[2] It is the exclusion of known infectious agents which can have epidemic or pandemic potential from the CDC list of nationally notifiable diseases which presents the first problem with how quarantines are implemented within the

United States. This is due to the fact that such exclusion can be viewed not as oversight, but instead as an intentional omission. An omission which may at some point have deadly consequences especially in relation to either new or re-emerging infectious agents which are not presently on the list.

Having looked briefly at the diseases which could lead a person to be quarantined focus can be placed on precisely who has the power to implement a quarantine. This can be viewed in two distinct ways: the power held by individual states and the power that is held by the federal government. It may erroneously be assumed that these measures and subsequent powers are the same, or that the former is a clear precursor to the latter, but in fact they are not and the differences between the two are distinct.

Focus can initially be placed on state specific power relative to the implementation of a quarantine. This is due to the fact that primary quarantine authority is generally under the auspice of state health departments and their respective officials.[3] In this vein it becomes necessary to explore several factors. These factors include where the authority of the state comes from, how state laws vary, why state laws vary, and both why and how state laws are changing. While these factors are interconnected, independent exploration of each is key as a means of providing the most comprehensive information.

It is necessary to understand where the authority of the state to implement quarantine comes from. In the broadest sense this authority is derived from the police powers that states are granted under the Tenth Amendment of the United States Constitution.[4] Such powers are applicable because they are not forfeited when a state becomes a member of the Union under the Constitution. According to common principles this police power must be utilized in such a way that it adheres to reasonable regulations which have been put into place by legislative enactment

for the protection of public health and public safety.[5] As such all states provide for isolation or quarantine by statute.[6] Essentially, this can be, and moreover has been, interpreted as the ability of the state, or more aptly someone acting on behalf of the state, to implement a quarantine measure as they see fit provided that it can be presented as a public safety measure.

On the surface the discretionary nature of state law as it pertains to quarantine may seem like a sound precautionary measure. It can be presented as necessary for the protection the masses in the event of an outbreak. However, it must be understood that what may be a protective measure for some may also ultimately be unintentionally punitive as well. A clear example of this was presented in the Maine quarantine order for nurse Kaci Hickox.

Noting that Kaci Hickox was discussed at length in chapter one, within the context of this chapter focus needs to only be placed on the most salient facts. First, at the time of the quarantine order Hickox was a nurse who was returning to the United States after working in Sierra Leone with Doctors Without Borders to assist in treating the Ebola epidemic. However, during her time in Africa she neither came into direct contact or treated any individuals who were infected with Ebola. Second, upon her return to the United States, despite exhibiting no signs of being infected with Ebola or any other disease she was ordered into confinement by the Governor of New Jersey where she could have been detained for up to 21 days. While she was ultimately released several days after her initial confinement it was with the expectation that she would go directly to her home in Maine. When she arrived in Maine the governor of that state ordered essentially the same measure that had been ordered by the governor of New Jersey, a 21-day quarantine, during which time Hickox was expected to remain confined in her home. In both instances, it may appear as if the states were acting in the best interest of public health and by the very nature of how state quarantine laws are derived, the actions of the governors may appear to be well within

the confines of what they were legally allowed to do. This is simply not the case. Exemplary of this consideration can be given specifically to quarantine provisions of Maine law which require the state to prove that there is a public health threat before implementing a quarantine. Within the context of these provisions a public health threat is defined as a condition where there is an infectious agent present in the environment under circumstances that pose a significant risk of an adverse health effect from exposure to or an infection with a notifiable disease or condition. Essentially, the law does not have any stipulations or caveats that allow for the quarantine of someone who is not known to be infected. In fact, the language of the law is as such that it serves to specifically reference the term "infected person". Hickox, despite the nature of her work in Sierra Leone was not infected and as such, regardless of the order of the governor of Maine could not legally be quarantined within that state.[7] Based on this fact, it can be posited that the actions of both the governor of New Jersey and the governor of Maine as they related to the desire to quarantine Kaci Hickox were less about public health and more about the optics associated with the attempted exercise of political power and social control.

While the orders of the governors of New Jersey and Maine were nearly identical relative to how they sought to deal with the presumed public health risk that they asserted was posted by the presence of Kaci Hickox it should not be misconstrued that all states or state actors have singular laws relative to quarantine. Instead every individual state is in control of the specific quarantine laws that are applicable within its borders. However, quarantine laws suffer from the same shortcomings as all public health laws in that it is not until the occurrence of an unexpected disaster, a biological threat, or the emergence of an epidemic or pandemic that the shortcomings currently inherent to such laws are revealed. As a result, when such events occur states are often in a position where they are developing relevant legislation and policies as

individual situations evolve precisely because of the fact that there is not, and moreover does not have to be, uniformity in public health law from state to state, and because whatever laws do exist are often outdated or not readily applicable to address contemporary infectious diseases. An example of this consideration relates to the SARS epidemic of 2003. During this period, new policies had to be implemented in at least one state as a means of addressing SARS because the legal authority for quarantine only covered specific diseases. Similarly, even when broader designations of legal authority do due exist they are often too broad in nature to truly be considered viable from either a medical or legal perspective. As an example of this one state has legislation which forbids individuals with contagious diseases from exposing themselves in public places without differentiating between those with airborne or blood borne infections. Another state utilizes equally confusing language by indicating that any person who is suspected of having a sexually transmissible disease who refuses examination and treatment must be subject to an immediate quarantine.[8] The questions that must be asked in that latter instance are suspected by whom and quarantined for how long, however such answers are not provided which only serves to add to the myriad of issues that surround the manner in which individual states have the power to implement quarantine.

It would go well beyond the scope of this work to explore and analyze the public health laws of every state as they pertain to the implementation of quarantine. As such focus will be placed on several states as a matter of showcasing the differences that can, and more importantly do, exist in this regard. Specific focus will be placed on California, Texas, New York, Florida, Illinois, Pennsylvania, Ohio, Michigan, Georgia, and New Jersey. The significance of these ten particular states is that as of 2004 they were the most populous in the United States and as such home to more than half of the total population. Additionally, these states all have key ports of

entry either by air or by sea and as a result they may be the first to both experience and/or amplify any epidemics that are brought in from other areas. It is due to both of these factors that these states will likely be crucial to the control of any large scale epidemic within the United States. Despite this importance however there are clear variances relative to both the content and form of the laws which deal with quarantine. In terms of the former divergences can be found relative to the exact specifications of the law, the level of detail provided, and the scope of application. In terms of the latter the laws diverged in terms of where they were located within the code as well as how they were structured. Such variances may seem inconsequential until it is understood that these ten states have traditionally been the primary actors in multi-state epidemics. The significance of this is that under the United States system of federalism during interstate epidemics there is a shared legal authority between state governments and the federal government relative to restricting the movement of individuals which can include quarantine however the earliest measures are likely to be ordered by state and local officials based on their laws because states and localities have the primary responsibility for containment measures during outbreaks.[9] Differences in state laws can therefore be potentially detrimental in the event of an actual public health emergency where quarantine may be needed.

The problematic nature of variances in individual state laws can be most clearly exemplified by once again considering the facts surrounding the Kaci Hickox case. As per the information provided in chapter one, despite being subjected to quarantine orders in both New Jersey and Maine, there were no precautions taken in transporting her across state lines e.g. the medical professionals she was traveling with wore no protective clothing, no travel advisory was announced and she was allowed to use public restrooms.[10] Consider that had Hickox actually been infected with Ebola that she may have served as both a victim and a vector and in her role

as the latter could have infected countless individuals.

The lack of precaution in the Hickox case is made even more disturbing when it is understood why she had been detained in New Jersey in the first place. Specifically, this detainment had occurred under quarantine rules which had been newly implemented in several states including New Jersey, New York, Florida and Illinois, following the case of New York physician Craig Spencer who was diagnosed with Ebola after returning from Guinea where he had been caring for infected patients. It was not the diagnosis per se that caused the quarantine rules to change, it was the fact that the diagnosis had occurred several days after Spencer had already been home in New York, a period during which he had engaged in normal activity such as riding the subway and dining out. It is important to note that Spencer was not breaking any active laws by engaging in these activities when he did. This is due to the fact that prior to the implementation of the rules which allowed for Hickox to be detained individuals who returned from Ebola impacted countries to the United States without fever or symptoms were asked to voluntarily monitor themselves for the 21 day incubation period of Ebola. During this time, they were meant to watch for symptoms and take their temperatures twice a day. They were further informed that in the event they developed a fever or other symptoms that they should contact local health authorities.[11] It is arguable that it was these more lax measures which allowed Spencer to be a potential vector for Ebola. What is not arguable however is that despite putting more stringent quarantine guidelines in place ostensibly to avoid similar situations, that they were not actually followed either in New Jersey where Hickox was initially detained or in transporting her across state lines.

It must be noted that in response to the manner in which she was treated that Kaci Hickox sued New Jersey Governor Chris Christie and New Jersey Public Health Officials for both

compensatory and punitive damages based on the ordeal that she went through as a result of their orders. In her suit, Hickox presented that there was no adequate, individualized assessment to determine what, if any, risk she actually posed to the public. Additionally, she claimed that her civil rights had been violated based on the fact that both the duration and terms of her confinement lacked justification. Hickox ultimately settled this suit in favor of reformation of quarantine practices in New Jersey. Specifically, this reform led to the creation of what was dubbed the quarantine Bill of Rights. This Bill of Rights includes both procedural protections and a heightened standard of medical necessity.[12] While such reformative action represents a positive change in quarantine law it was only implemented as the result of a lawsuit which would not have been necessary had adequate laws already been in place.

It is not enough to know there are differences and inconsistencies relative to the state laws that can impact quarantine. What must also be understood is why such differences exist. In the broadest sense the differences in state laws relative to quarantine can be linked to the differences in the states themselves and the ways in which they have evolved and continue to change. More aptly, when looking at the public health laws of each state what is apparent is how over time such laws have been shaped to reflect the concerns, science, and politics of the time periods in which they were introduced. These same laws are reflective of the overall expectations of the constituency of the area in which they are implemented and meant to be enacted.[13] Moreover such laws, which are often antiquated were in many cases built up in layers over the course of the 20th century in response to disease threats as they became known and subsequently often fail in terms of reflecting contemporary scientific understandings of disease or legal norms relative to the protection of individual rights. In failing to reform these laws public health authorities leave themselves vulnerable to the threat of legal challenge or their actions may be

preempted by federal statutes.[14] Noting this it is important to understand that sweeping changes to state public health laws have occurred over the last several years.

In looking at the changes relative to state public health laws focus can be placed on the Model State Emergency Health Powers Act (MSEHPA) the Turning Point Model State Public Health Act (Turning Point Act), and the Uniform Emergency Volunteer Health Practitioner Act (UEVHPA). MSEHPA and the Turning Point Act were drafted by public health law scholars at the Center for Law and Public's Health at Georgetown University Law Center and the John Hopkins Bloomberg School of Public Health. The UEVHPA was drafted by the National Conference of Commissioners on Uniform State Laws. The overarching goal of each act is to assist state and local law and policy makers as state and local public health laws often lack clarity, are poorly drafted, or confusing in nature.[15] Such acts serve as a helpful starting point for how laws can be, and in some instances should be, modified, however their presented changes should not be misconstrued as being mandatory in nature.

The MSEHPA was developed in 2001 following the anthrax incidences of that year. The purpose of this act is twofold and meant to address both legal and medical needs. In terms of the former, the act is based on model constitutional statutory, and case-based law at the state and national levels. In terms of the latter, the MSEHPA is also reflective of the contemporary scientific and ethical principles which serve as foundational to current public health practices[16] In this way the act can be used to provide guidance in refining state policy and is explicitly meant to assist states in updating public health laws which have become antiquated. Such assistance comes directly via the five key public health functions which are addressed by the MSEHPA. These functions include preparedness and planning, surveillance, the management of property, the protection of persons, and communication and public information. Additionally, the

MSEHPA also serves to provide both clearer standards and stronger guarantees of due process than earlier public health statutes which were drafted and implemented.[17] The significance of this cannot be understated in the sense that it both directly acknowledges the flaws inherent to current state public health laws and also serves to try and provide comprehensive solutions.

In looking at the MSEHPA directly as it relates to quarantine the act allows for broad state powers in relation to both the isolation and quarantine of individuals on the condition that such measures exist as the least restrictive means of preventing the spread of infection. However, failure to comply with state directions as they relate to either public health measure would be a misdemeanor. Additionally, under the MSEHPA mandatory vaccinations and the seizure of private property exist as additional public health measures. While such measures may seem overly punitive, it must also be noted that the MSEHPA guarantees that individuals affected by the sweeping powers granted to the state will have due process and be able to demand release from isolation or quarantine by requesting a hearing either to require the state to show cause for the implementation of the public health measure or to argue that the state breached the conditions of the order.[18] In theory such a provision will serve to protect violations against individual civil liberties, however it can do so only after such violations occur, and only in instances where individuals are made aware of, and freely able to, exercise such a right without prejudice.

Without discounting the importance of the MSEHPA in terms of what it serves to represent as a form of much needed reformation in the public health sector, its potential effectiveness may have been limited by its focus on bioterrorism as a catalyst for such reform. Exemplary of this point consider the impact, or more aptly lack thereof, of the MSEHPA on actual public health reform following its introduction to states in 2001. In this vein consideration can be given to Utah, Maine, South Dakota, and Indiana. The significance of these four states in

particular is that they serve to showcase how different states addressed the same issue, that of bioterrorism, as interpreted via the MSEHPA. What was revealed upon this review was the Utah focused solely on detection issues, and such a focus was correlated with the need to prepare for the 2002 Olympic games in Salt Lake City, while in contrast Maine largely ignored detection in favor of a focus on strengthening response powers. Similar to Maine South Dakota also chose to focus on response while also seeking to clarify jurisdictional issues that were present between state and county departments of health. Most striking however was the choice of Indiana not to make any changes at all.[19] Despite being representative of less than ten percent of the total number of states in the United States the reactions of Utah, Maine, South Dakota, and Indiana can be viewed as being indicative of the larger failing of the MSEHPA in that by focusing on bioterrorism state legislators may have failed to grasp the sense of urgency as it related to public health as a whole and as such did not view it as wholly applicable. More importantly however, the variances in responses to the MSEHPA which was a single and unified model, even among such a small sampling of states, serves to underscore precisely how different state public health laws, as well as how different they can, and will likely, remain without significant oversight or intervention.

Following the development of the MSEHPA was the development of the Turning Point Act which was completed in September of 2003. The Turning Point Act serves to provide a more comprehensive model for the reformation of state public health laws within the United States by covering a wide array of topics that extend beyond the realm of emergency situations in public health. This is evident in that it serves to address four key areas. First, it defines and provides authorization information relative to the performance of essential public health services and functions. Second, it offers insight into how public health infrastructure can be improved. Third,

relative to public health issues it provides encouragement for a cooperative relationship between the public and private sectors. Finally, it presents the need to offer protection for the privacy of any identifiable data which is acquired, used, or disclosed by public health authorities.[20] The significance of the Turning Point Act is that it exists as the most comprehensive model state public health law which has ever been introduced in the United States in that it serves to be applicable to any and all conditions which are of importance to public health. Such a focal point is key in that rather than a disease specific framework it serves to healthcare practitioners with significant flexibility in regards to the manner in which they could respond to both new and emerging threats without the need to resort to last minute legal updates as a means to address these issues. In addressing the role that the Turning Point act has relative to compulsory powers such as quarantine the act stresses both the need for voluntary compliance to be sought out, and provides due process of law in instances where compulsory powers are used.[21]

In looking at the impact made by the Turning Point Act focus can be placed on the widespread changes that were made as a result of the model. In looking specifically at the period between January 1, 2003 and August 15, 2007, the time frame during which the Centers for Law and Public Health tracked legislation relative to the Turning Point Act, it was found that 33 states introduced a total of 133 legislative bills. Of these 133 legislative bills, a total of 48 were passed. As an example of the type of legislation inspired by the Turning Point Act consider that the state of Alaska modernized their surveillance and reporting, privacy, and powers of authority for public health services. In a similar vein the state of Colorado passed SB-0894, the Public Health Revitalization Act in 2008. This legislation which was based largely on the Turning Point Act mandated newly defined leadership, enhanced collaboration, and put into place provisions for essential public health services relative to both infectious and chronic diseases.[22] The crucial

nature of such legislation should not be understated in that in both instances sweeping changes were made to the public healthcare infrastructure. Such changes can be seen as central to avoiding the types of issues that often plague state health officials when placed with public health emergencies that they have not explicitly planned for by providing clear guidance as opposed to requiring new measures to be developed as new scenarios present themselves.

Having addressed both the MSEHPA and the Turning Point Act focus can be placed on the UEVHPA. Drafted following the disastrous events of Hurricane Katrina the UEVHPA exists as a direct response to the overwhelming need for licensed volunteer medical providers in emergency situations. As such the act works to expedite the deployment of aid following a natural disaster or other emergency where such individuals will be needed and seeks to protect those who respond from future liability claims by recognizing during a declared emergency a healthcare license that was issued in another state. The model offers two ways for issues of liability to be dealt with. First, it is within the power of states to offer clear immunity for volunteers from civil liability for any and all acts that occur during the provision of either health or veterinary services. Second, the state also has the powers to replicate and utilize liability protections that are found within the Volunteer Protection Act (VPA) which is federal legislation that provides immunity to nonprofit organizations and governmental entities who provide care in emergencies preempting any state laws that are inconsistent with the VPA. While some states have adopted the UEVHPA in full others have only adopted certain sections.[23]

The relevance to the UEVHPA to quarantine is not specifically found in the contents of the model itself. Instead it is necessary to consider the purpose of the model which, at least in part, is to allow for seamless and prearranged cooperation across state lines in the event of an emergency that could adversely impact public health. The mere existence of this model, and its

wording, serves to showcase that such cooperation is not only feasible, but could with careful work, also become a reality. In the future such a reality could prove necessary to mitigate the spread of infection across state lines. Having addressed the inconsistent, largely inadequate, and relatively antiquated nature of state public health laws both as a whole and as they relate specifically to quarantine it is possible to consider the nature of federal public health powers. In short, the federal government has both the power and the duty to protect the overall public health when faced with fast-moving epidemic diseases. However, such a role is very rarely easy to execute.[24] In seeking to understand why this is the case it is imperative to address the role of federal quarantine powers compared to the powers held by individual states as well as current federal quarantine law and regulations.

As aforementioned state powers relative to both public health as a whole and quarantine in particular can vary widely based on jurisdiction. As a result, the actions of state public health officials can be governed by language that is broad, vague, or otherwise open to numerous interpretations which serves to provide individual states with the potential for almost limitless power. In contrast the federal powers to implement quarantines are far more limited in nature. This is based on the fact that the federal government is only allowed to apply powers that have been specifically delegated to it under the Constitution.[25] What must be understood though is that while the more focused powers available to the federal government relative to quarantine could equate to the more effective implementation of the public health measure that unfortunately such a limited scope can also equal limited actions. In seeking to understand this it is imperative to understand exactly what powers the federal government has and to place those powers into context with actual situations which have occurred.

Federal quarantine authority is derived from the Commerce Clause. Summarized, this

clause provides Congress with the power to act as a regulator of commerce with foreign nations and between states. By extension section 361 of the Public Health Service Act (PHS), 42 U.S.C. § 264, the Secretary of Health and Human Services (HHS) is imbued with the power to both make and enforce any regulations that are deemed necessary to prevent the introduction, transmission, or spread of communicable diseases that may be traveling from a foreign country into the United States or between states. Such actions can be taken at the discretion of the HHS Secretary; however, the authority is limited to the communicable diseases which have been published and officially presented in an Executive Order of the President of the United States.[26] Presented as such, this may be interpreted as the federal government having the paternalistic ability to overrule state decisions in the interest of public health. This is however a fallacy. While the federal government does have the power necessary to authorize quarantine under certain circumstances, the operative word is "certain" due to the fact that states, and by extension state level officials, hold the primary authority in this regard as an aspect of the aforementioned police powers which are retained by states. This decision dates back to 1796 and the fourth Congress of the United States and resulted in a law which severely limits the actions that can be taken by the federal government.[27] This is despite the fact that medical knowledge has progressed significantly since the late 1790s. Such power can be viewed as being contradictory in the sense that while the HHS Secretary has discretionary powers which are inherently broad in nature that such powers are severely limited based on the Executive Order that is in effect at the time quarantine decisions must be made, an order which based on new, emerging, re-emerging, or novel infections may not be sufficiently up to date to adequately deal with the present threat.

In utilizing its overarching powers the federal government is specifically allowed to act in one of several ways. First, the federal government has the authority to take measures such as

the implementation of quarantine in order to prevent communicable diseases from spreading between states. Second, the federal government may assist state and local authorities in preventing communicable diseases from being spread. Third, the federal government maintains a Do Not Board list. The role of this list is to prevent air travel for patients who are infected with any disease that may cause a potential public health threat to their fellow passengers. Individuals are only added to this list when reliable medical information is provided by a state public health official and after a reviewed approval process is completed by the United States Department of Health and Human Services.[28] Additionally, it must be noted that in general the federal regulations which allow for individuals to be apprehended, detained, examined, or conditionally released, e.g. what may occur during a typical quarantine, are only applicable in specific circumstances. Such circumstances include when individuals are coming into a state or possession from a foreign country or possession. As a result federal regulations require for reports to be made about any ill passengers who may be traveling internationally via modes of transportation such as airplanes.[29] The reference to air travel in particular is important because while federal quarantine power does exist for the interior of the United States, i.e. for interstate travel, it is rarely utilized and as a practical matter is relevant only to air travel.[30]

The key takeaway from this is that while federal quarantine powers stipulate that such actions may be taken, that they are not necessarily automatically triggered or in any way directly tied to the actions of state or local officials. This is made clearly evident in once again reviewing the case of Kaci Hickox. Note that as aforementioned Hickox was transported between states, ostensibly going from a quarantine in the state of New Jersey where she originally arrived from Africa after being involved in the treatment of Ebola patients to a quarantine in her home state of Maine. However, despite the governors of both states declaring that a quarantine necessary

neither sought to involve the federal government as Hickox was transported between several states without any precautions being taken to protect either those transporting her or the members of the general public who may have come into contact with her or her entourage as they traveled. This serves to showcase the limitations, or more aptly the failings, or current federal quarantine powers.

As important, if not more important that the federal laws which serve to govern quarantine are the agents and agencies which carry the laws out. This is due to the fact that it is these agents and agencies which can be seen as the true arbiters of the law. They serve to act upon and interpret it in practical as opposed to purely theoretical situations.

In looking at the former, within the United States federal public health officials have police powers which are constitutionally designated. These powers allow individuals serving in this capacity to take measures such as quarantining a person against their will. However, these measures are not always unilateral in nature as these officials share their powers with local, state, and international authorities.[31] As a result there is no single individual making quarantine decisions, and based on the circumstances federal agents may not even be involved as a part of the process based on factors such as where the quarantine was initially implemented and what type of infection the quarantine has been implemented to contain. It must further be noted that there exist clear limitations on what actions can be taken by those who are acting on behalf of the federal government to prevent the spread of communicable diseases. As an example of this consider the powers of United States immigration and border patrol officials. Acting as agents of the federal government it is within their authority to refuse admittance to the United States to an individual who is infected with any communicable disease that is believed to be a significant public health threat provided that individual is not a citizen of the United States. However, it is

not within the authority of these same officials to deny United States citizens entries to the country regardless of their health status or the potential threat that they may pose to public health. Instead, in such instances immigration and border patrol officials are in the position to order immediate isolation at the entry point and to prohibit air travel during the period where a sick patient is still contagious and may spread the disease.[32]

In looking at the latter, the core, though not sole, agency responsible for implementation of federal quarantine powers is the Centers for Disease Control and prevention (CDC). Beginning in 1944 the CDC operated under the Public Health Service Act which allowed only for the apprehension, detainment, and conditional release of individuals who were infected with a minority of diseases, all of which had to be specified by executive order. The first proposition to modernize federal powers did not come about until 2005, followed by another proposal in 2016. In the eleven-year time period between these two proposals there were several global health crises, including, but not limited to outbreaks of Ebola, H1N1, and the Zika virus. However, at this time the CDC was still operating under rules that had not been revised since the end of World War II.[33] It was not until February 21, 2017 that the CDC issued a final rule relative to their role in the control of communicable diseases. Specifically related to both domestic and foreign quarantine the final rule provides amendments that were added as a means of aiding the public health response to outbreaks of new or re-emerging infections and to grant due process to any individuals who are subject to federal health orders. Additionally, based on public comment received about the changes before they were finalized clarifications were made relative to various included safeguards that are meant to inhibit the spread of communicable diseases from both domestic and foreign sources.[34] Noting, that as of this writing the updates are less than two years old it remains to be seen what, if any, impact they will have on the manner in

which federal quarantine powers are utilized.

2. **West Africa**

In seeking to understand how quarantines are implemented in West Africa focus can be placed on two factors. First, it is necessary to understand the quarantine process which is supposed to be undertaken. Second, consideration must be given to the realities of how quarantine was actually implemented during the most recent Ebola epidemic. The rationale for presenting both perspectives is imperative as it serves to provide the most balanced counterpoint to the contrasting and conflicting nature of federalism within the United States which allows for both state authorities and federal authorities to have specific powers over how and when quarantine is implemented.

There is limited available information relative to the quarantine process in West Africa. However, the information that is available presents that historically the response to stop the spread of infectious disease is a multi-layered one. Specifically, intervention occurs early and includes isolating those who are known to be infected before instituting thorough surveillance and contact tracing which results in the isolation of suspected contacts. Actual quarantine measures involve entire neighborhoods where infection is found in conjunction with the establishment of special health care facilities in those areas and whenever possible vaccinations are provided for all individuals who are at risk.[35] While there exists no guarantee that such a process is followed to the letter in all, or even most, circumstances, it is still interesting to see how comprehensive it is when compared to the process of authorizing a quarantine at both the state and federal level within the United States.

In looking at specific countries within the West Africa region, information about public health provisions becomes more readily available. Such information is important as it serves to

provide an idea relative to the public health infrastructure within these areas which in turn can serve as referential when looking at the manners in which they implement quarantine measures. Exemplary of this, focus can be placed on the constitutions of three countries including Guinea, Sierra Leone, and Liberia. In all three of these countries their respective constitutions contain a wide array of emergency response measures which are explicitly meant to protect public health in emergency situations. Additionally, in Guinea other liberties granted by its constitution including the public right to freely assemble, is preserved even in a declared emergency.[36] What this serves to suggest is twofold. First, with respect to all three countries the clear delineation between public health and emergency response measures indicates a clear understanding that the latter needs to be handled in a manner that both works in tandem with, and yet is independent from, the former. Second, in regards to Guinea in particular these seems to be an idealistic desire to preserve routine civil liberties even in situations where such liberties may actually serve to cause more harm than good.

Having addressed the available information to both the manner in which quarantine is supposed to be implemented in West Africa as well as basic general public health and emergency response information in Guinea, Sierra Leone, and Liberia it is possible to take a more nuanced view of the manner in which quarantines were implemented during the most recent Ebola outbreak in 2014. During the course of the 2014 Ebola outbreak Guinea, Sierra Leone, and Liberia all revised their emergency declarations. These revisions authorized broader public health and enforcement measures in three areas: enhanced health surveillance, disposition of the dead, and isolation and quarantine practices.[37] Based on the nature of this work focus will be placed solely on the efforts relative to isolation and quarantine.

Collectively Guinea, Sierra Leone, and Liberia all took steps to implement a myriad of

isolation and quarantine practices, However, it must be noted that many were not actually implemented until months after the Ebola outbreak first began. As an example of these practices all three countries had emergency declarations which required the closure of both borders and public spaces such as schools and markets, and mass quarantines were declared based not on exposure or symptoms but instead on geographic location. One example of this was in Guinea areas that had an infection rate greater than 70% were isolated and kept under isolation using police and military assets. Another example of this was when Liberia quarantined West Point, which is one of the poorest and most densely populated neighborhoods in the entire country. However, the most extreme example of geographic bases quarantine occurred in Sierra Leone where the entire country, regardless of their exposure to the disease, was put under a three day long lock down in their residences in September of 2014.

Additional policies in Liberia and Sierra Leone were less strict and more focused, however they may be viewed as being similarly or equally punitive to the geographic based quarantines. For example, both countries quarantined entire households of people for a period of up to 21 days whenever there was a case of an individual who had been exposed to Ebola, was a confirmed Ebola case, or was a probable candidate for Ebola. This was done even in instances when the individual did not show any symptoms. In order to have the quarantine lifted it was required that two negative lab tests from the original suspected case were presented.[38] The variation as well as extreme nature of some of the quarantine measures by these three countries can be viewed as a sign that either the process that was historically utilized in West Africa to implement quarantine was either viewed as unreliable for some reason or otherwise unfeasible to undertake.

In taking a more nuanced look at the various ways in which quarantine was implemented

during the 2014 Ebola outbreak in West Africa what is revealed is an unexpected similarity to the manner in which quarantine is implemented on the state level in the United States relative to the ways in which different states have different protocols which govern when and how quarantines can be authorized. This becomes apparent when focus is placed on the country of Liberia and the differences between national planning and the preparation that was occurring within smaller villages. Exemplary of this it is necessary to compare what is known about overall Liberian quarantine planning with the manner in which quarantine was implemented in the village of Mahwah.

Within the village of Mahwah in Bong County, Liberia there was a multifaceted approach to the Ebola outbreak in September and October of 2014. During this time county officials proposed a community quarantine and local traditional leaders were given a platform to voice their concerns relative to the availability of food and medical care. As a result, when community quarantine was implemented there were local, national and international partners available to arrange the re-opening of a local clinic, the delivery of food, and to provide psycho-social support. Once symptomatic patients were removed and the community quarantine was implemented there were no new Ebola cases in Mawah.[39] This type of quarantine implementation can be viewed as an ideal account of what an individualized response to an epidemic can accomplish.

The example of what occurred in the village of Mahwah servers as an important example of the differences that can, and more importantly do, occur between various areas even within the same country. What is of equal importance are the divergent accounts of what occurred in communities that were viewed as being high risk. This is due to the fact that they provide topical insight into how jurisdictional differences as a whole, and not just in West

Africa, can impact the manner in which quarantines are implemented.

In stark contrast to the ways in which the traditional leaders of Mahwah were able to act as advocates for the community members individuals who lived in communities which were viewed as being at-risk were treated either as outright victims or as vectors of disease when they should have been treated as being central to controlling the spread of the epidemic. Exemplary of this, the government of Sierra Leone utilized coercive measures as their main weapon against infection. This was evident via both the aforementioned 21 day quarantine of any individual who had been in contact with an Ebola patient even in instances where the individual was asymptomatic, as well as the three day lockdown of all residents. Additionally, in the town of Port Loko, Sierra Leone the implementation of quarantine was more forceful in nature. Specifically, in that area security guards were stationed in front of the homes of anyone even thought to be infected with Ebola in order to prevent either them or their families from leaving. Similarly in Guinea quarantines started as early as July in some of the villages in the Bok and Forecariah provinces. Despite these measures however from late June to late July of 2014, a full quarter of the Ebola cases in both Sierra Leone and Guinea were only identified after the individuals who were infected died within their communities. This serves to suggest that the people in the countries either did not recognize the disease, did not report it, or did not seek care in the specialized centers that had been set up by the government.[40] It is also possible that even in instances where individuals suspected or knew that a friend or family member was infected with Ebola that they made the conscious choice not to alert the authorities because of the aggressive nature of the quarantine measures. While that line of thought is speculation, it is both probable and logical considering the widespread geographic based quarantines that were implemented in these countries.

3. **China**

In looking to address the manner in which contemporary quarantine is implemented in China it is necessary to focus on three interconnected factors. These factors include specific provisions from the Law on Prevention and Treatment of Infectious Disease of 1989 (Prevention and Treatment Law), the Frontier Health and Quarantine Law of the People's Republic of China, and the 2003 SARS outbreak. Combined, what is revealed is a comprehensive view relative to how modern quarantines and the ways in which they are authorized is revealed.

First, consideration must be given to the Prevention and Treatment Law. It would go beyond the scope of this work to look at the text of the law in full. Instead focus will be placed solely on the aspects of the law that are germane to the implementation of quarantine.

As the name suggests the Prevention and Treatment Law is one which focuses in large part on preventative measures. In that vein, there are a myriad of prevention measures which are presented in Chapter 2 of the law (Articles 9-20). These measures are widely inclusive and focus on everything from topics of vaccination to those of sewage and the designation of hospitals explicitly for treating infectious diseases. In looking more closely at the provisions relative to the prevention and control of infectious disease focus can also be placed on Chapter 5, specifically Articles 32-34 which presents measures for enforcement which include administrative penalties. Additional measures for enforcement are included in Chapter 6, Articles 35-39, which present circumstances under which fines and criminal sanctions can be leveled. Finally, Article 40 grants the Ministry of Health as well as its counterparts at the two lower levels of the government, the ability to develop ongoing public health measures via an explicit provision that authorizes implementing regulations to be enacted.[41] Acknowledging and understanding these measures are important as they serve to showcase that the Chinese understand that quarantine does not, or

more importantly should not, occur in a vacuum, but instead exists as a part of a larger public health plan.

What can be viewed as more important than the regulatory power that laws such as the Prevention and Treatment Law provide are the manner in which such powers are actually utilized. Since the early 1990s there have been several implementing regulations which serve to offer insight into how regulatory activity occurs at the central level of government. Exemplary of this consideration can be given to both the regulations that were issued by the Ministry of Health on the prevention and treatment of Tuberculosis (TB) in 1991, and on statistical reporting in 1992. The importance of regulations such as these is that they provide a modern legal infrastructure which is foundational for the implementation of public health measures.[42] However, it should not be misconstrued that such an infrastructure is, or always will be, sufficient for addressing every public health threat that arises. This is due to the fact that just as infectious agents can be unpredictable, the measures utilized to treat them must also be adaptable.

Having considered the preventative and regulatory provisions in the Prevention and Treatment Law focus can be placed Article 24 as the first specific reference point to how quarantines should be implemented. Article 24 addresses matters of both quarantine and isolation of individuals with various infectious diseases as well as those suspected of being infected with those diseases. Specifically, the Article includes provisions which imbue local governments where quarantines are deemed necessary with powers to aid in preventing the spread of disease. These powers include the right to restrict public assembly, close public spaces including schools, stores, and factories, and even to temporarily confiscate residences when an emergency or epidemic has been properly declared. Additionally, provincial governments also have the power

to completely stop the movement of both people and goods when an outbreak is declared.[43] While such actions occur at a local and provincial level, unlike similar actions in the United States taken at the state level there is the sense that these laws are meant to occur across all jurisdictions.

While Article 24 is an important aspect of the Prevention and Treatment Law as it relates to the act of implementing a quarantine, it is not the sole aspect worth considering. Additionally, the law presents provisions for dealing with human resource requirements during an outbreak (Article 27), how to handle the corpses of those who were infected with diseases (Article 28), and a requirement specifically directed at pharmaceutical companies making it mandatory for the supply of medicine to occur in a timely manner (Article 29).[44] These additional provisions do not deal directly with how quarantine is meant to be implemented but they do serve to offer key insight into the understanding of the Chinese government as a whole that the process of quarantine is a complex one requiring consideration of factors beyond who will be quarantined, for what reasons such a quarantine will occur, and for how long the quarantine will last.

In addition to the provisions contained in the Prevention and Treatment Law, China also has the Frontier Health and Quarantine Law of the People's Republic of China as well as the Regulations for the Implementation of the Frontier Health and Quarantine Law of the People's Republic of China. The former document dictates the exact measures that are meant to be taken relative to the provisions deemed necessary to prevent infectious disease agents from entering China as well as providing definitions for the exact disease that will serve to trigger quarantine orders. Additionally, the document dictates precisely how quarantine is meant to be carried out, how infectious diseases are meant to be monitored, how health is meant to be supervised in quarantine situations, and both the identified legal liabilities as well as supplemental provisions

which address matters such as the date when the law was meant to go into effect.[45] The latter document serves to specify the exact manner in which quarantine laws are regulated and meant to be carried out. Exemplary of this Article 4 denotes that in addition to individuals, that any motorized forms of transport, containers, or other articles such as luggage, goods and postal parcels that may transmit infectious disease are subject to quarantine inspection upon entering or exiting the country in accordance with the Regulations, with the caveat that entry and exit shall be permitted for these only after approval has been issued by the health and quarantine organization.[46] The level of detail and specification relative to the regulations is what serves to make this document so significance in that it leaves little to nothing to chance relative to how quarantine is meant to be carried out. However, it would be remiss in this case to equate significance with potential efficacy. For example, it exists as both plausible and possible that in being so highly specific that the regulatory document may actually serve to hinder the detection of an infectious agent in an event where its source is not on the list of articles that are meant to be checked.

It would be implausible to discuss contemporary quarantine implementation in China without also discussing the 2003 outbreak of SARS. This is due to the fact that this particular outbreak served as a core impetus for China to work towards the reexamination and revamping of its overall national emergency management policy.[47] An integral part of any nations overall national emergency management policy are actionable public health measures and by extension, quarantine. While SARS did not by virtue of either its existence or its infection potential, serve to create the Chinese CDC system, as a result of the timing of both the two did co-evolve. At the same time the SARS illness appeared in 2003 China was already in the process of transforming their public healthcare system from a Soviet modeled system to an American modeled one. In

order to complete this process each of the Anti-Epidemic Stations (AES) in the country was split into two distinct parts. One part was a Health Inspection Institute and the other was a CDC. In understanding that China was seeking to Americanize its public health infrastructure, the usage of the term CDC should be acknowledged as being explicitly referential to the United States CDC headquarters in Atlanta, Georgia. The selection of this reference was intentional as the goal was to evoke a modern scientific ethos. The CDC in the United States was utilized as an ideal with technology, hardware, speed and skill at responding to outbreaks being used as a model for what the Chinese hoped to accomplish. At the same time the name was meant to pay direct homage to original CDC which was admired almost to the point of being worshiped by Chinese public health professionals at both the local and national level. Such reverence for the United States System was not merely the result of seeking a change, instead the history between the two countries must be acknowledged. Specifically, the American CDC had taken an active role in the development of the preparedness and disease control capacities in China.[48]

In looking at the way this split worked in action focus can be placed on the Chinese city of Tianmai.[1] In this city the split from a single AES to a Health Inspection Institute and CDC took place during the peak of the SARS outbreak in May 2003. The role of the Health Inspection Institute was to take over the majority of the sanitation inspections while the CDC was tasked with placing its focus on laboratory and field research, disease prevention and surveillance, and epidemiological investigations.[49]

The timing of such a transition was likely fortuitous in nature. This is due to the fact that by 2003 the nationwide disease control apparatus that Mao Zedong had built up during his time as the Communist chairman of China had been steadily eroding for years. The low-cost, prevention

1 This is the pseudonym utilized by researcher Katherine A. Mason in her work "Becoming Modern After SARS" where this information is drawn from as a means of protecting the confidentiality of her informants.

based system that had birthed the AES and was also credited with significant improvements in the health of the Chinese population had become a victim of economic reforms that served to discourage investments in public health by the government. Effectively, from the time Zedong died in 1976 until the emergence of SARS the AES had been transformed from public enterprises into semi-private ones which were sustained via the paid sanitation inspections of public spaces like hotels, restaurants, and factories. The need for the AES to sustain themselves financially stemmed from the fact that the funding for things that local public health officials hoped to add to their systems such as high-tech labs, and surveillance systems was severely lacking. By responding to SARS in part with the continued transition toward an Americanized system local public health infrastructure were provided with what they had been seeking, but they were also provided with a very specific way of engaging in public health efforts,[50] which as evidenced by exploration into the manner in which United States quarantine implementation system works is not always efficient or effective.

4. **Canada**

The Canadian approach to quarantine implementation can be viewed as being most similar to the approach taken in China where the federal government acts as the central arbiter of when, where and how, quarantines will be implemented. This similarity to the Chinese approach however means that it operates in contrast to that of the countries in West Africa and the United States. While this is a globally focused work for matters of brevity, all further comparisons will be between the process of quarantine implementation in Canada and those in the United States. Such a view is sufficient from the standpoint that the United States and Canada have the clearest differences to explore based on the fact that West Africa is a region and not a single country.

As aforementioned in the United States it is the role of the local or state government to

act as the point of primary response to a public health emergency that is determined to require quarantine. In contrast within Canada express jurisdiction over quarantine is the domain of the federal government. As a result of this the individual provinces of Canada do not have the same powers as the local and state municipalities within the United States to pass laws relative to quarantine. Instead the Canadian Parliament passes all laws that relate to the health, peace, order, and good governance of Canada; this includes quarantine laws. With the federal government in complete control over the rules and regulations that govern quarantine it is possible for Canada to operate in a manner that is consistent throughout the country. As an example of this consistency, all quarantine rules within the country are standardized and do not change based on factors such as geography. Similarly, in Canada it is the role of the Minister of Health to choose quarantine officers. In this capacity, the Minister is allowed to designate anyone who he or she feels is qualified for the position as the officers are not required to have any specific skills or knowledge. These quarantine officers act in much the same capacity and with the same powers as their United States counterparts and as such they are authorized to inspect any goods or cargo that is entering or exiting the country of Canada. Additionally, they require others to help them to carry out their duties and a medical examination is required before they are able to detain anyone who has been in close proximity to an infectious disease vector, is ill, or is a suspected carrier of disease.

The benefit of such standardized regulations as they relate to quarantine is that it serves to reduce possible tension between local, provincial and federal officials, the type of tension that can be problematic in the United States if there are discrepancies between the desired actions of local, state and federal officials. [51] This benefit can also be seen as extending the fact that quarantine officials are hired at the sole discretion of the Minister of Health, in that there should

exist no dissent relative to the hiring decisions that are made. However, the question that must be raised is whether or not these benefits are enough to outweigh the potential problems that may arise as a result of such a system. As an example of this consider infectious diseases are by nature not entirely predictable and by extension the means of prevention which may be adequate in one area may have drastically different results in another area. Without being able to ensure identical conditions or those which can be replicated across the entire country it is implausible to believe or expect that a standardized methodology for implementing quarantine will result in results that are equally desirable across the country. In a similar vein the failure to require any specific prerequisite skill set, knowledge base, or educational background for quarantine officials is also problematic in the sense that it presumes that whoever the Minister of Health is will be ethical enough to ensure the positions only go to those who are actually equipped to work as members of the public health field and/or that the hiring decisions made by the Minster will be one that ultimately proves to be beneficial for the country as a whole in that those who are selected are both capable and competent.

What must also be understood about quarantine law in Canada is that it exists as separate from emergency public health powers. Within Canada such powers are constitutionally the responsibility of the individual provincial governments.[52] This serves to create a schism which cannot be ignored in the sense that while the provinces have domain over emergency public health they do not have power over quarantines and vice versa. For as flawed as the process of implementing quarantine may be in the United States based on the divided responsibilities of local and state governments and the federal government, the Canadian division of power can be viewed as being even more problematic in nature in that it attempts to create a distinction between emergency public health situations and quarantines. Note that while it is

wholly possible to have an emergency public health situation that does not necessitate a quarantine, that in the event of a medical quarantine there is almost certainly a public health emergency occurring.

In December 2006 of the Canadian government announced a new Quarantine Act. This new act served to modernize antiquated legislation which dated back to 1872, and was meant to be reflective of the changes from marine travel to air travel. It must be noted though that it did not give emergency health powers to the federal government. While the act was lauded by Canada's Chief Public Health Officer as being representative of a significant step forward in preparing Canada for an influenza pandemic, it must be noted that the name Quarantine Act is not wholly accurate in nature. This is due to the fact that in addition to addressing the use of quarantine that it also looks at case-specific measures at international borders. This act is administered by the Public Health Agency of Canada which employs a total of about 30 quarantine officers whose work is spread across 6 airport based quarantine centers in Vancouver, Calgary, Toronto, Ottawa, Montréal and Halifax). Under the auspice of this act these officers have been granted significant powers relative to case-specific measures as well as quarantine and authority which allows them to deal with potentially infected cargo, conveyances and human remains. When an individual of concern, e.g. one who is known to be ill, is identified they are referred to a quarantine officer by a member of the airplane staff as required by international law, or by a customs official. It is then the role of the quarantine official to perform the initial medical assessment, and if necessary, refer the individual to any local hospital where the Public Health Agency of Canada has a service agreement. It is at this hospital the disposition of the individual is ultimately determined and if it is required the hospital will require isolation facilities. In the event that a mass absolute quarantine is contemplated the federal minister of health is imbued

with the power to requisition any premises for usage as a quarantine facility.[53] Without disputing the need to modernize a piece of legislation that had not been updated since the early 1870s the clear failure of the 2006 Quarantine Act is that it did nothing to address the separation of emergency health powers which following the implementation of the law are still the sole discretion of the provincial governments and quarantine powers which still rest entirely with the Canadian federal government. This can be presented as an egregious oversight which is more likely to add to the problems of an eventual outbreak of an infectious disease as opposed to providing solutions. It should not be presumed that a lack of adverse health impacts in the past based on this separation will automatically translate into it never causing any issue.

The Global Approach to Quarantine Implementation

Thus, far attention has been placed on the manner in which individual states and countries implement quarantine as a means of preventing infectious diseases from either breaching their borders or spreading both within and beyond them. However, infectious disease is not solely a local or national issue, instead the spread of contagions can, and moreover do, have global implications. Understanding this it becomes necessary to address the global approach to quarantine implementation or more aptly the lack thereof.

First it should not be presumed that a lack of a global protocol for the implementation of a quarantine is reflective of a lack of attempted global cooperation relative to infectious diseases prevention. For the decade between 1995 and 2005 when the World Health Organization (WHO) adopted the revised International Health Regulations (IHR) the WHO, governments and non-state actors all worked towards building a new approach to the threats posed by infectious disease. This approach focused on creating links between public health and security thinking and was generally presented under the banner of global health security. In addition to being forward

thinking this strategy was central to the political revolution global health experiences between the mid 1990s and mid 2000s. The importance of this revolution, and by extension the strategy of global health security was centered around the fact that, at least in part, it took the view that rising infectious diseases equated to national security and foreign policy issues for states. This viewpoint served to alter the ways in which countries, both as individual nations, and as members of the global community work to approach the challenges posed by infectious diseases and their spread. The primary proposal of the global health security strategy was that all countries, not just those that were weak, needed new forms of international cooperation along with institutional capabilities and legal obligations, in order to protect themselves as well as their political and economic interests from serious disease threats. While it was not entirely the work of the WHO, the idea of global health security became linked to the organization and its efforts to strengthen its surveillance and response capabilities as well as its desire to revise the IHR as a means of transforming the ways in which countries managed the globalization of infectious diseases.[54] The concept and construct of global health security represents a significant act of cooperation, however its development is not, and should not be, mistaken for a clear consensus on how matters of public health and/or global health can, or should be implemented.

What can be presented as a clear consensus of such ideas is the fact that all 194 countries who are members of the WHO signed up to the IHR. The significance of this is that in doing so each of these countries agreed to report any potential global health threat to the WHO instantly. In turn the WHO coordinates an international 24 hour early warning and rapid response system. The entirety of this process centers around the ideal of the world working to help an individual country detect and control a new disease before it spreads.[55] In theory this idea could be the basis for the creation of a global system to implement quarantine, in practice however this system is

one that does not actually work.

In seeking to address why the 24 early warning rapid and response system does not work the simplest response is that setting it up poses a host of complex logistical problems that are not easily solved. As an example of this one of the most difficult hurdles to overcome is that of the time that such a system would take to set up. The regulations require that a 24 hour monitoring, reporting and response system is set up in each of the participating countries; each of these systems is expected to be capable of both sophisticated data collection and sharing. Additionally, each country is responsible for designating entry points that are totally disease free. It is important to note that this is not merely a manner of making sure that such entry points are secure against humans who may wish to breach them but that they also have to be impenetrable by both rats and mosquitoes as well noting that such animals can be vectors of zoonotic diseases. Finally, at these entry points there needs to be the capability for health checks to be conducted as well as immediate medical care for any passenger who is ill. Of the 194 countries who have agreed to do this, all of them have found these requirements to meet both from a logistical standpoint and an economic one. Even some of the most developed countries admitted that they found it difficult to meet the requirements and asked for more time to do so. It must however be noted that time alone may not be enough for some countries to comply. For example, there are 90 countries which are among the poorest and most unstable on the globe. When looking at these countries in particular it is revealed that some simply do not possess either the means or the requisite knowledge required to put the necessary systems in place. Other countries may have the both the means and the knowledge but may still fail to fully comply because of political matters such as war, overall instability or regimes that are secretive. As a result, while the IHR exists as a promising start it should not be considered by any means to be an end game when looking at

either global health or global health security. A large part of this stems from the fact that these regulations were developed based on lessons that were learned in the 1990s and early 2000s. As a result, they are not an adequate means of addressing the issues that have been raised by more recent outbreaks.[56] While the IHR is not nearly as antiquated as some of the quarantine laws which are still in place both nationally in the United States or internationally, it should not be ignored that they are based on ideas and ideals that in some instances may longer be relevant. Couple this with the unrealistic nature of what these regulations would require every country to do regardless of its current economic, political or public health status and what it becomes apparent that this is a quest for an impossible standard that will not be met without substantial compromise that could so significantly alter effectiveness as to render the endeavor useless.

The IHR is representative of only one attempt to build a surveillance and response system with the goal of identifying outbreaks early, implement a global response and contain the spread at the source. Following the SARS epidemic significant efforts were undertaken to develop such a system however even in light of these efforts there are still prolonged delays relative to the time a severe outbreak emerges and global collective actions. To date there have been two main reasons for these delays which have been identified. First, with any outbreak there exists a delay between the emergence of the index case of the outbreak and when that outbreak is detected be the relevant healthcare authorities such as healthcare providers, laboratory technicians, and public health officials. Therefore, one of the two-pronged goals of disease surveillance is to minimize this inherent delay while at the same time maximizing the available information which provides guidance throughout the public health response via ongoing data collection, analysis and management. Second, also inherent to every outbreak, there also exists a delay between the time at which an outbreak is initially detected and the widespread

recognition that the outbreak poses a viable threat to the international community. In instances where outbreaks have spread internationally and by extension require a coordinated international response, the necessary recognition is best evidenced by a declaration from the WHO. Such a declaration signifies that the outbreak constitutes a public health emergency of international concern. When such a declaration is made the director general of the WHO gives consideration to the prevention protection and response needs of the individual situation as well as the advice of an emergency committee before possibly mobilizing the efforts that will be necessary to address the identified needs. In instances when the systems that are responsible for recognizing and responding to disease outbreaks react too slowly to a threat the resulting delay leads to a greater spread of disease which in turn leads to additional individuals being affected both directly and indirectly, and may possibly lead to higher mortality rates.[57] The sluggish and ineffective nature of these surveillance and response systems serves to underscore by global quarantine implementation measures are neither practical nor possible in the current global environment. There simply do not exist the resources or consistency or standardization of practices which serve to allow for such a process to be able to work seamlessly. As a result what we are left with is an nonexistent global approach to quarantine implementation that is in many ways largely reflective of national and international quarantine implementation approaches that are contradictory, inconsistent, or otherwise not as effective as they possibly could be with significant retooling.

B. What Quarantines Do

In seeking to answer the question of what it is that quarantines do the simplest answer is that they temporarily detain individuals who are infected or believed to be infected. Without disputing the veracity of such a decision, it must be noted that it is not merely simple but also

simplistic. Instead quarantine must be defined in a much more comprehensive manner, one which serves to explore its inherent nuances and contradictions. Therefore, it is necessary to look beyond a singular standard definition by considering three interrelated factors. The first of these factors centers around the protocol associated with quarantine implementation which in this context is being framed in terms of what is supposed to happen once an individual or individuals is quarantined. The second of these factors explores what may actually occur during a quarantine. The final of these factors looks at the potential aftermath of a quarantine. When looking at these factors they are being considered in a universal sense and as such it is not necessary to consider them in the context of one specific country or another.

1. **What is Meant to Happen During a Quarantine: Protocol**

From a historic standpoint, the measures of quarantine and isolation have existed as the most immediate and universal measures employed as a means of prohibiting the spread, and mitigating the adverse impacts of, infectious disease.[58] Noting this regardless of where or how they are implemented there exists a fairly standardized protocol relative to what is meant to happen during a quarantine. Specifically, within the context of this work consideration is being focused on what is expected to and/or supposed to occur during an average as opposed to ideal quarantine. As such emphasis is being placed on factors such as the overarching goals and strategies of a quarantine rather than simply presenting that quarantine is meant to completely prohibit the spread of disease.

As quarantine is currently practiced it is a tool within the public health arsenal as well as a collective action meant to work in the favor of the common good. Noting this contemporary quarantines often involve only a few people who have been exposed to an infectious disease in a small area such as during a flight or while attending a public event. However, in rare instances

they are applied to entire communities or cities. The primary goal of modern quarantine implementation is to act as a means of reducing the transmission of a disease by creating a social distance between possible vectors and victims. This is accomplished by limiting the number of potential victims that individuals acting as potential vectors come into contact with. While this primary goal exists as unchanging for all quarantines what may differ is the way in which the public health official in charge of the quarantine attempts to meet it. For example, a quarantine can be passive or active symptom monitoring, but it can also be a short-term voluntary home curfew, or should an extreme circumstance arise it can also be a barrier that is erected around an entire geographic area.[59] Essentially, what this means is that a quarantine can be any action which serves to limit or prohibit contact between individuals who have been, or are suspected of having been, exposed to an infectious agent, and those who have not been exposed.

One of the easiest quarantine measures to implement is a "snow day" or "sheltering in place". Under this type of quarantine measure public places such as schools or work may be closed, or access to them may be restricted. Similarly, in such scenarios large public gatherings may be canceled or public transportation may be limited or canceled. This particular type of measure can be particularly useful because of the fact that most people understand the concept of staying at home in instances of inclement weather and take the viewpoint that their homes are the safest and smartest places for them to be when such conditions arise. This serves to increase the likelihood that these measures will be accepted in a quarantine situation. Another benefit of such measures is that they can be implemented instantly and generally without the need for additional resources in order for essential services to function. This is especially true in a situation where a quarantine may only need to last for a few days. However, the presented ease of the "snow day" measure does not mean that it is the only method which should be attempted or utilized. In fact,

the different ways in which this goal can be met are inherent to the ways in which quarantine can be implemented and the strategy which is ultimately utilized should be one which has been tailored to the exact circumstances.[60] What this serves to showcase is twofold. First, in presenting the "snow day" measure it reveals that while quarantine is an emergency public health tool that has the serious aim of mitigating the spread of infectious disease that it does not need to be overly complex or taxing for those who are being quarantined. Second, by presenting the importance of unique quarantine methods based on the situation it serves to highlight the varying and variable nature of infectious diseases and the manner in which they are spread.

The core ideal that should attempt to be met with every quarantine is that those who are quarantined are being detained or sheltering in place on a voluntary basis. Measures that are voluntary rely on public cooperation but they also reduce or completely remove the need for legal intervention and potential legal enforcement. Instead such measures use the instinct of most individuals to remain safe as a means of keeping them sheltered. If for whatever reason an involuntary quarantine is necessary the resulting mandatory confinement may result in individuals attempting to escape.[61] It should go without saying that as the purpose of a quarantine is to limit contact between those who may be infected with disease and those who are believed not to be, that individuals breaking the quarantine is not meant to occur.

2. **What Actually Happens During a Quarantine**

Similar to the way in which the utilization of a recipe does not guarantee satisfactory culinary results, the existence of quarantine protocol should not be viewed as predictive of what will occur once a quarantine is implemented. Therefore, in seeking to answer the question of what actually happens during a quarantine it is not sufficient, nor is it feasible, to provide a step-by-step breakdown of exactly what occurs. This is due in large part to the fact that every

quarantine is unique and it would go well beyond the scope of this work to provide an accurate historical record of every quarantine that has been implemented both nationally and internationally even if the scope in terms of years was limited to the last century. Additionally, what actually happens during a quarantine is highly dependent on external factors. The most salient of these factors include where a quarantine is implemented, when a quarantine is implemented, and under what condition a quarantine is implemented. In seeking to best understand this consideration can be given to both the mixed results that are known to have occurred when implementing quarantines in various parts of the world and to the circumstances that allow for such varied results to occur.

In giving consideration to the ways in which matters of "where" and "when" a quarantine is implemented can impact what actually occurs focus can be placed on quarantine implementation in West Africa during the 2014 Ebola outbreak. When looking at the ways in which quarantine can be implemented in West Africa it was shown that the various governments used similar measures with divergent results. Ultimately however it was the delayed implementation of comprehensive public health measures that were specifically designed for, or proven to work against, the Ebola outbreak that led to situations which required the measures that were implemented to be larger and more extreme.[62] A prime example of this can be seen when considering the aforementioned geographic quarantines, specifically the one in Sierra Leone which placed the entire country under lock down for several days in a measure that may have seemed medically prudent to the public health officials who ordered it, but just as likely felt unjustly punitive to the individuals who were subjected to the quarantine.

It should not be misconstrued that as a region West Africa is alone in implementing quarantines with mixed results, or that the Ebola crisis served to create a unique set of

circumstances that resulted in uneven implementation. Instead it must be understood that socioeconomic factors in general, regardless of where in the world the disease outbreak occurs, or what the infectious agent is, can also play and adverse role. Exemplary of this consider the implementation of community quarantines in low-resource settings. These circumstances serve to be such that access to critical goods and services are severely restricted. The involvement of local leaders during both the planning and implementation stages of a quarantine can help to ensure that community needs are met.[63] However, realistically, such involvement is not either always sought after or even possible. As a result it is completely plausible that the implementation of a quarantine may be successful in both mitigating the spread of an infectious disease and creating a situation where there is food scarcity or other issues where the basic needs of a community are not met in order to implement a public health measure.

Knowing that quarantine implementation can produce such unpredictable, and in some cases adverse results, it becomes imperative to understand what measures are, or are not, in place which make this possible. While there is no single answer to this query, one of the most plausible can be found in refocusing on the quarantine laws that exist at the local and state level in the United States. As an example of this note that while the majority of states have language within their quarantine laws that are protective of civil liberties that such language is limited, sometimes severely, in nature. Less than half of the applicable state laws include a provision that allows for an individual to have a right to counsel during quarantine, and even fewer have written protections that allow individuals the ability to either choose a medical provider or receive compensatory damages. In a similar vein only 20% of states offer any type of employment protection in situations where individuals need to stay away from work as a matter of safeguarding public health. Additionally, while half of the states have authorized explicit police

powers for the enforcement of public health actions during a quarantine, the remaining half of the states do not have similar authorization in place. Most problematic and worrisome though is the fact that less than half of all states have any language in their varied laws and regulations that is relative to providing quarantines that are safe and humane. The inconsistencies between states as well as the inclusion of rules that can be at best defined as curious serves to create the basis for a country-wide environment that will result in unease, confusion, and possible civil unrest if there is ever the need for a large-scale quarantine to be implemented.[64] In considering this information what cannot be ignored is that while it is addressing the situation in the United States specifically, that it can in fact be applicable to any country where the quarantine laws are similarly inconsistent or inconsiderate of matters such as civil liberties. This is important to recognize because it helps to further underscore the point that there does not exist reliable universal viewpoint relative to what exactly can, or more importantly does, occur when a quarantine is implemented.

3. **The Potential Aftermath of a Quarantine**

Just as there does not exist any single possibility relative to what actually happens during the implementation of a quarantine, there is no universal scenario that represents the totality of what the potential aftermath of a quarantine may be. It is possible that following a quarantine order that it may be found that the order did exactly, and only, what it was intended to do, and prevented the further spread of infectious disease. Conversely though there also exists the possibility that the implementation of a quarantine will lead to consequences that were either unforeseen and therefore unaccounted for, or known to be possible and allowed to occur because the threat of the disease was particularly great.

In looking at one example of an adverse aftermath following a quarantine focus can once

again be placed on the quarantines that were implemented in West Africa during the 2014 Ebola outbreak. During this time both quarantine and isolation measures led to the lock down of a substantial number of critical agricultural areas because of a loss of labor. By extension what occurred were critical shortage of basic food supplies.[65] Based on the especially virulent nature of the Ebola virus both in terms of how it is spread and the manner in which it impacts those who are infected it is plausible that even if the shortage in food supplies was predicted that public health officials would have still ultimately decided that the lock down of the agricultural areas was preferable to the potential further spread of the Ebola virus.

In looking at another example from West Africa during the Ebola crisis focus can be placed on some of the more long-term impacts. For example, as of 2016 school attendance in the region remained very low while health service delivery was operating at a 23% decline and similarly essential services such as water and sanitation were still experiencing disruption. In addition, individuals who survived the Ebola virus as well as their families were subject to discrimination within their communities. In some instances, this discrimination was so problematic that it required the survivors and their families to move. Despite the fact that these effects vary from jurisdiction to jurisdiction, the potential long-term ramifications of similar public health measures should be considered by public health officials when developing the policies and procedures deemed necessary for responding to infectious disease.[66] It would be remiss to presume that such possible long-term adverse impacts as a result of quarantine implementation could only happen in West Africa, in areas where there may already be public infrastructure issues, or in instances where public health measures are delayed. Instead problems such as these have the potential to arise any and every time that a quarantine is implemented.

C. Pitfalls Associated with Quarantine Implementation

In addition to the problems that can occur as a part of the potential aftermath of a quarantine there are several key pitfalls that are inherently associated with the implementation of a quarantine. These pitfalls include a need to balance individual civil liberties with the need to implement a quarantine, conflicting goals, obtaining compliance, fatigue, and issues relative to communication.[67] Additionally, attitudes about quarantine may also factor in and present obstacles. It is necessary to understand that both individually and collectively these pitfalls serve to adversely affect any possible quarantine measures because they should ideally be weighed against the threat of infectious disease by public health officials before a quarantine is implemented. However, in a real world situation it must be understood that based on factors such as how devastating the infection is, how quickly it is being spread, and how likely it is that individuals have been exposed to it, that it may not realistically be possible to give each of these potential pitfalls their due before the need to make a decision arises.

1. Civil Liberties and Public Health

The simple fact is that diseases do not respect national boundaries; they cross borders with no regard for the devastation that they may wreak and there may or may not be an initial warning sign that they are present. As a result, the threat of infectious diseases as well as their actual spread, will more often than not require significant restrictions on individual liberty as a means of protecting public health. In looking at the moderate end of this spectrum potential measures include temperature screenings and/or similar health checks for travelers. Based on the result of these checks a traveler may be unable to travel because it is either believed or known that they present a public health risk. However, on the opposite end of this spectrum what we are faced with are more extreme measures including compelling healthcare professionals to breach

doctor-patient confidentiality by notifying the relevant authorities of the details of an affected patient. In such an instance, it may be necessary for the freedom of this patient to be restricted until they are so longer infectious. Similarly, another extreme measure may be the implementation of a quarantine. While there exist clear examples of situations where the potential harm that an individual or individuals may cause to others requires compulsory measures as a means of controlling the action of those who may fail to act in a manner that is responsible and considerate of others, there is still a potential dilemma that exists. This dilemma centers around the questions of precisely how high the likelihood of harm should be in order for it to trigger restrictions as well as what degree of restriction can be justified by the action. In taking a proportional view the balance between harms and benefits needs to be maintained in order to ensure that the panic over the spread of the disease is not the cause of unfair restrictions.[68] It is in this way that by their very nature the utilization of restrictive measures such as quarantine can serve to highlight the opposing arguments between absolute personal autonomy and the collective rights of the community.[69] Specifically, what is revealed is that it is not, or rather cannot, be a matter of either/or, but that instead what must be found is a tenuous balance between both.

The stark reality is that by their very nature medical quarantines often serve to threaten the civil rights of those that they confine. Such threats generally present themselves in one of two ways. First, there is the potential that the quarantine will inflict harsh conditions on those that are being quarantined.[70] While what is considered harsh can vary based on the individual in recalling that even within the United States there do not exist universal provisions relative to safety of quarantines or directives requiring that they all meet the standards to be considered humane, there exists a wide array of unpleasant possibilities. Second, there is the chance that quarantine

may be imposed in a manner that is either arbitrary or discriminatory in nature.[71] This can be viewed as being especially plausible in situations where large-scale geographic quarantines are implemented or in instances where specific populations are targeted either because of a predisposition to being infected with a certain type of disease or a belief that it is likely to be more prevalent in their community. While such concerns may seem too broad or otherwise overblown it is important to understand that because of their tie to infectious disease that they are not. In general, infectious diseases, especially when they are presented as epidemics serve to commonly trigger instincts that are both retributive and discriminatory. As a result, quarantines which are meant to improve or at least protect, public health, in fact often lead to the individuals being quarantined being treated in a manner that is inhumane, stigmatizing, or even penal based on factors that have nothing to do with public health such as the whim of a public health official or someone acting in their stead or even prejudice.[72] What this serves to mean is that quarantines and their implementation are presently designed, utilized, and governed in such a way that even what many individuals would consider basic protections are in fact neither guaranteed or even required as a matter of course.

In focusing on the basic provisions that quarantine does not have to provide as a matter of protecting personal civil liberties focus can be placed on the concept of "negative liberty". While not a standard term the United States Constitution is often referred to as promising "negative liberty". This can be presented in two ways, both of which serve to define the term and both of which are valid. First, the term "negative liberty" is reflective of the distinction between freedom from (negative) and freedom to (positive). For example, there does not exist any federally mandated right to food, shelter or healthcare. This is due to the fact that the Constitution does not require that the federal government act as a provider of these things to its

citizens; however in other countries their constitutions declare that the government is responsible for these things.[73] Salient to the implementation of quarantine this aspect of negative liberty can be applied in that even in quarantining an individual the responsibilities of the government or other official entity quarantining them do not serve to extend beyond the responsibilities that they would have for or toward that person under circumstances that were not a public health emergency. Such a reality not only underscores the ways in which civil liberties can be ignored in a quarantine situation but also serves to provide a justification for these actions. Second, "negative liberty" can also be used to denote that while the Constitution seeks to protect individuals from actions that originate with or are undertaken by the government that such protections do not extend to actions that are taken by private parties like corporations. The rationale for this provision was that the framers of the Constitution had a fear that the powers of the government could be used to either overwhelm or suppress individual liberties. This clearly does not mean that there are no laws in place that restrict the actions of private individuals or entities, instead it means that they must fall within specific statutes.[74] The need for those restrictions to fall within certain statues serves to limit what, if any actions, can legally or feasibly be undertaken in instances where an individual has their civil liberties violated as the result of a quarantine that may be implemented on a local level such as at in an industrial setting following the release of a chemical into the warehouse.

Thus, far the violation of civil liberties has only been discussed in an abstract context. However, there do exist specific examples of where violations have occurred. One example stems from a quarantine that occurred in 1900 in San Francisco. Another example is from a 2003 quarantine in Singapore. The significance of these two examples within the context of this work centers around the fact that they come from two separate centuries and two separate countries.

This fact helps to illustrate both the historical and contemporary ways in which quarantines have violated civil liberties, and showcases the fact that such violations are not unique to a single country.

First, focus can be placed on San Francisco in 1900. On March 6, 1900 after the death of Chinatown resident Chick Gin, the city of San Francisco implemented a geographic quarantine that extended across the entire twelve block radius of the neighborhood effectively trapping the residents inside its borders. There are several aspects of this quarantine that are especially important to consider. First, the implementation of the quarantine occurred days before lab tests were able to provide confirmation of the initial diagnosis: bubonic plague. Second, out of the 35,000 residents of who lived in Chinatown, significantly less than 1% of the population was actually revealed to be infected. In fact, only 4 individuals were actually ill. Third, during the quarantine the residents were treated incredibly poorly. The San Francisco Health Department spent weeks attempting to inspect and disinfect every home and building in Chinatown. In working to try and accomplish these individuals were thrown out of their homes, personal property was confiscated and burned, and those who were deemed uncooperative were beaten. Additionally, while the Chinese residents of the neighborhood were restricted from leaving Chinatown, whites were allowed to come and go in and out of the area without any restriction on their movements. Additionally, it took the actions of an outsider to raise funds to ensure that food was provided to those who were quarantined. Finally, the Chinese were ultimately forcibly inoculated with the Haffkine vaccine. This vaccine was largely experimental in nature and in addition to the fact that it was not known to be an effective measure it also caused serious side effects.[75] In viewing this quarantine objectively it seems like an act of blatant xenophobia, and by extension prejudice against, the Chinese residents of San Francisco. This is made apparent

when it is noted that in the event that it was believed that there was a legitimate public health threat that individuals from outside of the neighborhood would have been forbidden from entering and exiting it freely in the same manner that the movements of the residents were restricted.

Second, consideration can be given to Singapore in 2003. During the SARS outbreak in this country individuals who were quarantined were required to appear routinely in front of web cameras that had been installed in their homes. Any failure to appear in front of the web camera were then made to wear electronic bracelets. This practice both violated the liberty of the quarantined individuals, but it also publicly identified those who were under quarantine serving as a breach of confidentiality.[76] Without disputing the potential viability of electronic monitoring as a measure for ensuring that quarantine remains unbroken what must be considered is the particularly invasive nature of a practice that required the installation of web cameras into the homes of those being quarantined. The security risks of webcams are significant. First, early webcam models were insecure by default as a result existed websites which offered thousands of viewing options for these streams.[77]

In serving to highlight how important civil liberties are it must be noted that as of 2014 current quarantine laws were in the process of revision due in part to the ways in which the issues of quarantine are reflective of the myriad of tensions between the rights of the individual versus the rights of society as a whole.[78] However, as evidenced by the revised Quarantine Act in Canada there does not exist any guarantee that such revisions will actually serve to address underlying issues or provide any significant remedy.

2. Conflicting Goals

Regardless of the factors surrounding when, where, how, or why a quarantine was

implemented or who authorized the implementation all quarantines are meant to have the same core goal of prohibiting infectious disease from being spread. However, even in instances where there is no opposition to this goal per se there may be other goals which are seen as being jeopardized or otherwise called into question by the quarantine. In these instances, it can present a dilemma for the professionals in these positions.

Within all healthcare organizations conflicting goals and interests along with ambiguous preferences coexist in a perpetual state of uneasy tension.[79] This may however be exacerbated in an emergency medical situation, regardless of the setting, such as one which necessitates the need to implement a quarantine. The rationale for this centers around the fact that just as the desire to preserve civil liberties need to be weighed against the overall good of protecting public health, quarantines serve to present healthcare providers with ethical goals that may cause them to experience similar ethical conflict. As an example of this consider that while it is the role of physicians to treat a patient under their care and by extension consider their needs first forest, when placed in an emergency medical situation of any kind, such as the types of situations that require quarantine, what must instantly be developed is a new doctor-patient . Operating under the new dynamic decisions are made in the context of uncertainty and additionally require that the physician look beyond their individual patient and both ask and answer the question of what may be best for the community at large.[80] Placed in such a condition it may be necessary for a physician to ignore, or act against the best interests of an individual, their patient, who they may have built a rapport with in favor of a divergent focus that is far broader in nature. This serves to effectively shift the core concern of physicians and places an expectation on them to be equally, if not more, focused, on the larger group in order to identify, and if possible vaccinate against or immediate treat, and emerging infections. In putting this into greater perspective it must be stated

that such actions will clearly be easier for some physicians than others. For example, emergency room physicians who are more used to the process of triage as a part of their standard work flow will likely be better suited to this type of shift in focus than physicians who have chosen to work in specialties where there is a greater emphasis on doctors and patients working together one-on-one. It must however be understood that based on the scale and scope of the quarantine that it will be necessary for physicians of all kinds to be on-call.

In addition to physicians social workers may also be faced with conflicting goals during emergency medical situations in general and when faced with the implementation of quarantine in particular. While the potential reactions and responses of social workers may not seem pertinent within the scope of this work, emphasis must be placed on two factors. One factor is their own unique role within their own fields as a unique mix of confidante, counselor and facilitator. Another factor is the ways in which the actions or inaction of social workers can serve to impact what medical decisions individuals make or which medical decisions are deemed necessary for them.

Similar to physician social workers can be positioned between what their clients need as individuals and the needs of the larger communities where they work. In looking at something like the case of an individual and their right to health and the demands that may be imposed by a public health regime, it is the role of the social worker to strike a balance between these two divergent forces. This particular tension has manifested itself over the course of various health crises including those involving epidemics and when it occurred individual social workers can be integral in influencing the implementation of public health strategies with a focus on human rights. This is due to the fact the social workers to operate on both the micro and macro level, both with their patients and within the confines of the broader systems that serve those patients,

can leverage their awareness of how systems of power and privilege intersect as a means of recognizing the individuals and communities that may be at a higher risk for being exposed to health crisis and work in part to ensure that they have access to healthcare, education and preventative services. As a whole, social workers have a natural disposition towards fighting against the violations that are experienced by, and serve to frustrate marginalized populations, while at the same time being given access to information relative to the broader implication of public health activities and the possible impact of those activities on health at a community level. This places social workers in a position where it may be possible for them to ensure that individual rights are only minimally infringed upon, ideally only to the absolute minimum degree that would be necessary to protect the public health while at the same time advocating for all other options before those that restrict human rights are restricted.[81] The issue that however arises is that any actions that a social worker may take relative to quarantine conditions may, depending on the locale, be within the full scope of the law, and may not necessarily serve to positively impact those who at the present time are being detained by the quarantine. In such instances the issue of conflicting goals may arise as a social worker finds themselves torn between one client or one set of clients who may be adversely impacted by certain quarantine measures and what this can mean for both them and future clients who may be similarly categorized, and the needs of other individuals who they have been charged with providing services to.

3. Compliance

There previously existed a period where it was generally believed that individuals would be happy to be compliant with sensible disease requests, such as compliance with quarantine. However, during both the 2003 SARS outbreak as well as the 2013-2016 Ebola outbreak what

was demonstrated was the exact opposite of this attitude. In terms of the former there was a general lack of compliance along with instances of individuals fleeing the area. In terms of the latter, lack of compliance was demonstrated via individuals leaving the quarantine areas and unsanctioned night burials. In both instances what is clear is both the resistance that individuals have to quarantine, and more importantly the ineffectiveness of quarantine as a public health measure based on this.[82] This stems from the fact that a quarantine is most effective under conditions where 90% of the affected population makes the choice to comply with the quarantine order because the success of a quarantine is contingent upon its widespread application to nearly all individuals in the area. As a result in cases where a large number of individuals refuse to comply to a voluntary quarantine order the potential efficacy of that quarantine will be questionable.[83] For example consider a situation where a community of 1,000 people is asked to observe "snow day" measures and shelter in place in their homes as a part of a voluntary quarantine for the duration of 24 hours. The more people who choose to observe that quarantine, the more effective it will ultimately be while in contrast the fewer people who choose to observe that quarantine the less effective it will be.

Public health officials may continue to make presumptions of compliance because there exists an expectation that individuals will be inclined to participate in measures that are somehow in their best individual interest. However this presumption ignores two key points. These points relate directly to potential efficacy as well as the nature of the request being made.

First, there is no guarantee that a preventative measure will be as effective as it is intended to be. As an example of this note that even when faced with empirical evidence about the dangers of smoking, there are many individuals who make the choice to continue to do so.[84] It cannot be ignored that if people will continue to smoke when faced with everything from

highly visible public service campaigns online, on television, and in print media to warning labels printed directly on packages of cigarettes and other tobacco products, that presuming they will comply with a quarantine that in the greatest likelihood will be implemented as a part of a public health emergency where there may be limited, misleading, or entirely wrong information being disseminated is unrealistic.

Second, there are some requests which are viewed as being unreasonable in nature from the perspective of these being asked to comply. This viewpoint may serve to explain a lack of compliance with preventative activities.[85] Seeking to explore this consideration can once again be given to a scenario where the members of a 1,000 person community are asked to observe "snow day" measures and shelter in place in their homes as a quarantine strategy. When this example was initially presented it was done so with the duration of the quarantine listed as 24 hours. It is a reasonable assumption that barring a medical emergency separate from the threat of potentially being infected with a contagious disease, such as a pregnant woman going into a difficult labor or an individual having a life threatening allergic reaction, or a threat of unemployment if they do not attend work, that most, if not all, of the 1,000 members of the community would be willing to comply with this order for the period of one day. However, in extending the requested quarantine period by as little as one additional day there may be a decrease in the number of individuals who are willing to comply, and the more protracted the duration becomes the more unreasonable the request may seem to be by those who are being asked to comply with it. This can be seen as adding an additional layer of justification to the decision of Kaci Hickox to not comply with the quarantine order that she was issued which was meant to last for 21 days, the duration of the incubation period of the Ebola virus. Consider that when the order was issued that Hickox was already within the 21 day window between exposure

and possible infection. As such a more reasonable quarantine request would have asked that she shelter in place or in a quarantine facility only for the number of days that were remaining. For example, if at the time the order was issued it had already been 7 days since she had been exposed the quarantine order should have only requested her compliance for 14 days. There is no guarantee that Hickox would have found this solution to be any more amenable but by virtue of being rooted in more sound medical logic it is more reasonable.

Noting issues of compliance, it may be tempting for public health officials or their functionaries to immediately resort to coercive measures as a means of implementing a quarantine effectively when faced with the threat of an outbreak. However, it is important that those who need to be quarantined understand that the act is a preventative one and not a punitive. As a result, all reasonable measures need to be taken as a means of obtaining compliance and by extension some semblance of cooperation.[86] However based on factors such as how the quarantine is framed, what it required of participants, and how long it is expected to last compliance rates will vary. For example, there is a greater likelihood of getting people to comply with a short-term quarantine that takes place in their own homes and does not require invasive surveillance measures, than there is with getting people to comply with a quarantine regardless of length that requires them to be present in a specialized facility or other designated area where they can be monitored. Similarly, it must be understood that initial compliance and continued cooperation are not mutually exclusive. In this vein, an individual may initially comply with a quarantine measure only to make an active attempt to escape it if the parameters change or if at any point they simply no longer feel willing to be confined in such a way.

4. Fatigue

When considering issues of fatigue in relation to quarantine implementation there are two

divergent concepts that need to be presented. First, there are issues relative to attention fatigue. Second, there are issues of compassion fatigue. In both instances, what is hindered is the ability of a physician or other healthcare professional to accurately and adequately perform their duties to the detriment of both individual patients and the greater public health.

First, focus can be placed on attention fatigue. In any instance where a person spends a prolonged period of time working on a task that is cognitively demanding there is the possibility that they will experience mental or cognitive failure as the result. What occurs in these cases is a deterioration of performance relative to the task as well as reduced motivation to keep working. Additionally, what also occurs is an uptick in both the amount of errors that are being made and the severity of the errors. Finally, when observing individuals who are mentally fatigued what is often reported is difficulty focusing coupled with being easily distracted which serves to indicate that mental fatigue can have serious ramifications relative to selective attention.[87] In putting this information in the context of a quarantine scenario all one has to consider is a situation where there are a limited amount of physicians or other healthcare professionals available to monitor and respond to the threat. Depending on factors such as how many hours each professional is expected to work versus how much sleep they are getting, how repetitive the tasks they have to perform are, or how long they are expected to interact with the quarantined individuals it is plausible to presume that there exist certain conditions where mental fatigue would be especially likely.

Another type of attention fatigue comes in the form of complacency. Despite the importance of their roles in the medical community, there are healthcare professionals who are inattentive to infection control measures. This is problematic because constant vigilance is key in the maintenance of quarantine and other public health measures throughout the period of an

epidemic.[88] Complacency in public health emergency is detrimental not only for the individual(s) who may be infected, but also for the public at large. If signs of infection are missed, misdiagnosed, or mistreated based on the fact that healthcare professionals are not paying close attention, then the risk for an infection to become more widely spread is increased. Additionally, if healthcare professionals are essentially behaving in a manner that does not take quarantine seriously, then it can be presented that those without healthcare access and knowledge may not take it seriously either. This is another factor that can serve to increase the number of individuals who are potentially exposed to an infectious pathogen and potentially creating the conditions necessary for the spread of a pandemic.

Second, focus can be placed on compassion fatigue. Unlike attention fatigue which may be the result of a specific situation or series of situations compassion fatigue does not occur in a vacuum. Instead, this type of fatigue can be seen as extension of other tension that a physician may already be experiencing. The nature of being a healthcare professional is oriented in such a way that contemporary doctors are working in an environment that is becoming both more litigious and less forgiving. They can be subjected to bureaucratic requirements that are consistently changing while at the same time being expected to remain aware of medical advances, some of which are changing at such a frenzied pace that it is entirely possible for a physician to become acclimated to one chance just in time for something new to replace it. Additionally, there are limited healthcare resources in many countries and mistakes are often seen as being unforgivable. When these factors cause stress in high levels for an extended period of time there are a wide-range of effects that a doctor may experience as a result. For example, those who work with patients who are traumatized may begin to experience compassion fatigue. Compassion fatigue can manifest itself in a variety of ways. For example, a physician who is

experiencing this type of fatigue may feel a sense of intrusion, avoidance, and or even arousal. It must be noted that these sensations can occur even after exposure to one incident and the prolonged exposure to traumatic materials, traumatic recollections, and life disturbances may also lead to the development of compassion fatigue. There are two known coping skills that are meant to prevent compassion fatigue. The first is a sense of achievement. The second is emotional disengagement. In working under the assumption that the majority of doctors aspire to demonstrate compassion for their patients and their work it is likely that they will feel distressed if they have to practice in a compassion-depleted state.[89] Note that while quarantined individuals are not traumatized patients in a traditional sense that by virtue of what a quarantine entails that they may still feel as if they are experiencing a traumatic event. As such it is entirely plausible that these patients could serve to act as triggers for compassion fatigue if the medical professionals tasked with their monitoring during quarantine are already experiencing external stress. Additionally, it cannot be ignored that the potential coping factors are highly limited in nature. For example, feeling a sense of achievement presumes that the physician in question is someone who actually feels as if they have, or are, achieving something or that they are not already disillusioned about their position and its potential importance. Similarly, the act of emotional disengagement is not always easily practiced nor should it necessarily be presented as a remedy in a quarantine situation noting that there exist no universal standards for quarantines to be either safe or humane. Based on that fact suggesting that doctors distance themselves emotionally from either the patients in their care or their surroundings can actually create a situation where they actively ignore a patient who is being abused or otherwise mistreated.

5. Communication Issues

When seeking to address matters of communication in relation to healthcare what is being

addressed is twofold. First, what must be considered are the ways in which physicians as well as other healthcare professionals and other public health officials are communicating information both to the general public and to those who are quarantined. Second, what cannot be ignored is what, if any, ability to communicate is granted to those who are being quarantined. The exploration of both of these factors is necessary as a means of showcasing the full breadth of potential communication issues that can, and do, arise, during quarantines.

Communication is a key factor in healthcare in general, and is especially important relative to the implementation of quarantine measures. Healthcare professionals can generally handle single cases and make limited contacts, however the need to implement a quarantine presents a unique set of challenges and concerns in that there is a need to balance pertinent communication against the needs and nature of the community. Specifically, information must be relayed in such a way that it expresses the urgency of the situation without serving to cause an unnecessary disruption. Additionally, physicians especially may need to deal with a variety of questions relative to the actions surrounding the quarantine[90]. What also cannot be understated is that healthcare professionals need to be able to collect pertinent information from those who may be infected, or otherwise exposed to the disease. In a small town, this may not present as a large issue, but it can be particularly difficult in a larger city, or in an area where there is a large population of individuals who do not or cannot communicate in a language familiar to the healthcare official as it may result in miscommunications and information that is incomplete, erroneous or delayed.

In taking a more nuanced look at what the effects of poor communication can be focus can be placed on what occurred in West Africa during the 2014 Ebola outbreak. As aforementioned West African governments in numerous countries took the necessary steps to

quarantine entire neighborhoods where they believed there was a risk even in instances where cases of Ebola had not been accurately identified. The result of this were vocal and physical outbursts of both anger and violence as local citizens made the claim that they were more likely to die from hunger than they were from the Ebola virus. This viewpoint on the part of the citizens was justified based on the fact that it was only after the epidemic was underway that any attempt was made to reach out to the quarantined communities and offer an explanation on what Ebola was, how it was spread, who was at risk, and why the government had made the decision to respond in such a seemingly aggressive manner. In addition to this delayed communication of the existing health risks in many instances little to no attention was paid to local cultural belief systems and decisions were often made by public health officials without carefully considering their potential ramifications on the populace that would be directly affected.[91] In many ways the communication methods employed in this instance can be seen as mirroring an unorganized version of the game telephone. In playing this game there is a speaker who creates a message and whispers it into the ear of the person next to them, this person then follows suit and the act is repeated until it reaches the final person in the chain who is them expected to repeat the message aloud. As expected more often than not the message that is repeated at the end of the chain differs, in some cases drastically, from the original message that was shared. As frustrating as this process can be for the children who are playing this game consider for a moment how high such frustrations must be amplified for individuals who are living under a quarantine and either receiving no message at all, a message that arrives too late, or a message that in some cases may not make any sense because it is in opposition to what it is that they believe or have been taught up until this point.

As difficult as it can be for quarantined individuals to receive clear information in a

timely manner, it can be equally if not more difficult for them to communicate with those who are outside of a quarantine zone. One of the defining aspects of quarantine is that it creates a literal distance between people. As such even someone who is quarantined in their own home may have certain comforts but communication is not always one of them. Therefore, as a matter of practicality one of the elements which may help to foster compliance with quarantines is to ensure that communication between those who are quarantined and their friends and family who are not can take place. Items like mobile phones and utilities such as internet connections allow for individuals to keep in touch with each other and express things such as the way they are being treated.[92] Individuals who live in industrialized countries, especially those have access to wireless and/or high-speed internet or their own mobile phones may view such forms of communication as so commonplace as to take them for granted. However, in a quarantine situation, especially in a scenario where an individual is detained away from home and access to their normal communication devices is restricted, or in a scenario where the quarantine is being implemented in an area with a poor overall communication infrastructure, the ability for a quarantined individual to be able to communicate with the outside world can be viewed as priceless.

6. Attitudes Toward Quarantine

Thus, far when considering pitfalls inherent to quarantine focus has been placed on matters that are likely to arise after a quarantine has already been implemented. However, it is also important to consider a potential pitfall that may arise in instances where the public either believes that a quarantine may be possible or once a quarantine is completed. In that vein, it becomes necessary to focus on public attitudes toward quarantine.

In seeking to understand the potential public reaction to the use of widespread quarantine

in the event that an outbreak was to occur researchers from the Harvard School of Public Health along with the United States CDC, surveyed residents of four countries included Hong Kong, Taiwan, Singapore, and the United States. In general, those who responded to the survey voiced concerns about potential overcrowding in quarantine locations, the fear of contracting an infection by virtue of being quarantined and a worry that being quarantined would not allow them the option of communicating with their friends or family. Specifically, the survey found several key points. First, researchers found that in countries where there were higher rates of disease outbreak, in this instance SARS, that respondents were more worried about contracting the disease. This is significant because it can be correlated with previously completed research that found that the greater concern a person felt about a particular health threat the more likely they were to alter their behavior. Second, the research found that there were generally high levels of support for preventative measures such as wearing a mask or an individual having their temperature taken. However, the support for quarantines was not universal, while individuals in Taiwan, Singapore and Hong Kong generally favored the measure even if it was compulsory, in the United States only 42% favored a quarantine that was compulsory and of that group, especially among African Americans that number decreased once it was revealed that an individual who did not comply could be arrested. Similarly, there were wide variances in all four countries about which methods of monitoring for quarantines individuals found acceptable. For example, in all four areas there was significant opposition to periodic video screening being used as a method to monitor those in quarantine. It is important to understand that in each of these countries a random sample was utilized.[93] The importance of specifying that the sample was random centers around the fact that it ensured that the participants were not solely those who had been through a quarantine or those who knew someone who had been directly impacted by a

quarantine. This is imperative because it meant that their attitudes in these cases were not biased by what may have been one-time bad experiences with quarantine measures, but instead that their perceptions were more likely to be focused on generalized and brad feelings about public health.

Similar to the survey conducted by the Harvard school of public health and the U.S. CDC was a survey conducted following the SARS outbreak in Canada. While this survey was limited to 500 random participants in Toronto its results are still important because it considers an area of the world not addressed by the other survey. Specifically, its findings indicated that there existed a strong public report for the implementation of quarantine when it was deemed to be necessary as well as support for the utilization of serious legal sanctions against anyone who failed to comply. [94] The distinct willingness to allow for the levying of legal sanctions against those who fail to comply with quarantine can be seen in part as a desire for individuals to have some say in what type of public health actions are taken while also conveying how important it is that the public is protected from potential threats.

The overall importance in understanding public attitudes about quarantine is that it can aid public officials in developing methods that are more likely to be viewed by the public in a positive manner. As attitudes about quarantine shift so may the willingness to voluntarily comply. While this is in no way a guarantee it does exist as a possibility.

Conclusion

The impediments to, and pitfalls surrounding, the implementation of quarantine serve to showcase how present methodology in this regard is flawed. Reliance on a chain of command that is largely outside of the medical profession, along with a myriad of issues surrounding key issues such as compliance and communication illustrates how quarantines are ineffective in even

small outbreaks, and how they may be potentially useless in the wake of a widespread infection. While quarantines are meant to protect the public health, it must be asked what value they truly have and what cost they actually exact. Chapter five will explore these questions in greater depth by taking a look at the ethical as opposed to logistical problems which are associated with quarantine and the ways in which they may be solved for.

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Chapter Five- Ethics and Quarantine

Chapter four presented an exploration of the inadequacy of current quarantine measures both in the United States and abroad as well as the complete lack of viable protocol relative to the development of global quarantine implementation. In considering this information the reaction of some may be the desire to completely eliminate quarantine as a control measure in the public health sphere. For others however, there may be the desire to examine quarantine from a divergent standpoint before making any concrete determinations. In focusing attention on the latter viewpoint as the less extreme what must be addressed is the relationship between current quarantine measures public health ethics, global bioethics, and vulnerability. Such an exploration is imperative because it serves to provide insight into the fact that presently an effective quarantine and an ethical quarantine are not necessarily the same thing on either a national or international level as well as the fact that current laws do not serve to wholly focus on those who will be directly affected by them and what effect such an impact may plausibly have. The acknowledgment of this distinction provides two clear ways for quarantines to be framed and by extension two clear ways for current quarantine measures to be potentially amended.

A. Overview of Ethical Parameters

There are myriad of ethical parameters that govern the medical field as a whole and medical practitioners and interventions in particular. It would however go well beyond the scope of this work to give consideration to each and every one of these ethical schools of thought. Instead, in considering both the global nature of this work as well as quarantine as the specific public health measure being explored focus will be placed on two types of ethics. These ethics include public health ethics, and global bioethics. The rationale for such a selection centers around their salience to the topical points. In taking this viewpoint careful consideration will be

placed on the origin and basic roles and functions of each ethical discipline. Additionally, there will also be a focus on the nature of vulnerability as ethical consideration with attention being placed on both its general nature and the way in which it can be applicable in terms of both public health ethics and global bioethics.

1. Public Health Ethics

Public health ethics can be reliably dated back to nineteenth-century England. During this time period there were massive outbreaks of cholera that were having a significantly adverse impact on the population. As a result, there was considerable fear and alarm in all of the major cities of the country. This was especially true for London. The prevailing medical theory of the period presented that cholera was caused by "bad air" or a "noxious miasma". This has of course since been proven untrue. Instead the spread of cholera is the result of unsanitary conditions, in particular drinking water that has been contaminated. This fact was established by a physician who discovered that the highest rates of cholera in the Soho district of London were in an area around a water pump on one of the streets. After making this discovery the physician was able to halt the spread of the disease by having the pump handle removed.[1] When compared to the decisions which needs to be made within the context of contemporary public health ethics the act of removing a water pump may register as so minor as to be viewed as inconsequential. However, the significance of this act should not be understated in the sense that it serves to provide the first clear example of a healthcare professional acting in a manner which can be viewed as equal parts morally and medically motivated.

While it is possible to place the origin of the discipline of public health even further back than the nineteenth-century, it must be understood that the more concrete ethical principles and codes which exists as guidance for public health practice have only been formulated

relatively recently. Such ethics serve to emphasize public action for the good of the community and as such they exist in contrast to the core principles that medical and research ethics are developed around, principles which are guided by the moral axiom that an individual has inherent value within and for themselves and that they should never be utilized merely as a means to an end for another person.[2] It is therefore the distinct focus on the public good in all instances what serves to make public health ethics so unique as a discipline.

As a discipline, public health ethics can be described in a variety of ways. One description presents it as a problematic triad. The members of this triad include governments, populations, and individuals and these three are viewed as being problematic because of the potential clash between members. For example, individuals and populations sometimes clash as the desired or granted rights and freedoms which the individuals have can be at odds with what may be needed to protect and promote the health of the population. When such clashes occur it then falls to the role of the government to act as the arbiter. In some instances, the government will side with the individuals while in some instances the government will find it necessary to side with the population. When the former occurs, individual liberties are prioritized over communal health benefits and when the latter occurs the health of the community is prioritized over individual rights and freedoms. What must be understood is that in such instances what is more important than the outcome is the fact that the triad exists and is interacting at all. Another description of public health ethics views it as a taxonomy of public health interventions and their distinctive ethical components. In taking such a view what is presented is the fact that every main type of public health program has corresponding ethical issues which are distinct to the program. For example, screening is a specific health intervention and inherently connected with it is the ethical issue of what kinds of conditions it is appropriate to screen for.[3] Regardless of

the manner in which an individual chooses to view public health ethics the underlying idea is the same in that public health ethics is defined by interactions between individuals and groups and the treatments that are either proposed, or in some cases withheld from each. In this way, it can be presented not as a matter of deciding whether or not a certain intervention will be beneficial per se, but instead how beneficial it will be and who exactly it will benefit with the deciding factor needing to be whatever is ultimately seen as being able to do the most good.

When focusing specifically of the practice of public health it has been found that ethical issues often arise as a result of differences in the beliefs and values among members of groups, between the interests of different populations, or between populations and institutions.[4] Given the inherent moral tug of war which serves to fuel this school of ethical thought that should not be surprising. However, it must be noted that making these ethical decisions is not merely a matter of the opinion of one group being presented against the opinion of another group, but instead that there exists a clear code of ethics which can be followed in order to help facilitate making such decisions.

The American Public Health Association (APHA) published its first code of ethics for public health practitioners in 2002 entitled *Principles of Ethical Practice of Public Health.* The code lists 12 principles written with the goal of establishing acceptable behaviors and values for public health practitioners. In this same vein, the intent of the authors was that their combined work would serve to clarify the populations and communities as well as the ideals of public health institutions that served them, ideals for which the institutions could be held accountable.[5] It is not enough to know that such a document exists, instead it is imperative to understand, at the very least, the crux of its contents.

The presented principles within the code emphasize social justice, human rights,

community, and the protection of research subjects. Additionally, it is written in such a way that it does not provide a comprehensive moral system of ethics, or a specific action guide rooted in concrete examples. This was intentional on the part of the authors who worked to use a language that could be adapted by public health practitioners and institutions alike.[6] It is also plausible that the authors sought to utilize a language that was adaptable as well as a means of being reflective of the inherently changeable nature of the public health landscape.

What the code does seek to explicitly do is to balance the interests of populations and individuals. This is evident in Principle 2 which presents that the achievement of public health should be accomplished in such a way that the rights of the individuals in the community are also respected. However, in the same provisional language which is utilized throughout the text it does not specify precisely how to balance those commitments when they conflict, or more specifically what should be done when faced with a certain type of case. This is despite the fact that the question of how to achieve balance between the interests of populations and individuals is, and has always been, central to the formulation of public health ethics.[7] The vague way in which the authors of the APHA chose to address the central tenet of the very discipline that they had provided a code for is indicative of the problems with the code that cannot be ignored.

In issuing the APHA what was ultimately issued was not a comprehensive code that could actually and effectively be utilized to either govern behavior in public health and/or hold public health institutions and practitioners accountable. This is due to the fact that the intentional and inherent limitations to the code exhibit two significant failings. First, the authors failed to engage specific ethical principles. What the APHA did instead of the provision of specific ethical principles that could act as a code which could both govern behavior in public health and/or hold both public health institutions and practitioners accountable was to provide an ethos for the field.

Second the authors failed to address the realities of the legal underpinnings of public health practice. The unfortunate result is that public health ethics still lacks the theoretical foundations and the synergy between theory and practice that is utilized in other fields. What this means is that public health practitioners are often forced to turn to medical ethics and research codes whenever they require professional moral guidance.[8] While the review of such codes can be, and likely is to a certain extent, useful it is not the same as being able to reference something specific to the discipline in which these individuals and institutions operate.

Based on the failings of the APHA it should not be assumed that public health practitioners and public health institutions are left to navigate without any guidance specific to their discipline. Such guidance comes in the form of a recently developed systematic framework for ethical analysis in public health that was designed to provide practical guidance. In looking at this framework in depth what is revealed is that it is comprised of two core elements which the creators identified as being necessary for any public health ethics framework which include both a base of explicit ethical justification and practical guidance for those working within or around the field. While there are several frameworks which have been previously developed not a single one has received universal approval.[9] Despite the lack of consensus relative to acceptance though it is necessary that a systematic framework is explored as a means of showcasing both how and why it works as well as why it exists as more beneficial than the APHA.

Within the context of this work, the framework being considered is one which was designed to address the shortcomings of earlier designs. This framework is being presented in brief as a matter of providing comparisons to the APHA, and as such only the most relevant aspects are being presented. Specifically, the framework includes an explicit normative foundation which is meant to provide guidance in the field of public health as a whole. This

foundation addresses five core criteria relative to all public health interventions including 1) the expected health benefits to the target population, 2) the potential harm and burdens the intervention could cause/impose, 3) the impact of the intervention on personal autonomy, 4) the impact of the intervention on equity, and 5) the expected efficiency of the measure. The framework is systematic in both selection and application of the normative framework. In terms of the former what this refers to is the manner in which the ethical norms provided are chosen. In this vein it must be noted that such a criteria is only met when the process to find such norms follows and defined methodological approach which identifies a comprehensive list of ethical norms and principles that are relevant and by extension should be considered in every ethical analysis of public health and its practice. In terms of the latter what this refers to is the process by which the norms are ultimately applied. In this vein there should be an explicitly designed process and in the event that deviation from procedure is necessary it should be justified. The inclusion of both of these elements was deliberate in that it allows the framework to explicitly link ethical analysis and empirical evidence.[10] Such a connection is precisely what was missing from the APHA.

2. Global Bioethics

Before delving into any discourse on the subject of global bioethics it is first necessary to look at the field of bioethics. In relation to medical ethics as a whole, bioethics exists as a fairly new field, one which only came into existence in the mid 20th century. It began in the context of doctor-patient encounters.[11] While not credited with its formation, bioethics can be seen as being rooted at least in part in the 1947 Nuremberg Code which made informed consent the fundamental ethical principle for all scientific research that involves human participants.[12] In seeking to provide insight into exactly who coined the term or where the practice originated there

exist divergent and conflicting accounts, as such Fritz Jahr, Van Rensselaer Potter, and Andre Hellegers, have all at one point with credited creating the term. In looking solely at the earliest usage however, that distinction goes to Jahr who first used the term in 1927.[13] In seeking to build upon this idea of the discovery and re-discovery of the term it is interesting to note that in some instances bioethics is viewed and thereby presented as a Western phenomenon, one which by extension is rooted in Western ethical principles and values. This viewpoint is evident in work such as *The Birth of Bioethics* by Albert Jonsen which presents bioethics as having originated in the United States to the detriment of not adequately or accurately presenting or exploring bioethics in other countries or cultural contexts.[14] Noting this conflict, it may make more sense to explore when the term bioethics was first utilized in intellectual discourse. In this regard, it can be noted that the word bioethics was introduced in the early 1970s. [15] It was during this time period that the paternalistic authority of physicians was being called into question. In lieu of this viewpoint there was a shifting focus towards a form of medical ethics that was more squarely focused on the patient, or more aptly on patient autonomy.[16] Initial dilemmas in bioethics included matters such as whether or not dying patients should be told the truth about their condition, whether or not confidential information should be revealed, or whether or not a patient should have their liberty limited for their own good. By extension the earliest bioethical cases involved issues such as the utilization of life-extending technologies for coma patients or in cases of terminal illness, organ transplantation, abnormal pregnancy, and the utilization of human subjects in experiments.[17] The connecting thread between each of these issues is that before the formation of bioethics as a discipline they were decisions which were relegated solely to the domain of the healthcare provider considering only what they felt may be best for the patient or for what was understood about the way in which the doctor-patient relationship should work,

instead of considering what it was that the patient may want. Based on this much of the early work in the field of bioethics centered around the discussion of dilemma cases.[18] For consider a case where a patient may have come to their doctor with an unwanted pregnancy. It can be posited that prior to the development of bioethics that even in the absence of religious influence, that abortions were not suggested as an option for women who were unwed, those who were victims of sexual assault, or those who simply did not want to or plan on having children. The rationale for such a position centers around the fact that the paternal nature of the doctor-patient relationship did not dictate nor allow for discussion relative to what a patient wanted to do in terms of medical intervention but was squarely focused on what a physician believed would be physically best for their patient.

In a contemporary context bioethics operate in large part by practically applying four principles which are viewed as being central to the considered in the relationship between the health care provider and the individual patient.[19] It would be implausible to attempt to understand the driving force of bioethics without considering these principles.

The four principles that bioethics are centered around include the principles of autonomy, beneficence, nonmaleficence, and justice. Before moving forward, it is imperative that a simple definition of each of these principles is provided. First, the principle of autonomy is also known as respect for autonomy. This particular principle is rooted in both the liberal moral and political traditions which underscore the importance of freedom of choice. Second, the principle of beneficence is one which in the broadest sense focuses on any and all actions which may ultimately benefit the patient. Third, the principle nonmaleficence is built upon one of the most quoted phrases in healthcare ethics which indicates that physicians should do no harm. Finally, the principle of justice is left open to debate and interpretation but at its core is the idea

that similar cases should be treated similarly. Additionally, there is the concept of distributive justice which denotes that within a society distribution should occur in a manner that can be regarded as being fair, equitable and appropriate.[20]

Among clinical bioethicists these principles have what is known *prima facie* status. *Prima facie* status is given to any obligation that from a moral standpoint must be fulfilled unless it conflicts with an equal or stronger obligation. In making these decisions it falls to clinicians to identify the relevant principles, look at them within the context of the case that they are working on, and then ultimately justify their clinical decisions and recommendations by considering all of the weighted principles in relation to what may be in the best interest of the patient.[21] It is important to understand that in every case every bioethical principle will not be relevant. For example in a situation where a patient is receiving a follow-up consult for elective surgery that they have opted to have and their physician has already approved it may not be necessary to consider the principle of autonomy as it should have already been considered during the initial consult and so barring a change in the patient since that first visit, such as the onset of diminished capacity as the result of head trauma there should exist no need to reconsider the role of that principle.

Prior to the latter part of the twentieth century the principle of Beneficence, which is the set of actions that is intended to benefit others, was viewed as the core principle.[22] This can potentially be viewed as a holdover of the paternalistic nature of the doctor-patient relationship prior to the development and implementation of bioethics. However, Beneficence, eventually lost its primary nature. As a direct result of this it became the burden of healthcare providers to have their previously unquestioned goodwill open to be scrutinized and in some instances challenged outright by their patients. In this vein, it became insufficient for a physician to provide a patient

with set of instructions such as to take a particular medication and/or to get more rest. Even when coupled with years of training and experience, the directive of the physician was no longer enough incentive for a patient to engage in a course of treatment. Instead patients began to question what the medication was, what potential risks it posed, and if it was the only option available.[23] Essentially, by virtue of the development of bioethics in the first places physicians opened themselves up to this line of questioning. It was their own attempt at collective moral reasoning that provided the ability for patients to question that care that they were receiving.

What replaced Beneficence, and remains in a place of primacy into the present day is the principle of Autonomy. Within the United States as well as throughout much of the developed world it is seen as the principle clinical value.[24] While it is possible to explore these concepts in terms of comparing and contrasting them such discourse would not add to this work as the purpose of this author is not to debate which, if either, of the two principles is better. Instead, it stands as enough to define and describe each of them.

The perception of autonomy came in part with the decline of beneficence. Just as patients were asking questions about the potential risks associated with the treatment courses that their physicians wished to prescribe to them, they were also recommending treatment options of their own in some cases. This act, regardless of how small it may seem in the grand scheme of things is reflective of one of the many changes that occurred both socially and medically which allowed for Autonomy to become the prevailing principle. However, its role as the primary principle should not be misconstrued as it being the only principle. In fact, ethical theory continues to hold it in *prima facie* equivalence with the other three guiding principles of bioethics.[25] What this means is that even though there are some practitioners or even entire parts of the world that may view Autonomy has having some level of extra special significance that its actual significance

places it on par as being equal to Beneficence, nonmalficience, and justice.

Having addressed the core elements of bioethics, it becomes possible to address what global bioethics encompasses. It would be remiss to presume that global bioethics developed as a natural response to globalization without prompt, or that it is simply a term applied to bioethics now that globalization has occurred. Noting this, it is imperative to explore both its origins and its intended purpose and function as a means of both differentiating it from bioethics as well as indicating its importance in relation to quarantine in particular.

In looking at the origin of global bioethics it can most succinctly be traced back to the vision of Van Rensselaer Potter, an American biochemist. Is should not be misconstrued that Potter was the only individual to look at themes of either globalization or bioethics, however the global dimension of bioethics is something which had always been implicitly assumed by Potter even when it was not directly mentioned in his work. This is evident in part due to the fact that the basic problems which bioethics are concerned with such as overpopulation and poverty have an effect of some kind on everyone. Building upon this the goal of survival in bioethics is a globally focused on in that it views the survival of humanity as being at stake and the methods of bioethics are global in the sense that they serve to combine all of the intellectual resources that are available in order to find solutions that are long-term in nature. In looking specifically at the view point of Potter in relation to global bioethics what is truly being considered is the unification of two meanings of the word global. In this vein it is a system of ethics that has a worldwide scope and it is a system of ethics that is unified and comprehensive.[26] This viewpoint is one which can be seen as being as valid today as it was when it was first conceived, something which becomes clear as the purpose and function of global bioethics is explored in greater depth.

In looking at why global bioethics exists, i.e. its purpose, as well as how it works, i.e. its

function, what is being addressed is what the overarching goal of global bioethics is and how it is applied. The distinct goal of global bioethics is to address bioethical issues in a global context. This can only be accomplished by taking into account a wide variety of factors including the economic, social, political, religious and cultural realities and adopting various ethical methodological practices in order to find global solutions. Such solutions are important when it is understood that it is no longer possible to make effective policies regarding bioethical issues in isolation. Exemplary of this consider that we live in a world where it is possible for the decisions and actions, or inaction, of one nation state to impact those who reside well outside of its borders.[27] Salient to this work, consideration can be given to the spread of infectious disease and a basic understanding of the various ways in which it is and can be spread, a topic which has been discussed at length in previous chapters. While the focus of global bioethics is not solely or even primarily linked to the issue of infectious disease, there does exist a clear relationship between the two which can be addressed via the lens of quarantine.

3. Vulnerability

As essential as both public health ethics and global bioethics are from an ethical standpoint, what is equally if not more important ethically is the idea of vulnerability and the role that it can, and moreover does, play in relation to both medical practice as a whole and quarantine in particular. Noting this, it is key that the concept of vulnerability is explored both on its own and as it relates to both public health ethics and global bioethics. Such an exploration serves to provide another way in which to frame public health measures. Before delving into the role of vulnerability in either public health ethics or global bioethics, it is first necessary to provide a working definition of the term. Vulnerability can be, and has been, defined in

numerous ways. It would go beyond the scope of this work to explore every presented definition of the word; however, focus can be placed on two definitions which when combined can create a way in which to define vulnerability as it is being considered in relation to this research.

One definition of vulnerability looks at the etymological root of the word which means "to wound". Based on this the most widely accepted interpretation of the word is that it means someone or something which is either open to harm or under the threat of harm. This is a basic definition which can be applicable in a wide array of situations however it may serve to be so broad as to inadvertently include those who are not truly vulnerable or to conversely exclude those who may be truly vulnerable because of the fact that there are numerous perspectives which can be applied to the idea of who or what is vulnerable. Additionally, Second, if the concept of vulnerability is going to function as something which generates a duty or responsibility to prevent harms from coming to someone then the definition cannot merely be a statement of fact, instead it must also include a normative ethical element.[28] Therefore while this definition of vulnerability is factually sound it is also functionally inapplicable from an ethical standpoint which means that it cannot be included "as is" as the definition of vulnerability within this work.

Another broad, but more apt, definition of vulnerability presents the concept as a marker or signal for moral concern. Taking this approach to the idea of vulnerability allows it to be viewed without any reliance on either moral theory or preconceived wrongs as an inherent part of how vulnerability is defined. By looking at vulnerability in this way, i.e., as a warning, then there exists no need to provide a larger definition which incorporates every single case in which a person may be vulnerable. This allows for focus to be placed on firm ethical concepts, including, but not limited to, consent, and harm, while exploring the ways in which these

concepts are applicable in the individual case. The idea behind this approach is that it requires engagement with the more substantive ethical issues as opposed to relying on stereotypes of what vulnerable populations may look like.[29] This can be key as the result may be engagement with populations that are actually vulnerable as opposed to those that are expected to be vulnerable.

In combining the two presented definitions of vulnerability, the concept can be defined as anything which should be viewed as a potential source of harm for a population because it may serve to violate or otherwise infringe upon their ethical rights. Created for this work, this definition is important for three key reasons. First, it accounts for the fact that vulnerability is a concept that is often used in both public health ethics and bioethics, however there is neither a universally accepted or clear meaning.[30] In applying the definition created for this work it becomes possible to explore vulnerability in relation to both ethical disciplines. Second, this specific definition serves to clearly present the type of harm that may be caused, i.e. a violation of ethical rights. Finally, the definition is intentionally broad in that it does not serve to mention quarantine specifically; this is key as it allows for it to be used within this work without being viewed as biased toward it.

In looking first at vulnerability and public health ethics, it can be noted that the earliest organized public health measures, i.e. those dating back to the 18th and 19th century, are known to have paid special attention to vulnerable members of society.[31] The question may arise as to what makes a member of society, or a group, vulnerable. In the most succinct terms vulnerability is characterized by being at a greater risk of being at risk because of certain social characteristics.[32] While this may sound confusing all this means is from a public health standpoint those who are viewed as being vulnerable are looked at in this manner because there is a greater likelihood that they will be susceptible to public health risks based on broader,

reoccurring, or otherwise prevalent factors. Examples of such groups include, but are not limited to, those that are economically disadvantaged, ethnic minorities, the elderly, and the disabled.[33] While helpful in theory, public health interventions which focus on vulnerable populations may in practice actually serve to encourage inequality as empirical observation has revealed that members of vulnerable populations may be the least able to positively respond to such broad interventions. Additionally, such interventions may also have unintended, e.g. unfortunate, outcomes for vulnerable populations based on the fact that there may exist inconsistent or inappropriate social or cultural assumptions between these groups and public health practitioners.[34] It is precisely because of this disconnect between vulnerable populations and public health that there exists a clear need to rethink the manner in which the concept of vulnerability is viewed. In failing to refocus the manner in which vulnerable parties are viewed in essence what is occurring is a failure to be fully effective in assisting them from a public health standpoint.

In looking at vulnerability and global bioethics what is essentially being considered is a missed opportunity for cooperation. One of the roots of bioethical inquiry may be the concern for human vulnerability. Despite this, the concept of vulnerability is largely under-theorized in bioethical literature.[35] However, limited theory should not be misconstrued as no theory at all. In this vein focus can be placed on two viewpoints, one which serves to present vulnerability in comparison to autonomy and one which serves to assert that vulnerability needs to be present as a distinct bioethical principal. First, as aforementioned within this chapter bioethics, especially as it understood and practiced within a Western context, values the principle of autonomy as being of particular importance. In and of itself such a viewpoint is not problematic; however, an issue does arise when vulnerability is viewed as diminished individual autonomy as such a framing

serves to hinder the ability to fully understand and address issues of vulnerability.[36] The issue with taking the comparative viewpoint is that it is far too limiting. Rather than looking at, or seeking to understand vulnerability as an individual concept it instead serves to reduce it to a matter of either/or where an individual is either wholly autonomous or where that autonomy must be compromised because they are classified as being vulnerable. It must be understood though that there is no need for such a limited perspective as their exist some valuable perspectives which contribute to seeking to define the principles of vulnerability as well as how it could be made operational.[37] Within the context of this work focus will be placed specifically on the way in which the potential principle of vulnerability has been presented by Henk Ten Have. The rationale for this is that his work exists as in depth and specifically serves to address the idea from a global perspective which is relevant to the nature of this work. In summarizing the position of Ten Have what is presented is twofold indicating that vulnerability cannot be fully understood via the framework of autonomy, and that the language of vulnerability is such that it serves to go beyond the traditional model of autonomy in such a way that it can aid bioethics in a global sense.[38] In specifically framing vulnerability as a bioethical concept what is asserted centers around value and appeal. In terms of the former, vulnerability refers to a value, e.g. the classification of an individual as vulnerable is a value judgment and in applying ethical notions there exist implications that a valuation is occurring relative to either a person or group. In terms of the latter, ethical concepts as a whole imply that there is an appeal to act either because of a claim which has been made on us and/or a direction about what should be done. In the event that an individual is labeled vulnerable then that person should be protected, there needs to be a creation of certain practices that ensure that they are not damaged.[39] What is offered is a simplification of the work of Ten Have but it serves to offer insight into the role that

vulnerability could play if adopted as a formal principle of global bioethics in that it would serve to provide clear ethical guidelines within the parameters of this particular discipline.

In attempting to correlate the concept of vulnerability with both public health ethics and global bioethics there exists one key issue which cannot be understated. In neither discipline, there is no clear or wholly effective method for providing assistance to vulnerable individuals or groups. As aforementioned, within the field of public health ethics there exists the possibility that measures targeting these groups serve to cause more harm than good and within the field of global bioethics there is no explicit principle of vulnerability which can be referenced. In both instances this serves to exacerbate ethical issues as a whole as such lack may lead to vulnerable individuals or groups being placed at an even greater disadvantage.

B. Quarantines and Ethics

Having taken a broad view of both public health ethics and global bioethics it is now possible to apply what has been learned about each of those disciplines and examine the ways in which they work both with and against the public health intervention that is quarantine. Additionally, insight will be provided into the unique role that vulnerability plays. Such a focus is important not only within the context of this work, but also as a means of adding to the overall literature which currently exists of the subject. When objectively compared to the robust literature on clinical and research ethics in general, there exists a clear dearth of ethics literature as it relates to both infectious diseases and public health disasters however it is growing rapidly.[40] Adding to this literature takes on additional significance when it is understood that just as there are numerous risks to public health as well as an equal if not greater number of methods used to address those risks, that when looking at the methods almost all of them present one or more ethical problems. While the concept of risk itself is seemingly impossible to define in

value-neutral terms and is by that failed definition inherently controversial, what is even more ethically pressing is the questions of what level of risk can be presented as being socially acceptable to individuals and communities, who should be allowed to make decisions about that and how exactly should that risk be risk be distributed across the affected population.[41] Quarantine may exist as a partial answer to those questions, but that does not mean that it is not problematic from an ethical standpoint.

There exists a basic underlying tension between the protection of public health and welfare and individual rights relative to the prevention, treatment, control, and eradication of infectious diseases.[42] Discourse surrounding quarantine and its implementation can serve as a prime example of this tension coming to head and with good reason. Exemplary of this consideration can be given to quarantine and isolation with a focus on the fact that the former is more ethically problematic than the latter. The reason for this is twofold. First, unlike isolation which is a measure reserved for those who are known to be infected with a disease, the implementation of a quarantine involves the act of confining of individuals who might not be infected. For example, as presented in chapter four there was an entire village in Sierra Leone that was quarantined during the 2014 Ebola outbreak because there existed the possibility that any of the individuals might have been exposed to Ebola. Second, quarantine can force people who have not been infected to be in spatial proximity to those who have been infected which increases the chance that the healthy individuals may becoming infected. [43] Despite these inherent ethical issues to make the assertion that the implementation of quarantine measures could never be compatible with overarching public health or bioethics measures would be both fallacious and dangerous. As a public health measure the value of quarantine centers around the fact that when faced with the scarcity or complete absence of drug-based medical interventions,

quarantine may be the only available recourse as a means of mitigating the spread of infectious disease. Additionally, quarantine exists as relatively inexpensive and low-tech when compared with other disease prevention measures, and it can be, if necessary, applied to a large group of people at once. What cannot, and more importantly should not, be ignored though is that implementing a quarantine can, and often does, present a wide array of ethical issues.[44] Specifically, in focusing on the common good, e.g. the good of the group what may be sacrificed are individual liberties. In seeking to explore these issues in depth it becomes necessary to view quarantine via the distinct lenses of public health ethics, global bioethics, and vulnerability.

1. Quarantine and Public Health Ethics

Within the United States the primary responsibility for public health matters within their borders resides with either local or state governments. This includes isolation and quarantine. In such instances however applicable state laws, regulations and procedures vary widely.[45] Additionally, it must be understood that while outside of the United States quarantines can be implemented differently that they are still subject to the regulations of whatever public health legislation is in place. Based on this it is usually accepted that when it is deemed necessary to protect the public from harm that there exists an ethical justification for any measures that restrict individual freedoms in instances where the least restrictive measures are used.[46] For example, an individual who is traveling by air from a country where there is a known public health threat into another country where public health officials are attempting to prevent that threat from either entering their borders or spreading further and infecting more of its citizens may expect, and will likely comply with, a relatively non-invasive health screening method, such as allowing their temperature to be checked when they first enter into the country.

In looking beyond one-time, extremely limited public health measures like temperature

screenings focus can be placed squarely on quarantines and their relationship with public health ethics. It would be both simplistic and fallacious to make the assumption that because quarantine is a public health measure, that it is always implemented in accordance with the best practices associated with public health ethics. Based on this it is possible, and even plausible that there are instances of quarantine implementation where public health ethics were not properly employed. In this vein consideration can be given to three of the most basic aspects of a quarantine including where it will be located, how those quarantined will be monitored, and whether or not it is likely that there will be compliance. This must be considered because of the inherent ethical conflict that arises whenever there is the possibility of implementing a public health measure that may infringe upon certain liberties, e.g. isolation and quarantine. Specifically, just as it is ethically problematic to allow a person who may be infected with a disease to roam freely, it exists as equally ethically problematic to restrict the movements of such an individual.[47]

One of the key aspects of a quarantine is where it will ultimately be held. In this regard, modern ideas about quarantine do not often look to measures that involve formal confinement but instead consider methods like “snow days” which were discussed in depth in chapter four, protective cloistering, or voluntary sequestering. However, idyllic such a thought maybe it exists in stark contrast with the reality that regardless of where a quarantine occurs in the world federal and state statutes rarely serve to specify where quarantine should take place, as such there exist a wide array of options. For example, when looking at the various SARS outbreaks across the globe homes, hospitals, schools, workplaces, and other institutional settings such as military bases, prisons, nursing homes, and stadiums. Based on these numerous possibilities there exists serious concern with quarantine simply as it relates to location. This is due to the fact that where a quarantine is located can be critical as certain locations may be prone to overcrowding whereas

others may increase the risk of being exposed to infection, or limit the quality and quantity of contact with loved ones. Far from being disproportionate to reality the public concerns which center around the location of a quarantine can be valid for numerous reasons. First, the logistical problems of large-scale quarantines would be formidable to overcome. As a result, there may not be any guarantee that the locations selected would be either safe of hygienic. Second, the more remote a location is the more limited access would be to things such as comprehensive medical and nursing care, basic necessities including food, water, clothing), and communications.[48] In taking a broad view and looking that the ways in which location can serve as a means of either helping or harming the individuals who are quarantined it becomes clear why it is such a salient issue when considered in relation to public health ethics. Without being able to guarantee that those who are being quarantined are in a location that is safe e.g. a location that will be beneficial to the health of most, if not all, of those who are being quarantined then is clear that such a location does not meet even the basic standards set forth by public health ethics.

What can be equally problematic to finding a safe location is figuring out the logistics that are associated with the monitoring of those who are quarantined and by extension ensuring that the quarantine orders and enforced. In looking once again at the global issue of SARS authorities in various jurisdictions enforced the quarantines which had been implemented by resorting to intrusive surveillance methods. These methods included the utilization of thermal scanners, electronic bracelets, Web cameras, or placards.[49] The question that must be asked is whether or not such invasive methods were necessary from an ethical standpoint, for example were they solely being applied on individuals who had attempted to escape the quarantine. If the answer to that it no, and instead it is found that these measures were being applied on everyone then they were not being used for the collective good per se. At best, it may have been believed

that the more technologically advanced the measures used were that the safer the quarantine may seem, at worse however they were an egregious and unnecessary show of force.

Having addressed both location and monitoring it is possible to look at the relationship that can exist between quarantine, public health ethics and compliance. Past experience provides insight which presents that both voluntary cooperation and public trust exist as central to ensuring that responses to public health emergencies. Additionally, past experiences may also provide important antidotes to quell any individual fear or community based panic that can accompany the announcement of an infectious disease outbreak. The role of public health ethics in this regard is to be attentive to the ethical values at stake in public health decision making as this can help to foster voluntary cooperation and broader public trust both of which should be integral aspects of state and federal pandemic preparedness planning.[50] When public officials are looking at precisely what ethical values may be at stake one of the most helpful things for them do may be to look at the problematic triad that is central to public health ethics. In seeking to truly understand what it is that individuals may feel that they are giving up for a broader public good that they may not wholly understand or consider relevant to them, it may be possible for public health officials to develop a strategy that better explains why quarantine is necessary or serves to clarify information that they may not have been considering as unclear from their vantage point but which may not be readily understood by someone in the position of a lay person.

It is without question that quarantine is one of the more extreme public health measures available. As such it is necessary that there are significant safeguards in place to protect those who are being asked to volunteer for, or otherwise ordered into, a quarantine. Ideally such safeguards should include a scientific assessment of risk and effectiveness, a safe and habitable

location, procedural due process, and the least restrictive alternative. Most importantly however state power must be exercised in a manner that is fair. For this reason, it should be implemented as a means of attempting to discriminate a group or merely as a show of political and police force because despite its unique nature as a public health intervention, quarantine requires public trust and acceptance in accordance with the principles of justice. Epidemic and pandemic situations can be divisive enough on their own and the political response is one which reflects on a nation not as it says it is but rather as it truly is and moreover as it aspires to be.[51]

Ultimately, if a quarantine or any public health measure wants to be viewed as being ethically just then it must only be implemented in instances where its risks are justifiable based on the potential social benefits that will be the result of taking those risks. Similarly, any presumed health benefits that are associated with acts like quarantine have to be measured against what social consequences may arise or what threats to liberty and personal individuals there be. Additionally, because implementing a measure like quarantine is one which necessitates the expenditure of substantial resources and requires significant logistical support, public health officials and other decisions makers also need to consider the financial element of these strategies in order to gauge the monetary cost of a quarantine in relation to alternative strategies which may exist.[52]

The takeaway from all of this is that while quarantines can be implemented in such a way that they respect public health ethics that such a respect is not necessarily guaranteed. What is meant by this is that there exists a difference between having an ethical framework and this ethical framework being automatically followed in every instance without fail. As such it becomes the role and responsibility of public health officials to check the actions that they wish to take against their ethical values and to ensure that ideally no conflict exists. In manners where

conflicts do exist however, the responsibility to behave in a manner that is in accordance with public health ethics does not go away instead it shifts so that any ethical violations are minimal at best. For example, based on the incubation period of the specific infectious disease and when a person was likely exposed it may not be possible to respect their autonomy and their desire to only be quarantined for a day or two based on some external factor such as the number of sick days that they may have available at work or their desire to attend a public gathering during the proposed quarantine period. However, just because that individual need cannot be met it does not give public health officials the right to quarantine a person indefinitely or for any length of time beyond the incubation of the disease and while attempts to do so may not explicitly violate public health ethics as they may only impact a single individual it would serve to violate the overarching principle of medical ethics which is to do no harm.

2. Quarantine and Global Bioethics

When considering the relationship between quarantine and global bioethics what is being considered is twofold. First, what must be addressed is the relationship that bioethics has to infectious disease in a global context. The rationale for this centers around the fact that without infectious disease, or more accurately without the threat of the infectious disease spreading, quarantine would be unnecessary. Second, what must be focused on is the relationship between bioethics and the individual. This is due to the fact that bioethics is in many respects focused on the individual.

Infectious diseases were traditionally one of the primary focuses, if not the primary focus of medicine. Despite this however there is a significant lack of bioethics discussion relative to infectious disease which can be viewed as being both strange and unfortunate. Conspicuously absent from the field of bioethics are the types of dilemmas that are typically associated with

infectious conditions. These dilemmas include, but are not limited to, the importance of making a quick diagnosis, the risk of transmitting illness to others such as family, friends, caregivers, and even strangers, prevention and immunization, and matters relative to both isolation and quarantine.[53] The question that may be asked is why and the answer is a simple as considering the time frame in which bioethics was developed both in the United States and abroad.

In taking a closer look at the period of the late 1950s through the early 1970s what we are presented with is a truly unique time in medical history. Consider that as the last decades prior to the emergence of HIV/AIDS that this was also a period in medicine where it was a widely-held belief that infectious disease was a problem which was fading and by extension one that no longer needed to be viewed as an active threat. This false optimism surrounding the presumed end to an era of infectious diseases was central to how bioethics was able to develop as a discipline that felt no need to be attuned to an issue that even the United States Surgeon General of the time viewed as one which would soon no longer be relevant.[54] Based on this the absences of rhetoric regarding infectious disease in the framework of bioethics was not the result of negligence or oversight, instead it was an intentional omission rooted in a belief that was only later proved to be erroneous about what types of medical issues would be pertinent in the latter half of the twentieth century. As a result, bioethics has no inherent relationship to infectious disease and in order to even attempt to view it as applicable to quarantine such a relationship needs to be created based on what tenuous connections can be made. One way in which such a connection can be made is by looking at what medical quarantines can do to the individuals who are quarantined.

Inherent to the nature quarantines can, and do, threaten the civil rights of the individuals who are confined by them. These threats can manifest themselves in one of two ways. First, it is

possible that quarantines may inflict harsh conditions upon those who are forced to occupy them.[55] For example, based on where a quarantine is located an individual may be placed into conditions where there is limited sanitation pick-up, a lack of functioning public utilities, or a space that is filled beyond capacity. This can be seen as being especially plausible in instances where a quarantine follows a natural disaster or other public emergency that may have had an adverse impact on the overall public infrastructure, in remote areas that are inherently difficult to access, or in areas where there is known to be political unrest that may manifest itself in the forms of civil wars, government coups, or actions by militant or dissident groups that can disrupt the natural flow of goods and commerce. Second, quarantines can be imposed in a manner that is arbitrary or discriminatory.[56] This is essentially what occurs any time an entire geographic area is quarantined based on the possibility that a handful of individuals in the area may have had contact with someone who was infected or in instances where members of a particular ethnic, social, or political group are singled out to be quarantined based not on their suspected or known contact with infected individuals but instead because they are being singled out and quarantine exists as a means of implementing punitive actions under the guide of preventative ones.

These threats to civil rights are plausible in part because of the types of behaviors that knowledge of infectious diseases can serve to trigger in individuals. While the threat of an infectious disease can be damaging enough on its own in that it may cause individuals to behave poorly when the that same threat is framed as the possible representation of an epidemic it can cause individuals to act in a manner that speaks to subconscious or conscious desires for retribution or to be discriminatory and as a result may lead to treatments that are stigmatizing, punitive, or inhumane.[57] Understanding that this threat to the civil rights of an individual exists, quarantines can be seen as possibly violating all four bioethical principles. This can be especially

true when considering the principles of autonomy, nonmaleficence and justice. However, it is necessary to take a closer look at the issue in order to be sure.

In taking a more nuanced look at the relationship that can exist between bioethics and quarantine what must first be understood is that the act of a government working to impose restrictions on those who represent a risk to others is an act that falls within the realm of an accepted exercise of broad state power. This at least serves to hold true in liberal societies. As a result, such an act is not in any sort of inherent conflict with, nor does it pose a problem when juxtaposed against, the ethical discipline of bioethics.[58] Based on this it there is no inherent conflict between bioethics and the practice of quarantine even though the former is centered around the rights and liberties of the individual and the latter is implemented as a means of preserving public health. This makes sense when it is further acknowledged that even though they are oriented differently that there does not exist any sort of inherent conflict between bioethics and public health ethics or bioethics and the existence of public health in genera in the sense that the two disciplines were neither designed nor altered to be at odds with each other. Noting this however there can still be a conflict between the ethical construct of bioethics and the public health measure of quarantine.

When looking at when and how problems emerge between bioethics and quarantine focus can be placed on instances where the risk to others exists as an uncertainty. It is in considering these specific types of risks that a crucial divide emerges between the judgments and beliefs of those who have a commitment to autonomy e.g. those committed to bioethics and those who have a commitment to public health. Specifically, this divide can be characterized by two questions that do not have answers which are either easy or absolute. The first question revolves around what moral weight should be given to the likelihood of harm while the second

questions centers around what moral weight should be given to the severity of harm. It is in part in this way that the tension between public health perspectives and autonomy-focused bioethics are positioned most clearly against each other.[59] However, once again it must be understood that the possibility of a problem is not the same thing as a problem itself, and that while there may be fundamental differences in the way in which a problem could be resolved that it does not mean that the solution has to be oriented in such a way that it serves to solely or blatantly favor one school of ethical thought or another in instances where it may be plausible for a compromise to be met. Exemplary of this consider that one of the fears of being quarantined is a fear of being exposed to someone who has a contagious disease.[60] The natural extension of this fear can be viewed as the worry that an individual who may have been healthy before being placed into the quarantine will ultimately leave the quarantine infected with one disease or another. This is a completely plausible fear since the very nature of quarantine centers around making the determination of whether or not an individual who was exposed to an infectious agent contracted that agent themselves. From a public health perspective, it is unlikely that this individual concern will hold any weight as any individual who is being quarantined is ostensibly someone who may themselves be a vector for disease and as such there may be no further need for discussion in this regard. In contrast, however there may be a different train of thought when considering this via the perspective of bioethics. As aforementioned from a bioethics standpoint orders for quarantine can be respected under the auspice of governments and their ability to impose restrictions on those who may be threats to others. However, respect for the government order does not mean ignoring patient autonomy and as such when faced with a patient who is fearful that compliance with a quarantine order may result in them being exposed to an infectious agent they made advocate for a quarantine measure that requires limited or no contact with other individuals who

are being quarantined as well. One of the simplest ways in which to accomplish this is to request that the patient be allowed to shelter in place thereby serving out their quarantine while in the confines of their home, or barring that as an option that they are placed in a facility that has a limited number of other individuals who are being detained at the same time. The rationale for this centers around the idea that in general patients should be given options which allow them to voluntarily make choices about public health interventions that have the possibility of being life changing e.g. the compliance with a quarantine order. Such options are important in the sense that they can discourage a physician or other healthcare professional from engaging in inappropriate paternal behavior which protects patients from interventions that are unwanted.[61] At the very least it may allow for them to have some input on some decisions which they may not be able to entirely dictate. In this way, the application of bioethics may actually serve to make quarantines more ethical.

The idea that the application of bioethics may serve as a matter of making quarantines more ethical is not one which is unique to this work. In exploring this consider that it is already understood that any focus on population-based health in turn requires a population-based analysis along with a willingness to recognize that the ethics associated with collective health may ultimately require among other ethical compromises, extensive limits on inherent values that individuals are reluctant to part with. This includes significant restrictions on liberty, such as what occurs when an individual is quarantined. Such compromises go well beyond the scope of what would be justifiable by bioethics with its prima facie focus on autonomy. This is directly relative to the fact that currents of both compulsion and coercion which are central to the implementation of public health exist in stark contrast to the values created, followed, and most importantly upheld by bioethics. However what is important to realize is that while measures of

compulsion and coercion may prove necessary in some instances to ensure compliance that what exists as preferable to those tactics are efforts which have been designed to elicit cooperation. In addition to being preferable they may also exist as more effective in nature. In looking at this from a broad ethical perspective, e.g. one that is neither focused on public heath ethics or global bioethics, but is instead centered around what a reasonable individual would consider rationale and "right", the desirability of ethics which inspire cooperation as opposed to force it centers around the fact that they have the effect of being potentially beneficial to public health without placing an undue burden on either privacy or liberty. Additionally, they may have the added benefit of actually reducing incidents in which compulsion a coercion actually need to be utilized as tools of the state during instances where cooperation is essential and it is not possible to rely on voluntary compliance. Essentially, what this suggests is that it is not necessary for public health measures to be insensitive when it comes to the importance of being protective of individual rights.[62] This conclusion relative to the potential relationship between public health ethics and individual rights serves to mirror almost to the letter the earlier conclusions which have been relative to bioethics and the implementation of quarantine in the sense that the fact that the ethical disciplines were not designed to work specifically within certain contexts that there is no reason for them to be at odds with those concepts.

On the surface quarantine procedures exist in stark opposition to the principles of bioethics. This is due to the fact that quarantines focus on treating individuals as a threat to public health, and in applying the label of threat there are instances in which individual wishes relative to treatment or refusal of treatment are ignored in favor of doing what is considered to be in the best interest of the community. However, after careful consideration what becomes clear is that fact that while quarantines and bioethics are ideologically different that these differences can

actually be positively exploited in such a way that bioethics can potentially serve to make the implementations of quarantine more ethical in nature.

3. Quarantine and Vulnerability

As important as it is to have an understanding of the ways in both public health ethics and global bioethics can be applicable during a quarantine, it is equally, if not more important, to understand the role that vulnerability can, and does, play in such a situation as well. Specifically, it is necessary to look at three interrelated factors. These factors include an explanation of why quarantined populations are vulnerable populations, the ways in which vulnerability can present itself in a quarantine, and what failing to consider vulnerability when taking an ethical view of quarantines does.

First focus can be placed on why quarantined populations are vulnerable populations. In order to best explore this, it is necessary to look at the nature of quarantines in general. Since quarantines were initially conceived centuries ago there has always been debate about their implementation. The strategy was perceived in part as intrusive and independent of sociopolitical context quarantines have been, and continue to be accompanied by suspicion, distrust, and even rioting. Such reactions can be directly linked to the fact that when a significant health crisis arises it is not uncommon for individual rights to be violated while attempting to do something for the greater public good. In such instances focus is often placed on how those from the lower class, or members of ethnic or marginalized minority groups are stigmatized or discriminated against.[63] Without seeking to dispute that there are certain groups which may be at an even greater risk, in utilizing the working definition of vulnerability developed for this work, all individuals that are subjected to quarantines are vulnerable. The rationale for this argument centers around the fact that anyone subject to a quarantine is by extension going to experience a

range of problems, many of which will fall outside of the purview of either healthcare or front line workers. Such problems can include, but are not limited to, feelings of fear, anxiety, or social isolation.[64] As such anyone confined by a quarantine is vulnerable both to potentially having their rights violated if it is deemed that such a violation is justifiable within the context of protecting the public at large, as well as potentially falling prey to emotional distress.

It is not enough to assert that those who are quarantined are vulnerable as a result of their confinement. Instead, it is also necessary to address the ways in which such vulnerability may present itself. Specifically, what must be considered are the ways in which this vulnerability can potentially manifest. The act of being placed in quarantine serves to take a considerable toll on the individual who has been subjected to confinement, however there is limited research and resources which have been dedicated to exploring this. However, in looking at the 2003 SARS outbreak in Toronto, Canada it was found that a substantial portion of those who were quarantined were distressed as evident by displays of symptoms of both depression and Post Traumatic Stress Disorder (PTSD). While it was not possible to affirmatively diagnose either depression or PTSD based on the anonymous nature of the surveys conducted, the results should not be dismissed.[65] What such results serve to suggest is that the impact of being quarantined can, and may, have an impact far beyond the period of being quarantined. It is without question that there is the need for additional research in this regard, research which is both more comprehensive and conclusive in nature, however such a need should not serve to overshadow what has already been discovered.

The consideration of individuals who are quarantined as vulnerable is imperative and a failure to recognize this can be viewed as a failure to adequately serve those who are quarantined. There must be a systematic approach developed relative to how those who are

quarantined will be dealt with both during and following a quarantine. One broad way of accomplishing this is by taking a deeper look at both the ways in which quarantines are implemented and the ways in which they can be implemented. As such the rest of this chapter will serve to explore the differences between effective and ethical quarantines as well as presenting a model for a quarantine that is both effective and ethical.

C. An Effective Quarantine vs an Ethical Quarantine

Having paid attention to public health ethics, global bioethics, and the concept of vulnerability both in terms of their broad natures and in the ways in which they can interact with the implementation of quarantines it is possible to shift focus slightly. This shifted focus looks at the similarities and differences between quarantines that are deemed as being effective versus quarantines that are viewed as being ethical. Such distinctions are especially important when it is understood that an effective quarantine is not necessarily ethical in nature and that an ethical quarantine is not necessarily effective in nature.

1. The Effective Quarantine

As per chapter four quarantines are largely ineffective, however this does not mean that they are wholly ineffective. Such a distinction is important as it serves to allow for the question to be asked relative to what constitutes an effective quarantine. Building upon this what must also be asked is at what price effectiveness occurs. In seeking to answer both of these questions consideration has to be given to how effectiveness, e.g. whether or not a quarantine is successful in mitigating the spread of disease, can be defined and quantified as well as whether or not that effectiveness is more or less important than other factors.

At present time, the research on quarantine effectiveness is both limited and far from

definitive. Additionally, there are a myriad of external factors that can influence whether or not a quarantine was effective and it can be difficult if not impossible to ascertain what these factors may have been simply by looking at historical records. Instead what it is easier to trace are the known socioeconomic consequences of detaining large numbers of individuals in the name of public health. Exemplary of this consider that in general the idea of mass quarantine is one which triggers feelings of mistrust, feelings which are not entirely misplaced when it is know that historically such settings have been rife with abuse. These perceptions are amplified as opposed to ameliorated in situations where individuals who seem healthy are turned into targets or otherwise stigmatized especially when this occurs in communities or to groups that are already marginalized or otherwise disadvantaged economically. Further exacerbating matters is the knowledge of quarantine being used periodically as a tool of police or politicians. Additionally, while the contemporary understanding about pathology and the disease transmission is more advanced than it was in centuries past it is still too simple to draw uneasy conclusions about what may occur and ultimately in order for a quarantine to be viewed as being successful it requires complete compliance and transmission without symptoms[66] What all of this essentially means is that in order for a quarantine to be effective that it does not necessarily have to meet high standards relative to the way in which individuals are treated, and in fact it does not even need to necessarily stop the spread of disease provided n one realizes that the disease has been spread. Instead an effective quarantine is one that appears to be effective versus one that has any measurable outcomes of efficacy. While such a viewpoint is undeniably cynical in nature it does serve to provide insight into why ethical behavior is not necessarily presented as a hallmark of effective quarantines. It is because an effective quarantine does not need to be ethical, it merely needs to work according to whatever logical framework has been put into place by those who

have authorized the quarantine.

Having addressed the dubious, but no less accurate, manner in which an effective quarantine can be defined focus can be refined to review specific cases. It is important to understand that the cases presented have been selected because of the fact that they worked within the preset frameworks of those who authorized them. For this reason, the methods in each case are such that they would likely be considered extreme by a reasonable individual and are not wholly ethical in nature. However, their relevance is that they serve to exemplify what could be considered effective quarantines.

First, focus can be placed on the quarantine of Hongkham Souvannarath. Souvannarath was a Laotian refugee in the state of California who was diagnosed with multidrug-resistant tuberculosis (MDRTB). In 1998 she received a notice, which was printed in English only, and not in her native language of Laotian. This notice specified that she was required to appear for a mandatory examination at the county clinic and that if she failed to appear that she would face isolation and quarantine. In being unable to read the notice that she had been served, Souvannarath subsequently failed to make an appearance at the clinic. The result was that Souvannarath was taken at gunpoint to the county jail where if it were left to the discretion of the county she would have been detained for the duration of her treatment, a period that could last up to two years. Souvannarath ultimately spent a total of 10 months in the county jail and during that time she was handcuffed to her bed for treatments and effectively treated like a prisoner. It is these conditions, and not the provision of medication, which she challenged. A California appellate court ruled that the usage of jails for isolation and quarantine violated California law[67] However, that does not serve to undo what Souvannarath experienced. It also does not negate the fact that technically the quarantine of Souvannarath was effective based on the fact that she

complied, albeit forcibly, and that there were no known transmissions of MDRTB from her as a vector. In the broadest sense, the actions of the quarantine, no matter how inhumane, did serve to protect the greater public health.

Eerily similar to the circumstances surrounding the quarantine of Hongkham Souvannarath was the quarantine of Robert Daniels. Daniels tested positive for MDR-TB and county officials ordered for him to be quarantined.[68] What specifically occurred was that public health officials obtained a court order which allowed them to involuntarily commit Daniels to a ward generally reserved for prisoners in a medical center. Once he was hermetically isolated within the confines of this ward, he was then strip searched, prohibited from going outside and forbidden to receive visits from his family. He was even barred from exercising.[69] Ultimately, he was confined for a total of nine months before legal action was taken on his behalf.[70]

In looking at the quarantines of Hongkham Souvannarath and Robert Daniels one of the ideas that is made clear is that emergency situations have their own logic and their own unique set of rules. This is made most obvious by the fact that in both cases quarantine orders were issued, and moreover upheld, in lieu of the issuance of the more medically accurately isolation laws considering that both Souvannarath and Daniels were already known to be infected with communicable diseases. This serves as evidence that such logic and rules can be confusing, if not downright contradictory, outside of a medical context. As another example of this consider that the working rule in every medical emergency, regardless of whether or not it takes place within the confines of an official emergency department or not is to treat an individual first and to ask legal questions about that treatment later. By extension the act of saving a life is so central that it is viewed as always justifying action which is why the administration of cardiopulmonary resuscitation (CPR) is conducted as an automatic response and as such is essentially the only

action that does not require the informed or implied consent of patient in order for a physician to be able to perform it. Instead the prevailing medical logic is that if a patient does not want CPR that they must refuse it before it is actually required via the issuance of a Do Not Resuscitate (DNR) order, or more aptly, a Do Not Attempt Resuscitation (DNAR) order in order to avoid having their situation viewed as a medical emergency which would justify immediate intervention.[71] In a quarantine situation similar logic serves to prevail in the sense that from a broad perspective quarantines can be viewed as matters of life and death which serve to impart upon public health officials the idea that they justify interventions that under different circumstances explicit consent would be required for such as the administration of inoculations or other medications. However, quarantines are not truly matters of life and death as much as they are matters of possible, as opposed to definite, infection spread. Based on this the thinking around them needs to be tempered with procedures that are ethical in that failing to behave in a manner that is ethically responsible actually serves to diminish how effective future quarantines can be by further disparaging public perception.

The question that must then be raised is if a quarantine can be effective and unethical from a bioethics standpoint, but ethical from a public health standpoint. Presuming that the answer is “yes” provided that public welfare is maintained, then consideration must be given to if that is what truly matters since quarantines are by a large a tool of public health officials and not private practitioners. If once again the answer is presumed to be “yes”, then what must be considered is if it is something which can be reconciled and if so how that reconciliation occurs.

In looking towards reconciling that idea it is necessary to take a less cynical viewpoint of what constitutes an effective quarantine. Specifically, it needs to be about more than just compliance and a lack of known symptom transmissions. Instead it must be held to higher

standards. In taking that viewpoint the effective implementation of a modern quarantine should include several key factors. First, there must exist a clear understanding of the roles of public health staff at federal, state, and local levels, and each group should know their legal authorities. Second, it is necessary for appropriate partners, including, but not limited to, relevant transportation authorities and law enforcement officials, to be both identified and engaged in the planning process. Finally, there is a need for the public to be made aware in advance of the specific disease threat and to be given information on the role of quarantine in containing an epidemic.[72] Such a practice is still largely focused on public health but it does not completely ignore the role of individuals by taking the time to provide information that may help them to understand why quarantine may be warranted.

2. **The Ethical Quarantine**

In seeking to answer the question of what constitutes an ethical quarantine, the answer can be viewed as being far more subjective that what constitutes an effective quarantine. The rationale for this centers around the fact that whereas an ethical quarantine has certain clear measures of efficacy such as the compliance of those who the quarantine order is levied against, there are not similarly clear measures of efficacy when given consideration to an ethical model of quarantine. The reason for this centers around the fact that what may be deemed ethical based on one set of ethical guidelines may not be ethical when judged against a different set of ethical guidelines even when the only thing that changes is the ethical lens via which the model is being viewed. However, it can be presented that regardless of the ethical lens being used that there exist some basic overarching criteria which can be used to determine whether or not a quarantine is ethical. Specifically, consideration can be given to four interconnected factors including the application of the harm principle, proportionality, reciprocity, and transparency.

The first element of an ethical quarantine is that it must meet the harm principle. Essentially in meeting this principle what is being assured is that the intervention of the state is necessary in order to avoid harm being done to others.[73] What this means is that in order for quarantine to be viewed as a viable ethical option that there are several factors which must be met. First, it should be clear that in the event that the disease was to go unchecked that there would be measurable harm done to others. Second, with specific regard to quarantine the infection should be something that is spread from person to person, otherwise quarantine is not justifiable ethically.[74]

The second element of an ethical quarantine is proportionality. In general, when considering proportionality from an ethical what is being considered is the relationship between the probable public health benefits and the required infringement in order to essentially way the positive against the negative[75] However that definition is not applicable in relation to quarantine. When looking proportionality as it applies to quarantine what is being considered in the least restrictive means that can be employed. Exemplary of this proportionality is evident in situations where quarantines are not immediately compulsory in nature but where there exists an option for compliance to be voluntary before the implementation of more restrictive measures including but not limited to devices such as thermal scanners, coercion or incarceration.[76]

The third element of an ethical quarantine is reciprocity. What this means in part is that when society asks an individual to give up their liberty, even in part, that society must provide that individual with something of some value in return. For example, when looking at quarantine an individual is being asked to give up temporarily their freedom of movement. In response, it is the ethical responsibility of public health officials to ensure that these individuals are given certain provisions in response and failure to do so would be unethical.[77] What is important to

understand however is that reciprocity should not be misconstrued to mean that individuals will receive something that is equivalent to what they value their time at, nor is there an ethical responsibility on the part of public health officials.

The final element of an ethical quarantine is an adherence to the transparency principle. Acting under the auspice of this principle it is the role and responsibility to public health authorities to clearly communicate the justification for their actions as well as to allow for the process of appeal.[78]

D. A Model of an Effective and Ethical Quarantine

Having separately addressed the parameters of an effective quarantine and those of an ethical quarantine, it is possible to put forth a model for a quarantine that is both ethical and effective. Such a model is being presenting with the clear understanding that powers such as quarantine, e.g. any powers which are implemented as a means of attempting to control the spread of infectious diseases, exist as some of the most coercive measures that any government or society can implement. By their very nature such measures deprive individuals of their liberty even if every reasonable attempt is made to minimize that impact. Within a democratic society, the utilization of these powers should be carefully justified so that a balance is struck between acting in the best interest of the public and still working to ensure the freedom of the individual.[79] Designed exclusively for this work such a model is comprised of several core components each of which was selected following extensive research. These components include clear communication of intent, a focus on protecting public health, the enforcement of ethical responsibility, and a provision for compensation once the quarantine is lifted and a tool for the measurement of overall efficacy. Combined they serve to present a model that can be globally applicable because it is more reliant on proper planning and training than it is on vast financial

resources.

Before proceeding it is imperative to point out that this model is an implicit model in the broadest sense. This is based on the fact that two of the defining elements of implicit models are that their internal consistency cannot really be tested, and their consequences cannot be played out and examined at length or in depth.[80] However, this does not render the information presented invalid for three core reasons. First, each of the components presented in this model has been included after research relative to the elements that are deemed necessary for both the effective and ethical implementation of a quarantine. It is imperative to note that while there are hundreds of publications available which could have offered insight that a conscious decision was made on the part of the author not to include information from every single one of them. The rationale for this is that it best served the scope of this work to have a narrower focus for a more nuanced approach. Second, even explicit models, i.e. those were results can be replicated, those that can be calibrated against historical cases, and those that can be tested against rigorous data, are not replacements for sound judgment or able to eliminate all uncertainty and it is harmful to present or believe otherwise.[81] Consider that in allowing models of any kind to completely supplant the ability to make clear judgments when faced with an issue or to view them as absolute is to essentially allow them to replace growth in any field. Finally, when presented with a matter such as quarantine there are, as evidenced throughout this work, a myriad of external factors that cannot ever be fully accounted for. Models are however by design idealizations, which is acceptable provided they are productive and not misleading in nature.[82]

1. Clear Communication of Intent

Epidemics can cause significant levels of anxiety within the public. When faced with both

the threat of an epidemic and heightened public concern some public officials may, as a matter of impulse, begin to behave in a manner that is incredibly aggressive. This aggression can manifest itself via the public health measures that are ultimately implemented. One potential action/reaction in this situation is to impose a large-scale quarantine. Other ways in which this may manifest include initiating outright travel bans from certain countries or requiring higher than necessary levels of medical surveillance. Such an inclination can be understood as a matter of attempting to control a situation or bring order to it however when policies are overly aggressive they are less likely to be effective in terms of actually ending the epidemic threat while at the same time serving as a means of spreading further panic among an already overly anxious population.[83] What may be far more effective, and what can also be deemed as being necessary if the goal is for a quarantine to be both ethical and effective is for public health officials to clearly communicate their intent and the intent of any and all public health measures that they plan to implement.

Along with coordination, clear communication is heralded as potentially being one of the most important aspects of planning a strategy to address a public health emergency.[84] This should not be surprising as combined those two elements can be used effectively in any situation where it is necessary to bring together individuals and resources. Additionally, clear communication can also be used to ensure that there is little to no confusion relative to what is required and who specifically is meant to be responsible for what.

Additionally, however clear communication is also paramount when there is a need to speak to the public about a health emergency. As evidence of this the Model State Emergency Health Power Act (MSEHPA) has a specific provision for a set of post declaration powers and duties which are meant to ensure appropriate public information and communication is

disseminated. The provisions are contained in Article VII: Public Information Regarding Public Health Emergency and they present that it is the role and responsibility of the public health to provide information to the public relative to the emergency. This information includes what protective measures should be taken and information regarding access to mental health support.[85] Noting that the MSEHPA is not law per se, but instead an act which was designed to be considered by states legislation with various aspects being implemented by some,[86] it is possible for every state public health board in the United States to adopt a similar measure. Admittedly, it may be difficult for this measure to be adopted universally across the globe because of the limited communication infrastructures in some countries and the inherent secrecy of some political regimes.

Ideally, what the clear communication of intent would entail in regard to a quarantine situation would be threefold. First, in seeking to clearly communicate their intent it would be the initial role of public health officials to announce what the public health threat was. Without seeking to inspire greater anxiety or fear into the public the act of providing the name of the infectious agent is important in the sense that it would identify the issue to the public. Second, clear communication of intent would provide insight into what the planned public health measures were and how long they were expected to last. For example, if public health officials were planning on implementing a quarantine for all individuals who had recently returned from visiting a specific country or region they would announce this quarantine as their public measure, indicate what would be required for individuals to comply and specify precisely how long compliance would be necessary. Finally, clear communication of intent would present what treatment options were available in the event that individuals learned that they were infected. By being upfront about what the course of treatment was as well as any options there is the potential

that individuals would be more likely to be compliant with it.

Clear communication of intent is a requisite component for an effective quarantine because of its potential to favorably impact compliance. While the threat of an epidemic can be anxiety inducing, the individual fear that a person may have when they learn that they, or one of their loved ones, may be a vector of disease, can be devastating. Overcome with panic it can be difficult to think straight or to know where to turn for accurate information and faced with either conflicting information or no information at all it is plausible that an individual may not want to comply with a quarantine order. However, in the event that information about the quarantine is clearly communicated from the outset of a public health emergency there may be a greater willingness to comply.

Clear communication of intent is a requisite component of an ethical quarantine because it demonstrates the necessary transparency that ethical quarantines must have. It can also be seen as relative to the principle of beneficence. Operating under the principle of beneficence it falls to a healthcare provider to help individuals do things such as balance potential benefits against potential risks.[87] The clear communication of intent helps to facilitate this by clearly explaining the relevant aspects of public health measures thereby allowing an individual to make a decision which will likely result in complying with the quarantine which can be helpful in an instance where they have actually contracted a disease versus failing to comply which may ultimately put themselves and others at risk.

2. Protecting Public Health

Noting that quarantines are a public health measures it may seem either redundant or unnecessary to indicate that a component of a model for an effective and ethical quarantine would be an explicit measure to protect public health. However, this measure is being included

precisely because of the fact that quarantine implementation has now always been utilized as intended. For example, there have been instances in which quarantine measures have been used as a threat in order to compel compliance with some other healthcare law. Similarly, there have also been instances where quarantines have been implemented in such a way that the broader public health of those impacted by the quarantine seemed to not be a priority for public officials who have roles and responsibilities which extend beyond authorizing quarantines.

First, consideration can be given to an example of a time in which the possibility of a quarantine was used as a threat. In looking at this focus can be placed on a series of laws enacted in the state of Michigan following the initial HIV/AIDS crisis in the 1980s. Referred to collectively as the "health threat to others" law within the state of Michigan it is a crime which is punishable by up to 4 years in prison for an HIV-positive individual to engage in any form of sexual contact without first disclosing their status to their partners. In addition to allowing penalties to be levied even in instances where there is no malicious intent the broader health threat law is even more expansive in that it allows for offenders to be labeled health threats and orders that they endure forced testing, counseling, and/or that they are remanded for quarantine.[88] In working to position the provisions of this law as an act where the threat of quarantine was being utilized in a punitive way as opposed to in a manner that was truly respectful of public health there are several factors which must be considered.

The most obvious sign of this being an instance where the threat of quarantine was less about the preservation of public health and more about attempting to use quarantine as a tool of policing centers around the fact that quarantine is even an option at all. Consider that HIV-positive individuals are already known to be infected with a communicable disease. Quarantine is not the appropriate public health measure to deal with individuals who are known to be

infected. Instead when it is deemed necessary for the sake of public health to segregate an individual with a known infection the appropriate public health measure is isolation which is something that a public health official would know, or at least should know. The failure of the lawmakers to use the correct terminology in the law suggests that using quarantine was not necessarily being viewed an actual action but instead that there was a hope that in listing it individuals would be compelled to comply with the law.

Another indicator that quarantine may be being used solely as a threat in this instances centers around the fact that while it was packaged as the "health threat to others" law that there were only measures relative to individuals who were HIV-positive. Without ignoring the sociopolitical context in which such laws were enacted e.g. a period that was a part of the peak of the HIV/AIDS crisis when there was still very little known about the disease, or disputing the fact that contacting HIV/AIDS at this point in time could have been so life-threatening as to be a death sentence, it would still be remiss to fail to point out that any blood borne illness can be transmitted via sexual contact. Yet, in continuing to assert that this was not a matter of stopping the spread of illness, evidence can be placed on the fact that no other group of individuals who had been diagnosed with communicable diseases was included as a part of this legislation.

The final indicator that quarantine may have been being used primarily if not solely as a threat in this case can be found in the extremely limited number of times in which it was actually used as an option. Equally telling is who this option was exercised on. Research indicates that there was only a single individual who was ever subjected to quarantine under this order. It must be noted that this individual was a woman who was described by news reports as being "mentally deficient".[89] In looking at the extremely low quarantine rate coupled with the fact that the individual quarantined may not have even had the cognitive reasoning skills to understand

the law and it seems more probable that quarantine was being used as a threat.

The issue with using quarantine as a threat to force compliance elsewhere is that it serves to frame it as a punitive and not preventative measure. This shift in perception is important because individuals who associate quarantine with a threat may at the same time correlate it with being a punishment. The result in such a case is that if there is an instance where they are being asked to comply with a quarantine there may be reluctance if not outright refusal to do so if the individual does not feel as if they have done anything wrong.

What can be more problematic for overall public health than instances where the threat of quarantine is used are instances where quarantine is implemented in such a way that it is the sole focus of public health officials. A prime example of this type of action was the three-day long lockdown of the entire country of Sierra Leone during the 2014 Ebola outbreak that was discussed in chapter four. What was not presented in chapter four however that this lockdown was not a one time event. Instead it was something which was conducted by the government of Sierra Leone twice, once in September of 2014 and again in March of 2015.[90] In reviewing this quarantine once again what becomes apparent are several ways in which the implementation of a quarantine in this instance may have served to threaten overall public health.

First, it cannot be ignored that prior to the first lockdown that there were some public health officials in the country who worried about the overall impact that the lockdown would have. Specifically, these officials expressed fears that the aggressive nature of the action would have the effect of undermining the already fragile relationship between the government and the communities of individuals that they needed to trust them in no small part to ensure that new Ebola cases were brought to light.[91] As aforementioned when the government response is too aggressive in nature it can serve to adversely impact the manner in which public health

interventions are viewed. However, in Sierra Leone critics of the lockdown were opposed by proponents of the plan who believed that implementing a lockdown would all for new Ebola cases to be more easily found as they would be able to go from house to house to check.[92]

Second, consideration must be given to the fact that while information about the lockdown was shared with the citizens of Sierra Leone in advance of it occurring, that it did not serve to make citizens prepared for the lockdown the second time that the government chose to take such actions. In this vein, note that while the government warned residents that they should stockpile food that some of the poorer residents of the country ran out of food before the lockdown ended. While food distribution points were established such areas were not always safe as evidenced by the fact that soldiers at one such point felt the need to use tear gas to break up a crowd that had become unruly.[93] The fact that the government was cognizant enough to both inform residents to stock up on food supplies as well as set up food distribution points showcases that they were aware that food scarcity could pose a problem during the lockdown yet, despite the fact that Ebola had re-emerged as a threat in 2014. Rather than work to ensure that poorer residents had the necessary provisions in advance e.g. via the delivery of food ration boxes, the lockdown was prioritized and as such it is plausible that residents who did not or could not make it to a food distribution point went hungry which could be detrimental for those with conditions such as diabetes, while those who did venture to such points literally risked their physical safety to do so.

Third, Sierra Leone is known to be one of the countries in West Africa where the Ebola virus caused significant damage to its overall political infrastructure. During the outbreak the government stopped spending money on services not relative to combating the disease and as a result the facilities that provided daily services began to deteriorate.[94] In making the choice to

focus so doggedly on measures relative to Ebola in particular and interventions such as the three day lockdown in particular the Sierra Leoneon government effectively weakened their ability to address future public health needs in favor of looking at a single issue in the present. Even in understanding the potency and virulent nature of the Ebola virus, the conscious choice to expend all available resources to address it was to essentially fight a battle for a future that would be disadvantaged from the outset.

The issues with quarantine being the sole focus of public health officials are well illustrated by what occurred in Sierra Leone: such measures tend to be overly aggressive in nature while at the same time being both short-sighted and extremely costly. The end result, is that while some members of the public may clearly benefit from a healthcare standpoint e.g. those who have actually contracted the infection and by virtue of the quarantine may be able to receive treatment in a timely manner, the impact on overall public health can be detrimental. In this vein consider the sheer amount of time, money, and energy that it can take to rebuild a political infrastructure that was allowed to lapse to the point of even mild deterioration.

Protecting public health is a requisite component for an effective quarantine because of what it is that a quarantine is designed to do. The purpose of a quarantine is to prevent the spread of infectious disease into a population. However, in instances where quarantines are used to threaten members of the public or in instances where their implementation is the sole focus of public health officials they actually serve as a threat to the populations that they are meant to protect. This exists in direct opposition to their core function.

Protecting public health is a requisite component for an ethical quarantine because it is via this action that the harm principle is met. Additionally, as a whole the population has a legitimate expectation that they will benefit from public health services. This is because the

population is served by the government and by extension they can hold the state accountable for a meaningful level of health protection.[95] In instances where quarantines are used as threat or as the sole focus of public health officials it serves to undermine the good that they may be able to accomplish for the public, the good that the public is well within its rights to expect.

3. Respecting Civil Liberty

Quarantines not only impact general liberty, by hindering the freedom of mobility within society, but also personal autonomy, by substituting the judgment of public health officials, acting as an extension of the government, for that of individuals. Moreover, such measures tend to breed fear and blame among the people in a community, frequently leading to the unjust shunning of marginalized individuals and unpopular social groups. Overreaction, particularly when it is prejudicial, is a daunting area of concern for those questioning the propriety of such measures in a democratic society.[96] Noting this the preferred first option in a situation where it has been determined that a quarantine will need to be implemented is a voluntary quarantine which does not require total compliance in order to be effect.[97] However, even in instances where it is necessary to mandate compliance for a quarantine, respect for civil liberty still needs to be a clear priority.

It should not be misconstrued that respect for civil liberty either has to, or by definition should be a total acquiesce on the part of public health officials to the desires of individuals who are being asked to, or made to, take part in a quarantine. However, in seeking to ensure that civil liberties are respected there are certain thresholds which should be respected. Specifically, it has been presented that there are five key requirements which must be met. The first requirement is that any individual who is being asked to or made to comply with a quarantine should pose a real threat to the public. The second requirement is that the intervention must be both reasonable and

effective. The third requirement is that the intervention must be conducted in such a way that it provides the individual with equal protection under the law and affords them access to due process. The fourth requirement is that all individuals must be provided conditions that are both safe and comfortable. The fifth and final requirement is that compensation for loss of income must be ensured.[98] Within the context of this section only the first three requirements are being discussed. More in depth information on the fourth requirement can be found in Section v.: "Ensure Basic Needs are Met" and more in depth information on the fifth requirement can be found in Section vi: "Compensation".

First, consideration can be given to the fact that before any individual is quarantined that it should be confirmed that they represent a real threat to public health. This means that the person has to have been exposed to an infectious agent and that they must still be in the period where they can transmit the disease to others. If both of these conditions are not met then there is no need for the individual to be quarantined,[99] and quarantining them anyway would be a violation of their civil liberty.

Second, in order to be respectful of individual civil liberty any interventions must be reasonable and effective. What this means is that public health officials needs to give careful consideration to the factors of how grave a public health risk is posed, how the disease is transmitted, what the potential outcome of containment could be, and what the least restrictive methods of containment are.[100] Exemplary of this it may be viewed as both unreasonable and ineffective to ask individuals who may be infected with an airborne disease to participate in a mass quarantine as if even only one of them is actually infected when the quarantine is first implemented that there is a real risk that by the end of the quarantine that there will be more confirmed cases of the disease. In contrast a reasonable and effective approach may involve

having those who are possibly infected shelter in place and self monitor for the duration of the incubation period. Even in instances where it was requested or required that during this period they abstain from coming into contact with anyone else who may reside in their homes this can still be seen as a reasonable infringement on civil liberty because it serves to take the least restrictive approach to quarantine while still being mindful of the broader public health needs.

Third, quarantines need to be implemented in such a way that the preserve the rights individuals are imbued by the Constitution to both equal protection and due process as a means of respecting individual liberty. In terms of the former this means that the intervention cannot be discriminatory in nature. In terms of the latter this means that individuals should receive adequate notice in advance of the implementation of a quarantine and be granted a right to counsel, a right to a hearing, and a right to appeal relative to their quarantine status.[101] It must be noted that such measures was clearly developed with the United States in mind, however that does not mean that it cannot be applicable in some form in other parts of the world. Consider that all countries provide their citizens with some form of basic rights and while they may not be the exact same as the rights afforded to individuals who live in the United States it falls to public health officials to ensure that the rights which can be most closely correlated to these are applied and implemented.

Respecting civil liberty is, as evidenced by both the Hongkham Souvannarath and Robert Daniels cases, not a requisite component for an effective quarantine. As long as public health authorities are able to legally utilize coercive powers it will not be necessary for them to be respectful of individual freedoms. However, respecting civil liberties has been shown to make quarantines more effective which is a fact worth considering. Respecting civil liberty is a requisite component for an ethical quarantine for three key reasons. First, it serves to fulfill in

part the condition of proportionality. Second, the presentation of an ethical quarantine should not be presumed to be an ethical quarantine that is solely respective of public health ethics based on the fact that quarantines are public health measures. Instead an ethical quarantine must take a broad approach to ethics. Third, the most difficult aspect of any quarantine law centers around determining a balance between how much protection should be accorded to individual right and liberties while still ensuring that the public is kept safe.[102] This difficulty is however largely removed if a clearly defined respect for civil liberty is built into a quarantine model. While it does not, and cannot, solve for other difficulties which may arise in this regard it does provide a foundation for balancing between what is in the best interest of the individual and what may be in the best interest of the public.

4. Enforcement of Ethical Responsibility

One of the most significant challenges of pandemic planning as a whole is the fact that the public health system is not represented by a single entity. Within the United States alone it exists as a network of 3,000 local, state, and federal health organizations.[103] Expanding this view globally the number of involved agencies increases exponentially as does the difficulty in making concrete plans relative to how an epidemic or pandemic situation should, or will be, handled. What should not however be difficult is the decision to enforce ethical responsibility.

In a quarantine situation, it is not enough to present that public health officials, healthcare officials, and any requisite government officials or law enforcement officials need to behave in a way that is ethical. Instead it is imperative that it is understood from the beginning that there will be an enforcement of ethical responsibility. Such an understanding is especially imperative in instances where quarantines involve groups that may not be able to wholly advocate for themselves e.g. children or foreigners who are not fluent in the language(s) spoken in the country

where they are being in quarantine, groups that are viewed as having limited rights e.g. undocumented immigrants or prisoners, groups that have special medical concerns e.g. the elderly or pregnant women, and in situations where the language of the quarantine law being applied is either antiquated or vague.

The enforcement of ethical responsibilities occurs in several key ways including via training, socialization and self-monitoring.[104] First, in looking at the option of training what this means is that individuals can be explicitly taught ways in which they can uphold their ethical responsibilities. For example, when a law enforcement official is given insight into the acceptable use of force policy for the organization where they work they are being given direct information on the ethical responsibility that they have when they make the choice to use force. Second, in addressing the ways in which socialization enforces ethical responsibilities consider that with every social interaction individuals have the opportunity to see how others respond to them when they do and do not uphold their ethical responsibilities. Finally, considering self-monitoring what this idea presents is that every individual can, if they are willing to be objective, be the arbiter of whether or not they are behaving in a manner that is ethically responsible.

Within a quarantine situation training would be the best method for enforcing ethical responsibility. The rationale for this stems from the fact that it is known that whenever undertaking an emergency response that a lack of national leadership can lead to significant variations in the ways in which standards are carried out. This in turn may lead to protections that are unequal and in some cases inadequate.[105] In utilizing this same logic it stands to reason that having clear, standardized training about what the requisite ethical responsibilities are for all officials involved in quarantines and information pertinent to how they will be enforced will help to ensure that they are carried out in a manner that best benefits those who are quarantined.

Having noted the numerous ways in which ethical responsibilities can be enforced what can be presented are the penalties that an individual may incur in the event that they do not meet their ethical responsibilities. In general, when an individual fails to meet their ethical responsibilities the penalties typically include either a loss of prestige or social and professional disgrace. This is what is known as "soft" enforcement and it tends to be viewed as being favorable to more tangible penalties because it allows for higher ethical standards to be set. This is due to the fact that when following a code of ethics means following a highly specific list of legally enforceable standards which if broken will result in something such as the need to pay a fine that there can be a lack of professional inspiration.[106] Additionally, it may the unintended effect of having some individuals being willing to accept the monetary costs of unethical behaviors if they knew that they could afford to do so because the loss would be financial as opposed to social or professional.

It is also worth noting that when considering additional ways in which ethical responsibility can be enforced that there already exists a precedent for some policies to be created in such a way that they act as a further promotion of ethical responsibilities.[107] What this means is that any policy that is put in place by public health officials in this regard can be designed in such a way that it includes additional safeguards. This can be especially important in a quarantine situation as it serves to underscore the need to behave ethically under conditions which unfortunately may not always be equitable or ideal.

It is important to understand that the enforcement of ethical responsibilities is not necessarily a required component for either and effective or ethical quarantine. That however does not serve to negate its importance when consideration is to the current state of quarantine laws throughout the world. For example, as presented in chapter four there exist some areas

where there is no clear language in the quarantine laws that require them to be either safe or humane in nature. While it is possible that the omission of such language is an oversight, it can also be viewed as an opportunity, one which provides public health officials the chance to hold themselves to a clear set of ethical standards, and to ensure that those around them do the same, even when the application of such standards may not increase the efficacy of the quarantine or when there is no specific ethical directive to do so.

5. Ensuring basic needs are met

As aforementioned one of the ways in which individual civil liberty can be respected in a quarantine is via the provision of safe and comfortable conditions. One definition of such conditions presents them as those were an individual has access to shelter, along with adequate food, clothing and medical care.[108] Another way in which this can be presented is to state that while under quarantine orders that the basic needs of an individual need to be met. This can understandably be difficult to accomplish.

All quarantines require some level of logistical support in order to be implemented. What varies between quarantines is precisely how much support will be needed as that is dependent on both the size and scope of the intended quarantine as well as what resources may or may not have already been in place prior to the implementation of the quarantine. For example, in a quarantine at home situation provisions such as food, medicine, and other supplies and services that are deemed to be necessary must be provided to those who cannot leave their homes. Additionally, in all quarantine situations public health officials have to have adequate monitoring and communication in place. Such systems provide a clear connection between the individuals in quarantine and the relevant healthcare professionals. Finally, there must be a

transportation plan in place in case individuals in quarantine become ill and need to be taken to a hospital or other facility where they can be treated.[109] It is important to understand that these are the baseline type of measures that should be applied in normal quarantine situations, quarantines that are implemented in the midst of larger public emergencies need to still meet the basic needs of those who are quarantined however accomplishing this is not necessarily done in the same ways.

When faced with a broader public emergency such as a large-scale natural disaster where the implementation of quarantine is also necessary, it is important for public health officials to understand how to work with resources that are severely limited. The need to carefully allocate scare resources in emergency conditions is an inevitable task. Based on this the central question for those who have access to the resources is not whether such allocation should occur but instead how it will ultimately be done.[110] There is no easy or universal answer to this and as such the answer will largely depend on the specific situation. When the basic needs of individuals are not met during a quarantine the result is that there are individuals who will attempt to meet those needs themselves which means that they will attempt to break the quarantine. This was evident during the 2014 Ebola outbreak in West Africa. There were several points when residents of three separate countries: Guinea, Liberia, and Sierra Leone made several attempts to break quarantine. In one such instance in the slum of West Point in Liberia over 70,000 people attempted to cross a barricade that was guarded by soldiers. While soldiers worked to enforce the blockade they were not entirely effective in this regard.[111]

Ensuring basic needs are met is a requisite component for an effective quarantine because as evidenced in West Africa if those who are being quarantined are not having those needs met they will attempt to break the quarantine. Consider that even if individuals are only

partially successful in this regard e.g. if they are able to get past initial barriers but are then forcibly brought back to the quarantine, that the quarantine may become a complete failure. This is especially true in instances where either an individual is actually infected with an easily transmittable disease e.g. MDTB and they come into contact with another person while they are not quarantined, or in instances where there exists another health threat in the area and they are infected by that. While such scenarios are highly specific, there is a scant possibility of occurrence and in either case overall public health is threatened thereby weakening the overall effectiveness of the quarantine.

Ensuring basic needs are met is a requisite component for an ethical quarantine because it is an illustration of the principle of reciprocity. Individuals who are subject to quarantine orders give up certain liberties by sheer virtue of their compliance. In exchange for this compliance public health officials have the ethical duty to provide these individuals with something even if all that is happening to be a meal and clean drinking water.

6. Compensation

Similar to the manner in which being infected with a disease such as Ebola can have lasting health effects on survivors, being subjected to a public health order like quarantine can also have long-term consequences. The individuals who complied with the quarantine order, the professionals who treated them, and in some instances even the communities in which the quarantines occurred, may all be adversely impacted.[112] It is not enough to understand that this may occur after a quarantine, instead and ethical and effective quarantine model must also have clear provisions in place for how such experiences can be compensated.

As previously presented, one of the ways in which the civil liberty of an individual is

respected during a quarantine is via the assurance that they will be compensated for loss of income.[113] While this is an idea that sounds good in theory, it is unlikely to truly be feasible in practice. The lack of feasibility stems from four sources. First, consider that a quarantine may be a precursor to, or enacted as a part of, a larger epidemic or pandemic event. In specifically looking at a pandemic event as the cause or eventual effect the question that has to be asked is what is meant to happen if in the process there is an economic collapse. The answer is that the necessary funds to provide compensation simply will not be available, and by extension there will be a failure to meet the duty to provide compensation.[114]

Second, quarantines occur all over the world and not all public health systems have the same discretionary financial resources available, in poorer jurisdictions especially the need to provide monetary compensation to those who have been quarantined may in some instances bankrupt those systems, or could have the effect of limiting the number of necessary quarantine orders that are issued in an attempt to try and save money. Similarly, infectious outbreaks do not occur with the same frequency throughout the world and as such areas that have a greater frequency of disease outbreaks would have their public health systems unfairly burdened by this provision. Finally, consider that based on scope and duration that a single mass quarantine, even in a jurisdiction that has a relatively well-funded public health department, may serve to cause a severe drain on future resource availability. Noting this within the context of the presented quarantine model what is being presented is a version of this principle that is more realistic in that it looks to protect the livelihood of those who are quarantined without jeopardizing the solvency of individual public health departments.

It cannot be understated that infectious diseases serve to represent a multifaceted threat. In addition to being potentially detrimental from a health standpoint, they can also wreak

socioeconomic havoc as well. As an example of the adverse social and economic impact that infectious diseases can have consideration can be given to the role that infectious disease, both perceived and actual can have on critical matters such as job security. Specifically, the fear of infection is so powerful that is had led to groups of people being discriminated against even in instances where only a few members of the group were infected or contagious. Similarly, there exists the reality that it is possible for an employer to make the choice to either discharge, replace, or terminate any employees who miss work because they were in quarantine. In both cases the result is that barring job security legislation that there is a possibility that either during or shortly after complying with a quarantine law that a person may find themselves without a job.[115]

It is not the role of a quarantine as a public health measure in and of itself to develop public health legislation. Additionally, based on exactly where in the world a quarantine is implemented and the financial resources that may or may not be available, it is not feasible for public health officials to promise those who are quarantined any monetary compensation. What may be possible though is for the language of quarantine orders to be worded in such a way that they do two key things.

First, the language of the orders would require employers to pay individuals for any missed days of work at the rate of half of what they would have earned if they were there without causing the individual to have to give up a sick day, vacation day, or personal day that they have earned. The rationale for a specific directive is that it serves to acknowledge that the employer likely had to pay someone else to cover the work shift of the individual and they should not be forced into paying for the same job twice. It also serves to prevent an employer from forcing an employee to use any of their accumulated time off in order to comply with a quarantine order.

Second the language of the order would prohibit companies from firing or otherwise penalizing or discriminating against employees who comply with quarantine orders. This is necessary as it would serve to provide employees with some measure of job security. This may also assist in ensuring greater compliance rates.

It must be noted that within the United States there is a precedence for an edict that would prohibit employment discrimination. In the early 2000s some states began enacting laws which provide a modicum of job security to employees who have been quarantined. However, such laws vary widely on a state by state basis. For example, the 2002 Delaware law solely serves to cover permanent termination and there is no specified remedy for the terminated employee. In contrast, the 2005 Iowa law covers discharge, taking or failing to take action regarding a promotion, or the reduction of wages or benefits and offers reinstatement as a remedy for those who were discharged. It must be noted though that even in states like Iowa where a broader array of punitive actions are covered that in general the provisions are applicable only with the caveat that the individual was under either isolation or quarantine based on the orders of a state official or judge. Based on this they offer no protection to individuals who were complying with requests for isolation or quarantine or who were caring for a family member or members who were under a quarantine order.[116] In limiting coverage for employees who were placed under a mandatory quarantine order, it is possible that such state laws will create more adverse health consequences as they indirectly serve to discourage compliance with voluntary quarantine orders unless an individual is willing to risk the loss of their job. No one should have to choose between their health and their livelihood however in failing to account for, or provide compensatory needs, that is precisely what current quarantine measures are asking individuals to do.

Compensation is a requisite component for an effective quarantine because its availability may assist with ensuring greater compliance. Considering that lost wages or lost jobs are real and significant fears associated with quarantine the promise of compensation may entice more individuals to comply. This is especially true in relation to the method presented within this model which does not promise a dollar amount from the public health system but instead looks at a more feasible solution. Compensation is a requisite component for an ethical quarantine because similar to ensuring that basic needs are met, the provision of compensation also fulfills the requirement of reciprocity. Additionally. the provision of compensation for loss is required out of respect for victimhood. While those who comply with quarantines may not be viewed as victims in the traditional sense within the context of having been constrained such a label fits. In this vein compensation can be viewed as what is rightly owed to these individuals.[117]

6. Measures of efficacy

Measures of efficacy are inherently elusive when it comes to quarantine. However, elusive is not the same as impossible to develop or implement. As a result, when considering whether or not a quarantine is effective there are two primary metrics that can be considered. The first metric centers around whether or not the quarantine actually served to mitigate the spread of disease. The second metric centers around deciding what, if any, loss of services, can be viewed as accessible.

In order for a quarantine to be considered a useful measure of disease control there are three criteria that should be met. The first criteria is that there must be efficient and effective identification of the individual or individuals who are likely to be incubating the infection.[118] For example, it is not sufficient for quarantine purposes to identify that an individual recently traveled to a region where a specific infectious agent was known to be present, instead there

must exist either reasonable suspicion or knowledge that the individual came into contact with a disease vector in a manner where the disease could be spread. The second criteria is that any individual or individuals who have been effectively identified as potential vectors of the disease must be willing to comply with the conditions of the quarantine.[119] Compliance should not be presumed even in instances where the quarantine order being levied is voluntary in nature since as presented in chapter four individuals do not always choose to comply with quarantine measures especially in instances where they view those measures as being unreasonable. The third and final criteria is that the infectious disease in question must be transmissible in its presymptomatic or early symptomatic stages.[120] Consider that it is possible for a person to be infected with a disease but not necessarily contagious and noting that a quarantine is a measure meant to prohibit the spread of disease it is a punitive measure as opposed to a preventative one in any situation where the individual quarantined is not actually capable of infecting anyone in their current state.

Presuming that those three criteria are met then what must be considered is what must first be considered is a metric that can be used as a means of determining whether or not the quarantine was effective in limiting or stopping the spread of disease. Noting the importance of fast-paced decision making that is required when faced with the emergence of pathogens and the potentially lethal consequences of poor containment strategies it becomes further necessary to have in place a set of qualitative guidelines that can be used to make determinations about the success of failure of a specific quarantine measure. The current available information on the use of quarantine or symptom monitoring is currently only produced for a single or specific purpose and as a result is frequently distributed across several resources for one specific disease. This is problematic precisely because of the fact that it's so specific. As a result, it is not possible to

generalize it in such a way that it becomes useful for the type of rapid decision making that is required when dealing with novel pathogens. Additionally, attempts to use it only lead to confusion during implementation.[121] As a result of this previously designed measures are useless when dealing with new or emerging infections or when dealing with variants of known infectious agents that are being newly encountered. However, what has not been considered is a potential universal measure.

An important feature of all quarantines is that they do not need not be absolute in order to be deemed effective. Even what is known as "leaky" quarantine, where the quarantine is partial in nature such as the types of quarantines that are often the result of requesting as opposed to mandating compliance, can reduce the transmission of disease.[122] In understanding this the measure of efficacy can be presented as whatever percentage of the population is needed to fully comply with the quarantine in order to significantly halt the spread of the disease. While this number will vary based on factors inclusive of the infection itself, the rate at which it spreads, how it is transmitted, and how many individuals have been, or may have possibly been exposed, it can still serve as good base line to begin to judge whether or not a quarantine was effective.

Measures of efficacy are a requisite component for an effective quarantine because they provide clear insight into what is not working. This is imperative in the sense that as this data is gathered from a variety of quarantines it may help to create a more specific and streamlined system. Measures of efficacy are a requisite component for an ethical quarantine because they can be seen as providing a form of transparency. In the event that public health officials share the results of why a particular quarantine was effective, it may provide them with the necessary information to justify another public health measure. Additionally, by being able to clearly present what did and did not work and to what extent public health officials also have clear

findings that they are able to share.

Limitations of the Proposed Model

While the presented model of a quarantine that is both effective and ethical has been developed utilizing careful research what cannot be ignored are its clear limits. First, the model was not developed by either an epidemiologist or a public health official, individuals who have practical, hands-on knowledge relative to diseases containment. Second, the model is not currently testable.

Conclusion

Prior to implementation quarantines can be viewed as ethically neutral because while on one hand they serve to infringe upon the rights of individuals on the other hand they are designed with the protection of the public good in mind. This serves to create a complex, although not entirely troublesome, dichotomy between the ethical disciplines of public health ethics and global bioethics, both of which can make valuable contributions to what is known about, and what must still be learned about relative to quarantines, and the vulnerable nature of those who are quarantines. One way in which this is done is simply by causing a greater focus to be placed on the differences that can and do exist between quarantines that are considered ethical and those that are considered effective. While such differences have been reconciled in part, such reconciliation currently exists as purely theoretical in nature. In looking toward, the sixth and final chapter in this work it will be necessary to revisit what has been learned about the complexity of quarantines thus far before the provision of a series of recommendations for the future.

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Chapter Six- Summary and Recommendations

Infectious disease is now, and for the foreseeable future will remain a public health concern. Understanding this means also understanding that there is a necessity to find sustainable ways to mitigate the spread of viruses and contagions that have epidemic and pandemic possibilities. However, as important as it is to address public threats, doing so cannot be done at the cost of public trust. Therefore, public health policies have to be reflective of a desire to limit the spread of disease without engaging in practices that will cause the public to lose faith in the medical community.

A. Summary

Quarantine exists as a longstanding and key component of public health policy. This is due to the fact that he practice is one with a historical basis and even in the 21st century it is still implemented around the world in countries and regions that are facing epidemics. Presently however the efficiency and effectiveness of quarantine measures can and should be called into question. In seeking to summarize why this is there are several factors which must be explored including the role of globalization, the nature of infectious threats, the ineffectiveness of contemporary quarantine measures, and the ethical quandaries that are associated with modern quarantines.

1. Quarantine in a globalized world

There exists no non-alarmist way to present that fact that presently global health conditions are at a critical point, or more specifically they are in a state of crisis.[1] The mere act of globalization is so pervasive that is has the power to, and moreover is, altering the current landscape of public health to the point that health issues are among those which are front and center on the global stage. Similar to the ways in which globalization influences health,

globalization itself is also influenced by a myriad of factors which are inclusive of, but by no means limited to, new developments in the technology sector, politics, economic upturns and downturns, social and environmental concerns which are on the rise. Whereas population health status and the distribution of health at that level are determined by corresponding influences with globalization and by extension global health what has been created is a context that both exists and must interact globally, and one that is rapidly changing as a result of that unique orientation. In such a space local and national actions while still important are in no way able to wholly ensure public health security as collective, e.g. global, action has reached a critical point.[2] In working to not merely acknowledge, but instead to fully embrace the reality of existing in a globalized world it is imperative, especially for those in healthcare, to have a clear understanding of the ways in which this reality impacts things such as the prevalence and spread of infection.

Salient to this work one of the key things that globalization has done relative to healthcare and health-related issues is to showcase both the failings of existing quarantine measures and the quarantine laws that govern. Specifically, it serves to highlight the naivete of believing that it is presently possible for a single nation to effectively control the spread of disease on its own. The reality is that this is no longer truly possible in our current era where everything from commerce to travel and ecological change are intertwined at a global level. It is also worth noting that even major public health organizations such as the Centers for Disease Prevention and Control (CDC) have officially recognized that formerly valid distinctions between "domestic" and "international" health are presently of little relevance when it comes to the control of infectious diseases.[3] In living in a more globally connected world we must begin to accept that there are no borders which can keep disease out. Travel, commerce and trade all exist as ways for individuals to be exposed to an infectious disease. In addition to the possibility of

accidental contamination, there is also the possibility of intentional biological based attacks. While quarantines may be utilized as a means of mitigating the spread of infection, the reality is that they may not prove effective. Regardless of how long quarantines have been utilized as a tool of public health it does not serve to negate that in the present, globally focused healthcare climate that "as is" they exist as largely ineffectual with a propensity towards being unethical as well. This should not have been accepted when quarantines were solely a matter of public health in a single nation, and it cannot be accepted now that quarantines are more openly being utilized to combat diseases that have crossed international borders.

2. Public Health Policy, Legislation and Quarantine

We are living in a period where significant changes are occurring in the field of public health.[4] By extension, if not entirely by intention, this also means that we are living in a world where significant changes to public health policy are occurring as well. Such changes can be seen both in the actions of individual nations, their subsequent legislation and in the development and adaptation of regulations which govern global health.

Such changes are not occurring in a vacuum or without just cause. Instead these changes are occurring because health, despite being a field that seems as if it would take naturally to engagement in joint action, is in some respects still a field where matters of public policy are still largely linked to the nation states which developed them. The result is that countries have been placed in a position where they are balancing the defense of their internal sovereignty over their healthcare policies against the fact that in many instances they are losing, or have already lost, sovereignty over policies that are relative to factors which are viewed as determinants of health. These factors include the marketing, distribution and sale of consumer goods including but not limited to food and tobacco, the growth and maintenance of a global health industry which

includes at minimum pharmaceutical products and insurance , environmental pollution and infectious disease which are both spreading globally, and finally the health impact of the global financial system.[5] Such issues are only exacerbated when among them consideration must also be given to the potential needs to implement quarantine, a need which has repeatedly been felt in recent years by a number of countries and regions including but not limited to the United States, Canada, China and West Africa. In looking beyond these issues to how they are being dealt with it is necessary to consider several factors. These factors include the broad evolution of public health policy, current global health laws, and most salient to this work the individual ways in which independent nations implement quarantine.

First, focus can be placed on public health policy as it currently exists. The 21st century can be seen as presenting unique opportunities and challenges for public health overall and progress is in no way guaranteed. In addition to needing to address issues which remain unsolved, there is also the need for public health policy to find solutions for, or work within the constraints posed by the impacts of globalization on health.[6] As such public health policy can be viewed as going through a period, where perhaps more than previously before, it needs to be carefully assessed and reassessed to ensure that it remains relevant, and by extension useful.

Working in concert with the individual public health policies that nations develop as a means of dealing with their own health issues are globally focused health laws. Such legislation serves to address a variety of matters including everything from the rights of individuals to how matters of global heath can be addressed. However, one of the most important aspects of these laws is that they can be viewed as a double-edged sword which is both beneficial and mired in bureaucracy.

In terms of the former description of global health legislation consider that such laws

often set a standard or provide a standardized protocol for how matters that impact global health should be handled. As an example of this consider the International Health Regulations (IHR) which in part, since 2007 reformations following the SARS outbreak, provide member nations with a legally binding framework to coordinate the management of events, such as an infectious disease outbreak which may be viewed as a public health emergency that can have the type of impact that would classify it as an international concern.[7] Such information is undoubtedly helpful in the sense that it serves to provide guidance during a time where it can be greatly needed and may work to ensure that no pertinent information in inadvertently left out of reporting on a situation that if left unchecked or otherwise improperly attended to could serve to create a wider reaching emergency.

In terms of the latter description of global health legislation, focus must be placed on the sometimes idealistic requirements which can be difficult if not impossible for all nations to adequately reach. As an example of this consider the agreement of all members of the IHR to be contributors to the international 24 hour early warning and rapid response system which is overseen by the World Health Organization (WHO) and what exactly that entails. Specifically contributors are meant to develop their own 24 hour monitoring, reporting and response systems, each of which needs to be able to collect and share sophisticated data. In addition to building these systems each country must also designate a completely disease free entry point, i.e. one that is impenetrable to even rats and mosquitos where health checks can be performed and any individual who is determined to be ill can receive immediate medical care. As expected this has been a daunting task to complete as it requires both a great deal of logistical support as well as the availability of significant economic resources. As such many countries have not been able to comply, and more importantly some may never be willing or able to expend the necessary time,

effort, and resources to ensure that they are able to. Noting the inability thus far to complete this system, what takes on increased importance is the legislation which governs the ways in which individual nations work to implement quarantine measures.

As expected there exist clear differences in the legislation which governs the ways in which individual nations implement quarantines. For example, within the United States the primary power to implement a quarantine resides with local and state authorities and their respective public health officials.[8] As presented in chapter four this is stark contrast to countries like China and Canada where such powers reside with their respective federal governments. While such differences in implementation can be important to understand from an academic standpoint what it most important from a medical standpoint is the similarity that much of this legislation is, or was until this century, incredibly antiquated in nature. As an example of this consider that in 2006 Canada introduced a new Quarantine Act, one which modernized legislation that had not been updated since the early 1870s with the primary aim of focusing on air travel as opposed to travel via waterway.[9] While this update is clearly representative of some modicum of progress what cannot be ignored is how long such progress took and the fact that it served to solve for a problem that should have been solved for decades ago. The broad reliance on legislation that is stuck in, or has only recently been, removed from the past serves to create issues in implementing quarantines that will in all likelihood persist if not carefully and consciously addressed.

3. Globalization and Increased Risk of Epidemics and Pandemics

Within the modern world infectious threats are not solely a healthcare problem, they can also be viewed as a global security issue. This is due to the fact that in addition to the threats which are posed by diseases must be considered as transmissible in a variety of contexts that can

be viewed as being directly linked to globalization. Additionally, there is an increasing amount of global concern relative to the threat of biological attacks and the role that the spread of intentional contagions could have on creating an epidemic or pandemic event. Noting the sheer number of human, animal, and other vectors, special attention needs to be paid to public health infrastructures in general, and public health measures like quarantine in particular in order to help to mitigate the possibility of future epidemics and pandemics.

In first looking at infectious diseases relative to how they can be spread thought needs to be broadened beyond the modes of transmission e.g. airborne or blood borne, and instead be placed on the behaviors, actions, and desires of individuals that can contribute to the spread of disease. In this vein consideration can be given to the relationship that exists between migration and disease which has been recognized for centuries,[10] but is becoming more relevant with globalization, increased trade and commerce, matters of food processing and handling which take into account the fact that as globalization introduces individuals to new foods that it also opens them up to new and unexpected risks,[11] and the increased spread of zoonotic diseases which account for more than half of the known infectious diseases.[12] Essentially, as humans come into closer contact with both each other and the items that our individual societies produce we increase our overall risk relative to being exposed to diseases that either are not native to or otherwise not prevalent in the areas where we are from or where we currently reside.

In addition to the threats posed by fairly innocuous behaviors such as eating local cuisine while on vacation in a foreign country or making purchases from sellers and stores overseas, there are exist the threat of intentional contagions via bioterrorist attacks. As presented in chapter three of this work bioterrorism is not a concept that is unique to the 21st century. However, in recent centuries, based in large part on globalization, it has become easier to carry out a

biological attack, and such attacks can be difficult, if not impossible, to trace back to their origin points,[13] a fact which should not be viewed as fear-mongering, but instead taken seriously as a warning of what is possible.

Noting the myriad of ways in which infectious disease can be spread in a globalized world focus can be placed on what happens when that spread begins to develop into an outbreak. Regardless of the infectious agent that is posing the threat all emerging disease outbreaks require rapid responses. In seeking to provide this response government officials are often called on to make decisions regarding the implementation of control measures, such as quarantine, on the basis of limited knowledge about disease transmission dynamics.[14] As an example of this consideration can be given to the most recent experience with SARS. In dealing with this disease outbreak what was revealed was that there were two core questions that policy makers needed to address when they were faced with the potential outbreak of infectious disease. The first question centers around the likelihood whether or not basic health measures, such as isolation and quarantine, could be used to control the spread of disease. The second question is whether or not both isolation and quarantine should be utilized within the context of that specific instance.[15] The fact that these are the two primary questions serves to showcase both the importance of, and reliance on, the measure of quarantine relative to slowing or stopping the spread of infectious disease. However, it would be remiss to believe that based on these questions that quarantine is a wholly effective measure. Instead, it would be more apt to present it as a measure with is familiar and such familiarity with the ways that it can be implemented and how it is supposed to work serves to make it a viable option when faced with a potential public health emergency.

4. The ineffectiveness of contemporary quarantines

Contemporary quarantines are not merely ineffective, they are woefully ineffective, and

there does not exist a single clear reason as to why this is the case except to present that in continuing to implement quarantines in the manner in which they are implemented that essentially what we are trying to do is to attempt to treat twenty-first century pathogens with a medicine chest that has not been updated since the fourteenth century.[16] If this sounds dire it is because the situation is dire. What is perhaps most frustrating about this though is that complaints about inadequacy and ineffectiveness relative to this system are not even unique to this century. Exemplary of this it can be reiterated that as early as 1904, at least within the United States, questions were being raised about aspects of the quarantine system which seemed to arbitrary and nonsensical as a result.[17] Despite answers to these questions however, quarantines across the board continue to be both governed and implemented in a manner that is largely ineffective in nature.

In giving credence to the preponderance of evidence stemming from real-world events, public opinion surveys, and mock exercises, it is disquieting that in the twenty-first century there are still those who act as advocates for quarantine measures that can accurately be described as being draconian throwbacks to the 19th-century, and in some instances even further back. Such advocacy is likely the work of public health officials who are more invested in the theoretical ideals of their work than they are in its practical application, and as such operate under the delusion that brute force and effective control are synonymous with sole focus on the former concept and none on the latter which leads to misconceptions about how both epidemics and biological terrorism should be addressed. Unfortunately, as long as these are the types of ideas that exist as the driving force of the public health community we will continue to see quarantines implemented in ways that are both ineffective and unethical.[18] In stark contrast are more modern quarantine measures which while still highly flawed have the potential to be transformed into a

public health measure which is much more effective.

The flaws inherent to modern quarantine cannot be overstated. With that said however there are some redeemable aspects. For example, as quarantine currently exists it is not a monolith, instead of being a single intervention which cannot be changed, it instead represents a wide range of possibilities in that quarantines can be scaled to be reflective of required size and scope. As such it can be an integral part of broader public health interventions and when applied properly it has been shown to both slow and stop the spread of epidemics as evidenced with SARS. This is due in part to the fact that quarantine is at its most effective when it is implemented as the result of comprehensive disaster planning, planning that allows for effective communication and the building of public trust, and not utilized in lieu of such planning. Effectiveness is also increased when it is possible to tailor it to the unique circumstances surrounding the specific situation and in scenarios where it is not the sole containment measure being implemented. However, adherence to ethical standards can cause contemporary quarantines to be both resource and labor intensive,[19] something which may serve to provide insight as to why not all quarantine laws have language which requires ethical treatment, something which can be viewed as a means of only furthering the ineffective elements of quarantine.

5. The ethical quandaries of contemporary quarantine

The core ethical quandaries of contemporary quarantines stem from the fact that there exists a clear disconnect between both effective quarantines and ethical quarantines as well as a lack of focus on the vulnerability of those impacted. While these are different issues, the results are the same in the sense that both problems may make it more difficult to obtain voluntary compliance for quarantine orders which then serves to necessitate the orders to be made

compulsory. It is however not enough to acknowledge that such conflict exists, instead it must also be examined as a means of both getting to its root cause(s) and considering a way, that if possible, it may be resolved.

First, focus can be placed on the divide between quarantines that are effective and those that are ethical. It is important to note that, as far as the research reveals, no local, state, or government public health agency seeks to create a quarantine that will specifically fit into one of these categories. Instead such a divide is unintentional and not always explicit. As such there can be effective quarantines that are also ethical as well as ethical quarantines that are also effective, however these occurrences do not seem to be based on any specific quarantine laws or regulations or any unique designs which may serve as a means of identifying why matters of efficacy and ethics are not always balanced in quarantine implementation.

Essentially, the basic goals of effective quarantine center around getting compliance to the order, regardless of whether such compliance is mandatory or coerced, as well as one that seems to be or can otherwise be presented as effective.[20] These basic goals are generally expanded upon when looking at contemporary quarantines however. In that vein effectiveness is the result of several interconnected factors. These factors include local, state, and federal public health staffs all knowing and working within the context of their unique roles, the identification and engagement of appropriate partners whose work is ancillary to public health officials during quarantines such as law enforcement agents and agencies and providers of transportation services who can be involved during the planning process, and finally the provision of adequate notification to the government about the threat of specific infectious disease threat and the role of the intended quarantine in mitigating it.[21] The additional goals serve as a means of providing more focused guidance which can be utilized in conjunction with the protocol for quarantine

implementation however they should not be mistaken for measures of efficacy.

The goals of an ethical quarantine are less clear when taking a global focus. This is due to the fact that just as individuals have different ethical viewpoints that countries also have different agreed upon ethical principles which guide both the ways in which they practice medicine as a whole, and how their public health policy is implemented in particular. For example, while global bioethics exists as a distinct discipline, it would be remiss not to acknowledge that different countries and regions have their own perspective relative to precisely what bioethics is and how it should be practiced. For example consideration can be given to the core difference between Western bioethics and Asian bioethics and the fact that the former focuses staunchly on the individual while the latter places focus on social units.[22] In acknowledging the existence of such differently and more importantly the probable roles that they play on the manner in which quarantines were implemented in different parts of the world, it was necessary to take a much broader, and by extension a much more likely to be applicably globally with the least amount of adaptation, view on what served to constitute an ethical quarantine. In taking such a view there were several factors that were identified as being requisite for the implementation of an ethical quarantine. The factors included application of the harm principle, proportionality, reciprocity, and transparency.[23]

Within the context of chapter five of this work a model for an effective an ethical quarantine was presented. It described several core components that included clear communication of intent, a focus on protecting public health, the enforcement of ethical responsibility, and a provision for compensation once the quarantine is lifted and a tool for the measurement of overall efficacy. The purpose of this model was twofold. First, it was meant to showcase that it was possible to consistently implement a quarantine that is both ethical and

effective. Second, it was meant to provide a model that could be applicable globally with little to no adaptation. However, what cannot be ignored are its limitations as a model. Essentially, unless, or until, it is tested it remains unproven. As a result, it cannot be viewed as a viable solution to the current ethical quandaries of quarantine.

Second, attention can be placed on the role vulnerability. Within the context of chapter five it was shown the vulnerability does not exist as a new concept for public health ethics,[24] and that there are scholars who understand the need for, and moreover want, vulnerability to be considered as a part of global bioethics.[25] Understanding this is especially key in relation to quarantine especially when viewing it globally because of the way in which international society operates. Specifically, in international society is both inconsistent and selective when you compare global regimes on a side by side basis. What can be understood by this is that it is not uncommon for those who are already in an advantageous position in terms of healthcare to be granted even further advantages.[26] This helps to underscore the need for vulnerability to be both recognized and accounted for when quarantine orders are implemented in order to best provide assistance for this group of people regardless of where in the world they may be located.

B. Recommendations

Having addressed a wide array of information relative to the manners in which disease is currently being spread, the myriad of threats and the inefficiency of, and ethical dilemmas associated with quarantine, the cliché question that must be posed is "Where do we go from here?" The most succinct answer to that question is "forward", however it is not the most satisfactory. In seeking to provide a more satisfactory answer it is necessary to give credit to the idea of contemporary quarantine.

In acknowledging the role that modern quarantine can play as a critical public health

measure what cannot be understated is the fact that quarantine currently works wholly in theory and partially in practice. In order to increase practical effectiveness it is imperative that it becomes both more reflective and responsive to current global medical needs and norms. Based on this there are several suggested recommendations for moving forward. These recommendations include a focus on ethically responsible globalization, appropriate global focus on emerging and re-emerging infections, the development and adoption of clear and comprehensive national quarantine standards, and finally the development and adoption of a global quarantine-based model that is both ethical and effective.

1. Ethically responsible globalization

At the present time, we all live in a world that is interconnected and interdependent in ways which are unprecedented and the reality is that we may not all be fully prepared for what that can, and does, mean, for matters relative to public health. It is imperative that in such an environment that countries are cognizant of both the opportunities and the risks that they are presently exposed to because domestic action alone is no longer enough to ensure that the population of a nation remains healthy. Instead there is a clear need for increased collective action by all of the countries that are impacted.[27] What may be less clear though it what exactly that action looks like.

Throughout this work examples have been provided relative to the ways in which globalization can and has both helped and harmed the global population. Additionally, in addressing actions such as involvement with the International Health Regulations (IHR), what has also been explored are the tactics that have been tried, as well as those which presently exist, as a means of attempting to address global health problems. As important as all of this information is the reality that it may not be enough without a conscious effort to engage from

this point forward in ethically responsible globalization.

There does not exist a single way or single set of directives which serve to be the correct answer to ethically responsible globalization. As such the suggestions being presented within the context of this work are germane to the idea of helping to mitigate the spread of disease in a world that is steadily becoming more, and not less, connected. In this vein there exist two short-term solutions which need to be explored by the global health community for their potential viability in terms of application in a wide variety of countries including those where there exist limited funds and/or resources as well as in areas where public health structures may need to be built or rebuilt. It is imperative that such locations are explicitly included in actionable global health measures from the outset so that the challenges unique to them can be addressed early on. It is further important to note that these recommendations are not all quarantine specific since there are broader issues which need to be addressed before consideration can be given to the issue of quarantine.

First, every country needs to create a framework for global public health ethics that would be culturally acceptable as a means of working towards generating a truly universal standard. Global health ethics is a relatively new term which is meant to address the process of applying moral values to health issues that in general have a global effect and/or require global action.[28] Noting its global impact, it should have global input. It is implausible, and it should not be expected that every country will come up with the same ethical values but there is a need to focus on the values that are similar and shared while also seeking to understand the ones that are different. The rationale for this centers around the fact that as a whole global health is supposed to be about a partnership between developed countries and their poorer counterparts thereby allowing it to be free from the outdated and paternalistic patterns that have previously pervaded

the relationship between countries when there exists a significant wealth gap.[29] However, it is not accurate to frame it as a partnership if Western values, or values of wealthier nations are the ones which by default act as the guiding principles that everyone else is meant to follow regardless of their own beliefs and moral systems.

Second, every country needs to create a framework for an actionable 24 hour monitoring and response system for the detection of infectious diseases. As aforementioned all countries who are members of the IHR agreed to implement these types of systems already however logistical issues presented themselves in many cases based on the specific requirements set forth by the IHR. Without disputing that the requirements of the IHR serve to be representative of the ideal course of action that should be followed, what cannot be ignored is that for many countries the option does not exist for them to comply. Based on this it may be far more feasible for every country to present precisely what it is that they can do and to build a system utilizing that information. While this will not result in an immediately standardized system it will serve to showcase what such a system could potentially look like by putting into perspective the realities of both what every country is capable of and where every country may require assistance in order for their portion of the system to be useful overall.

Combined these recommended actions are representative of a mere fraction of the possible measures that can be taken to work towards more ethically responsible globalization yet they can still be viewed as a positive step forward. In addition to these short-term recommendations there are also several long-term recommendations that can be made as well. As with the short-term recommendations these suggestions should be implemented in a variety of locations where there are distinct differences in economics and access to resources.

First, in looking towards the long-term it is necessary not to lose sight of the short-term

recommendations. Noting this, in the long-term it will be important to ensure that progress is being made on both of the short term measures suggested. In taking the time to check on these projects the opportunity also presents itself to see where assistance can be lent to help make individual country goals a part of a collective global health reality.

Second, emphasis needs to be placed on developing a universal framework which will serve to provide sanitation standards for exported foods and other goods. In understanding that foods and products can serve as potential vectors of accidental contagions as aforementioned it is imperative that steps are taken toward finding a solution which will serve to mitigate that risk significantly. However, such steps will likely need to vary on a country by country basis as a means of account for individual resource availability and infrastructure.

Third, countries need to work to create actionable and ethically acceptable measures for coordinated border surveillance measures. There is precedence for this type of international cooperation. For example since 2000 the CDC has served as both the organizer and supporter of an annual border infectious disease surveillance meeting between the United States and Mexico. Present at this meeting are representatives of both federal governments, border states of both countries, the U.S.-Mexico Border Health Commission, academic institutions, and other relevant stakeholders.[30] Similarly, there are specific programs that exist specifically in border states as a means of addressing specific health issues in those areas and engaging in targeted disease surveillance. For example The US-Mexico Border Health Commission (USMBHC) supports the San Diego County Public Health Department in terms of addressing specific diseases such as tuberculosis. Additionally, in 2010 the USMBHC sponsored what proved to be a turning point for border collaboration in the state of California: the Leaders Across Borders (LAB) program. The LAB program is a yearly, 10 month long program focused on educating and mentoring

health professionals and community leaders to design and implement projects that specifically address the needs of those who live in the under-served communities that make up the U.S.-Mexico border region. The individuals who participate in the LAB program learn effective collaboration via the development of skills in health diplomacy and gain a deeper understanding of cultural differences and binational health systems.[31] Similar methods and measures can plausibly be implemented in other border regions across the globe in order to provide more comprehensive infectious disease surveillance in those areas while at the same time increasing cooperation between the involved nations as they work toward the shared goal of helping to protect global health.

2. Appropriate focus on infectious disease

A focus on infectious disease exists as central to any conversation or policy decisions relative to public health. This is especially true when considering new, emerging, or re-emerging infections, and the ways in which their spread can be mitigated. However, in seeking to work most effectively it is imperative that in a global arena that such focus is appropriate.

When new infectious diseases appear, especially when they have high mortality rates they can serve to create fierce competition both scientifically and politically. What occurs as a result is a rush of scientists all seeking to be the first to "discover" the virus and to claim patents and rights relative to the disease.[32] Such activity can undoubtedly be important in that its plausible that this attention may lead to the emergence of new information about the infection. However, that does not negate the fact that it serves to essentially commercialize a practice that, for the good of global health, be a collaborative one.

Noting the need for scientific explanation of new diseases to be collaborative the question has been raised relative to how it would be possible to get scientists to work together during this

critical period to discover ways in which such diseases can be managed or mitigated as opposed to capitalized on. Rather than waiting for this question to be answered there are those in health field who have asked the IHR be revised in two specific ways. First these individuals asked for a definition of international expectations about public health data that is essential in nature and how the products that emerge from that data should be managed, shared and owned. They also asked for clarification relative to ways in which states should interact when there was crucial information for risk assessment that was needed by the global health community.[33] It is telling that such questions have to asked. In seeking to provide an answer consideration should be given to a compromise that essentially creates a mandatory reporting system for scientists and other public health officials when faced with new infectious diseases. Such a system could be utilized as a means of presenting explicitly what information must be shared upon the discovery of a new disease and how such information should be shared.

In looking at what information would need to be shared about a new disease it is suggested that there are five core factors which need to be shared: mode of transmission, symptoms, incubation period, geographic origins or prevalence, and affected population. Each of these factors was selected because of their relevance to public health as a whole. While these factors obviously work together, it is important that their significance is explored separately.

First, in considering the mode of transmission for new infectious diseases scientists need to present whether or not the new disease is blood borne or airborne. Additionally, they need to indicate what the potential or known vectors for the disease are. Finally, they need to present whether or not the disease in potentially zoonotic in nature.

Second, in presenting the symptoms of the disease the scientists need to be as detailed as possible. For example, rather than presenting a headache as a symptom, it would be far more

beneficial to present that “a cluster headache lasting for between 20 minutes and one hour” as the symptom. While such precise information will not always be available, whenever it is it needs to be shared. The rationale for this is that it may allow public health officials to make clearer determinations about whether or not the disease has spread into their area based on the symptoms that their patients present. Additionally, it is imperative that when known scientists also indicate any other short term or chronic conditions that a patient may have and when possible differentiate which symptoms are caused by which disease in order to present the most accurate information possible. Consider that if such information is omitted that it may lead to incorrect diagnoses with future patients who have the disease but do not present it in the same manner.

Third, in seeking to present the incubation period of a new infection it is plausible the scientists or public health officials who see the initial cases may not have an exact time frame. Factors such as when a patient seeks medical help, when it is determined that a patient is infected with an unknown pathogen, and how long it takes to notify the appropriate parties for further testing can, and will likely, serve to put scientists in a position where they need to make an educated guess relative to the incubation period of the disease. Even in knowing that this is the case scientists need to share any information that they have relative to what this time frame may be as it may assist public health officials.

Next, in addressing the geographic origin or prevalence scientists attempt to determine one of two factors relative where the disease is localized. Specifically, what needs to be addressed is either where the disease may be originating from or where the disease seems to be localized. Such information is important because in addition to providing public health officials with an idea relative to where the new disease hot spot is or may be, it may also serve to provide invaluable information to scientists relative to the type of environment that the disease thrives in

as well as providing insight into additional vectors of the disease which may not have been known before or may not have been previously considered.

Finally, in looking at the affected population it becomes possible for scientists to put together a demographic profile of those who have been infected. This information is important for two reasons. First, it is plausible that in looking at this information it will be possible for scientists to fill in any blanks that they may have relative to the previously discussed factors. For example, if scientists are initially uncertain about whether or not the disease is zoonotic but they then learn that most if not all of the patients presenting with the new infection are those who have recently been bitten by rats, it may then be possible for them to present with more certainty that it is possible for the disease to pass from animals to humans. Second, this information is important for public health officials because it allows them to best determine who may need to be quarantined by looking at other members of the identified population or those they may have reasonably come into contact with. It is imperative however that after identifying the affected population that other members of that group are not discriminated against or otherwise unfairly targeted.

3. Clear comprehensive national quarantine standards

As presented is chapter four quarantines as they currently exist are ineffective. A significant aspect of this ineffectiveness stems from the manner in which they are implemented which can be, at least in part, traced back to the legislation that indicates which types of disease outbreaks trigger quarantine, which government body holds the responsibility for initiating a quarantine, and what rights the individuals being quarantined do or do not have. This serves to make the experience of being held under quarantine highly subjective based on factors that have little to do with the nature of the potential infection and more to do with what power is or is not

available to public health officials. Noting this fact, it is recommended that national quarantine standards are developed both in the United States and in countries across the globe.

The way in which a nation responses to an epidemic is not solely a matter of which resources it has available. Without seeking to dispute the importance of either personnel of healthcare equipment, it must be understood that such a response also serves as a means of reflecting the core values of the nation where the disease outbreak is occurring. In seeking to better understand this idea focus can be placed on the SARS epidemic of 2003. During this epidemic Canada, China, Hong Kong, Singapore, Taiwan and Vietnam were the most heavily impacted areas on the world and collectively they quarantined hundreds of thousands of individuals, the majority of which supported the effort being undertaken and as such complied. Exemplary of this consider that in Toronto, Canada that a total of 30,000 individuals were quarantines for a total of 10 days. Out of these 30,000 people only 27 of them did not choose to voluntarily comply necessitating the issuance of court orders. The question may be posed as to how such high levels of voluntarily compliance were achieved and the answer in rooted firmly in Canadian values. Canada, as well as the other countries which were most heavily affected, is a nation that is known in large part for its communitarian values and social solidarity. In stark contrast is the United States. In the United States there exists a greater focus on libertarian values, individualism, distrust of the government, a willingness on the part of individuals to invoke their legal rights and the belief that healthcare is a personal as opposed to public responsibility.[34] Noting this it exists as plausible that if there was a need to implement a large-scale quarantine in the United States that the rates of voluntary compliance would be far lower than they were in Toronto or anywhere else during the SARS outbreak. While it may not be plausible, or even desirable, to change the core values of of a nation it is plausible to change the

values which serve to steer its systems.

In giving greater consideration to the possibility of changing national systems in lieu of altering national values focus can be placed on the United States as a means of showcasing why such changes are necessary. As greater focus is placed on public health it is becoming clearer that the current healthcare system in the United States needs a new conceptual framework as opposed to a series of tweaks and changes. There reason for this is that there are two major issues which need to be addressed. These issues are capacity and the current state of public health law.[35] While these are certainly not the only issues which plague the public health system they are significant enough that any changes to them would likely necessitate fundamental changes to the manner in which the system is able to operate.

The first major issue with the public health system centers around capacity. As an example of this, in Washington the Board of Health discovered that only about a third of its counties had isolation protocols set up in their hospitals and that of these hospitals only a limited number had self-contained air systems necessary for the isolation of contagious patients. The situation in Washington speaks to the broader issues of surveillance capacity across the nation in that it is both inadequate and incomplete. Couple this with additional issues such as data systems which are antiquated, laboratories that are technologically inferior and a workforce that is both under-trained and under-qualified and the result is a public health infrastructure that is not only insufficient but grossly deficient. The source of this deficiency in twofold and can be traced back to highly inadequate funding and a lack of strong public support for the issues which is now only beginning to shift.[36] It goes beyond the scope of this work to make comprehensive recommendations regarding how this issue could be addressed, but it exists as plausible, at least in part, that this issue will be impacted by any changes made relative to the second major issue

within the healthcare system.

The second major issue with the public health system as a whole centers around the law. In this vein, there have been three main problems with public health laws which have been identified. These problems include antiquity, multiple layers of law, and the inconsistency of laws both as they exist and are applicable across states and territories.[37] These problems which plague public health law as a whole also serve to gravely impact quarantine law, and by extension any standards which currently exist relative to the manner in which it is implemented based on that legislation. In seeking to address this it is recommended that new quarantine laws are drafted in order to create a foundation for clear and comprehensive national quarantine standards.

In seeking to set new quarantine standards by redrafting quarantine laws it is recommended that public health officials ask and answer several questions about every new law proposed. Each of these questions is relevant to some aspect of this research. In that vein each of them is meant to address something which has been revealed to be a source of inadequacy or ineffectiveness in quarantine implementation both in the Unites States and in other countries. Noting this these questions can be seen as being globally applicable.

The first question that must be asked is "Is it relevant?" In seeking to ascertain whether or not a proposed quarantine law is relevant consideration must be given to whether or not the law makes sense within the context of a globally connected world. Exemplary of this consider the lists of diseases that trigger quarantine which are found in many, if not all, countries. As aforementioned these lists have been questioned since the early 1900s, at least within the United States, when it was noted that there were infectious diseases which despite being considered dangerous were omitted. It is plausible that such omissions can cause more harm than good as

they may allow for more people to be adversely affected by a new or emerging infection solely because it is not explicitly listed. Noting this it may be far more relevant to replace these lists with a series of criteria relative to each individual disease outbreak

The second question that must be asked is "Is it reliable?" In looking at reliability in relation to quarantine what must be addressed are the measures and methods which are going to be applied as a result of the law. For example consideration can be given to something like how quarantine requests are going to be communicated. By default such requests will likely be communicated in the native language of the country which is understandable however it is not a reliable measure if there are not provisions which indicate that reasonable efforts must be expended to ensure that the communication is understood by the intended recipients.

The third question that must be asked is "Is it economically feasible?" Quarantines by their very nature can be costly endeavors. As an example of this focus can be placed on the 2003 SARS outbreak and the cost of implementing quarantine in Ontario. Based on the first quarter report of Ontario Finances for the fiscal year the direct cost of the epidemic is estimated to be $12 million. In looking at a breakdown of how this money was spent the provincial government spent $10 million on SARS related administrative costs. These costs were so significant because when the outbreak began in Toronto in 2003, public health authorities were put in a position where it was necessary for them to immediately establish an administrative infrastructure which would allow them to carry out contact tracing and enforcement of quarantine in a matter of weeks. Every aspect of this infrastructure including a computer database which was utilized to track of contacts, information and surveillance hotlines, along with a staff to monitor the health status of the individuals needed to be created because quarantine had not been utilized in the past. In addition to the $10 million administrative cost, $1 million was spent in order to protect

the jobs of the individuals who were quarantine and $1 million was used in the establishment of a SARS Assistance Office. The function of this office was to deal with the interests of employees who took time off of work to either quarantine or isolate themselves.[38] While not all quarantines will require the development of new systems in order to be implemented there will obviously be the expenditure of some cost, and that cost is likely to be significant in nature. Noting this it is imperative that in developing quarantine laws these baseline costs are considered in relation to any costs that new provisions may require in order to determine the economic feasibility of such provisions.

The fourth question that must be asked is "Is it socially responsible?" As presented in chapter five during the Ebola outbreak of 2014 the government of Sierra Leone made the decision to stop spending money on any services which were not directly related to combating the disease. The result of this choice was a significant deterioration of their overall public infrastructure, an infrastructure which was still necessary once the outbreak was over yet was not as capable as meeting the needs of its citizens. Based on this it becomes imperative when considering new quarantine laws to be certain that they are not placing short-term public health measures over long-term public welfare. Without disputing the need to ensure that a quarantine is adequately carried out no aspect of its implementation should threaten the operation of other critical services that are not in some way directly related to the quarantine. Additionally, even when looking at the services that may be directly related and therefore impacted, such an impact should be temporary. As an example of this consider that for the duration of a quarantine it may be necessary to alter or eliminate certain mass transit routes, in preparing a process for this to be undertaken what must also be addressed are ways in which those routes will return to normal or otherwise adjusted after the quarantine as a means of not further damaging the livelihoods of the

individuals who rely on those services.

The final question that must be asked is “Is it ethical?” As aforementioned different countries have different values that guide them and different beliefs relative to what they do and do not consider to be ethical. However, as presented in chapter five there exist four core elements of an ethical quarantine including the ability to meet the harm principle, proportionality, reciprocity, and transparency. Noting this in seeking to determine whether or not a proposed quarantine law is ethical what must be decided is if it violates any one of these principles. If it does then it is not ethical.

It is plausible that if all of these questions are answered in relation to new quarantine laws that new quarantine standards will be set. The rationale for this centers around the fact that if every individual law is relevant, reliable, economically feasible, socially responsible and ethical, that by extension quarantine as a whole will embody these same qualities. It is imperative to note that in setting such standards the goal is not to create standardization as every quarantine needs to be able to have the flexibility to respond to the unique situation created by a disease outbreak. Instead the goal is to set high standards.

4. The development of a global quarantine-based model and is both ethical and effective

It can no longer be ignored that quarantine in its current form is an outmoded public health measure largely propped up by laws that are either antiquated or inconsistently updated. As a clear extension of this any attempts at creating a global model are burdened largely by a need for all participating countries to have the same system when they do not have the same resources at their disposal. It is for this reason that the final recommendation of this work is the re-development of a global quarantine-based model which is both efficient and effective. It is imperative to note that the implementation of such a model will require significant shifts both in

how we view quarantine and what we require from the global community. Before delving into what this new public health measure could look like, or providing insight into what can be done until it is developed, it is necessary to provide some insight relative to why such a change is essential.

The challenge that infectious disease presents to public health ethics is one that is embodied by the clear and consistent tension of balancing individuals rights with public good and public health as a whole. Therefore, in seeking to garner stronger public support for restrictive measures including, but not strictly limited to, quarantine, it is imperative that appeals are made first to the individual as a means of assuaging any doubts or fears. Specifically, it is imperative that there exists a comprehensive systems of both supports and safeguards which fulfill the dual role of educating and informing the public health workers that will be on the front line as well as engaging the public in a open conversation about the ethical usage of how and why restrictions are utilized during the outbreak of infectious diseases.[39] It is plausible that new quarantine laws and the new standards that they are capable of creating can be the beginning, or even the entirety, of such systems. More importantly however the time is ripe for such significant changes to be made.

Presently public health is in the middle of a revolution, and as with all revolutions old conventions are being challenged by new and divergent ideas. As the idea of public health is being more thoroughly into the idea and implementation of global health what still exists in part is an outdated viewpoint which looks at the world as segregated sovereign nations that under the protection of appropriate security measures, will be unable to be harmed by threats either accidental or intentional. Despite this no longer being the reality public health establishments are moving far too slowly to address the new state of interdependence between nations, one which is

no longer defined solely by quantifiable elements such as the goods or services being traded, or the migration of individuals, but must also account for a shared environment, infectious diseases, terrorism and an increasing set of ideas which are becoming international law and address what is and is not considered fair. All of this serves to underscore that global health is a complicated matter which requires consideration of more than just security concerns as evidenced by the international reshaping of public health which has been occurring since the end of the Cold War. What such reshaping is proving in part is the social movements for health have the power to pose a viable challenge to state, institutional, and cultural authorities and by extension act as a means of increasing public participation in social policies and regulations while also democratizing the process by which both scientific knowledge as it relates to medical science and public health in terms of both production and dissemination. The partial result of this is that as both an academic discipline and practice that public health is being reshaped.[40] However what remains to be seen is precisely what this reshaping will do and how it will serve to impact collective actions.

In looking more closely at collective actions as they relate to global health it is necessary to consider why such actions are more expedient than others. Developing an understanding of this specifically as it relates to global disease breaks works to provide guidance which may hasten future response. In general poor political mobilization, as opposed to technical surveillance capacity, is the reason for longer delays. In noting this one solution may focus on making improvements to the structures that slow such mobilization.[41] The rational for this centers around the fact that similar to a chain the public health system of the world is only as strong as its weakest links. Evidence of this was apparent during the 2014 Ebola outbreak and the contrasting ways in which different nations were impacted. As an example of this comparisons can be made between the countries of Liberia and Nigeria on the continent of

Africa. Liberia is one of the poorest countries in Africa and it was one of the countries that was most ravaged by the Ebola outbreak. Despite being populated by a little over 4 million individuals the overall healthcare system in Liberia was in such a dire state that even before the epidemic began there was only one doctor per 100,000 civilians. This fact, coupled with the deaths of numerous healthcare workers and the refusal of some physicians and nurses to attend to their duties due to a lack of personal protective equipment resulted in a scant 18% of Ebola patients receiving care in hospital settings. This percentage is in stark contrast to the CDC estimate that 70% of Ebola patients would need to receive hospital based care in order to help prevent the spread of the disease. In comparison Nigeria is a wealthier country with greater healthcare resources at its disposal including, but not limited to, an existing disease operations center, healthcare workers who are trained in epidemiology who were able to conduct contact tracing, and laboratories that were capable of conducting Ebola testing in a matter of hours. As a result of this infrastructure, Nigeria was able to respond both quickly and effectively to the Ebola cases that were initially detected within the country and ultimately only 8 people died in the country as a result of the disease.[42] What this serves to exemplify is that there does not exist a single, predetermined outcome for the impact that an infectious disease can, or will, have on an area, and by extension what impact it may have on the global community as a whole if it spreads.

In seeking to make a transition to a more effective international quarantine system, the onus should be placed on the United States to act as the catalyst for this. As previously presented the United States could benefit from a single national standard which would serve in part to reconcile the current dichotomy that exists between state and federal quarantine laws.[43] The rationale for such modeling is threefold.

First, in presenting the development of clear and comprehensive national standards for

quarantine the United States was not excluded from this recommendation. Chapter four served to provide in depth information relative to the issues that surrounded implementing a quarantine within the United States as well as the schism between state and federal powers. In addition to this as aforementioned within this chapter it is plausible that based on the values which are largely held by citizens of the United States that implementing a large scale quarantine may prove unfeasible without coercion. However, in updating the current quarantine laws and by extension the standards that are the result of those laws it may be possible to create a situation where individuals are more willing to voluntarily comply. This can then be used as a basis for other nations which have not yet undertaken the task of revising their own quarantine laws.

Second, there already exists a precedent for similar modeling in the global context. Specifically, as presented in chapter four, following the SARS outbreak of 2003, China modeled their own CDC after the CDC in Atlanta, Georgia. Noting such large-scale past modeling it is plausible that there would be a willingness for other nations to follow a similar trend as it related to quarantine standards.

Third, while it may be elitist or otherwise taboo to say so, having the model created in an industrialized country without a socialist or otherwise communal medical system may allow for a more realistic approach to economic, political, and logistical necessities of the situation. The rationale for this centers around the fact that nations with more communal values may be more willing to bear the brunt of costs that they consider reciprocal but in reality do not need to fall under their purview. Exemplary of this consideration can once again be given to the costs expended as a result of 2003 SARS quarantine in Toronto. A total of $1 million was spent on securing the jobs of those who were quarantined while an additional $1 million was spent on an office which dealt with the interests of those who were quarantined. While the combined $2

million was less than 20% of the total $12 million spent such costs would not have been economically necessary under a quarantine system that forbid companies from firing employees who were complying with a quarantine order and where individuals understood the need to take personal responsibility for handling their own affairs. Without seeking to change the values that other countries hold as important, what also cannot be ignored is the fact that not every country can bear similar expenses and that likely will not be taken into account if the initial standards stem from a country with communal values.

Having addressed both the salient issues which precipitate the need for change as well as where the catalyst for change can stem from it is now possible to address what change can, and more importantly should, look like. In this vein, it is necessary to concede the point that quarantine is ineffective. As a result of this ineffectiveness quarantine alone will not, and does not, prevent the spread of disease. This is due in large part to the fact that the efficacy of a quarantine is largely, if not wholly, determined by whatever logistical support systems are in place at the time of the quarantine. This serves to in part explain why historically quarantines have been crude an ineffective and why more modern quarantines, which have co-evolved with improvements to sanitary measures in public health, seem to be, more effective, although it must be noted that there is a lack of hard data to support this.[44] Therefore in seeking to move forward quarantine cannot, and should not, be allowed to either continue to exist "as-is" nor should there be a continued allowance of the policies and protocols which are meant to act as preventative but are instead prohibitive to progress.

In terms of the former, quarantine laws and by extension quarantine standards have to change for the better in an objective sense. In noting the clear correlation between changes in public health as they related to matters of sanitation and changes in quarantine efficacy it stands

to reason that direct improvements in standards will have a similarly positive outcome. However, consider that even if efficacy rates plateau that an improvement in such standards still has the ability to potentially improve public perception and rebuild public trust making it a win-win situations.

In terms of the latter in lieu of continuing the efforts that have been started by the IHR specifically as they relate to the requirements that all nations implement the same surveillance and response measures it is more practical to shift those efforts to ones which are more feasible. By extension such efforts are more likely to lead to positive results. In seeking to do this it must first be understood that global connectivity does not serve to negate global inequality. As a result, it is irrational to expect every country, regardless of their stated willingness to be to perform the exact same tasks at the exact same levels. Instead allowances should be made for countries to either individually or collectively focus on the measures that they have the resources and logistical support to effectively undertake. For example, it may be unfeasible for a country to invest in and support 24 hour surveillance however that country may possess the technological and scientific capabilities to analyze a new infection as means of best determining information about its origins, mode of transmission and who is likely to be impacted. The sharing of such information could ultimately prove far more valuable than expending resources on a disease free entry point which will need to be maintained regardless of whether or not it is ever breached.

It is only in committing to, and more importantly following through on, the above stated changes that quarantine can in good conscience continue to be used as a public health measure. It would be both ineffective and unethical to continue operating as if the known issues did not exist and doing so can be seen as intentionally gambling with public health by risking the possibility of an epidemic or pandemic event by implementing measures that are known to be faulty. This

would be a matter of gross incompetence.

Conclusion

In order to adequately address the needs of a globally connected population modern medicine cannot continue to rely on outdated and by extension highly inadequate, methods or measures. Quarantine as it currently exists is one such measure. Throughout the course of this work what has been presented is a clear juxtaposition of both the threats that exist currently and with all likelihood will continue to exist or become worse, as well as the ways in which quarantine is used as a means of addressing such measures. While there are those who may seek to argue that by virtue of being more effective than it has been in the past that contemporary quarantine is sufficient in nature, such arguments seek to equate something being "better" with it being the best it can be, and that is not a fair correlation to make when the consequences of being wrong can literally be the loss of hundreds of thousands if not millions of human lives.

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