COVID-19 and the United States

Submitted by

Alexis Boron

Clinical and Diagnostic Science Pre-Professional

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Mentor: Christina Lim, Professor of Clinical Diagnostic Sciences

School of Health Sciences

Oakland University

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Abstract

Why is COVID-19 spreading differently and not going away in the United States? The United States has been continuously struggling with this pandemic while other countries have returned to normal activities. Analyzed in this project will be the correlations of state heterogeneity, lack of universal healthcare, and increased rates of obesity and heart disease on the rates of COVID-19 in the United States. The impacts of this research project could be far-reaching in that it could point out the weaknesses of the United States in response to global pandemics. This could prevent the spread of disease, save valuable medical resources, and in turn save lives by reducing the number of infected individuals in the United States. Knowing why the United States is more vulnerable than other countries and working to mend those issues is invaluable in the fight against future pandemics, for the inhabitants of the United States as well as around the world.

Current Research

COVID-19 is a disease that has spread worldwide, and yet the United States remains a hotspot months into the pandemic while other countries have begun to return to normal. In an attempt to help prevent a pandemic like the one associated with COVID-19 from becoming so widespread and life-changing, this project will analyze what makes the United States more vulnerable than other countries.

The current discussion regarding the relationship between COVID-19 and the United States focuses heavily on the relationship between racial discrimination and COVID-19 infection and death rates (Laster Pirtle, 2020). In addition, the current discussion covers things that have slowed the spread of COVID-19, such as the increased presence of urban vegetation slowing infection rates or early intervention practices, and American attitudes toward following them (Park et al., 2020; You & Pan, 2020). Other discussions include weaknesses of the United States healthcare system and how it could be potentially fixed as well as health risks that make someone more likely to die of COVID-19 such as diabetes, obesity, and a poor diet (Belanger, 2020; King, 2020, Sanchis-Gomar, et al. 2020).

The current research focuses on specific risk factors, but there has not yet been any connection made between risk factors and why the United States seems to be so prevalent in maintaining cases of COVID-19. This is the gap that this research project is attempting to fill: what about the United States makes it a consistent hotspot, and why, even with intervention and social distancing policies, can the United States not seem to plateau in their cases of COVID-19? This project will analyze how state heterogeneity, health risk factors, and lack of universal health care contribute to the difficulty of controlling COVID-19 in the United States.

Aims and Objectives

Introduction

While other countries have been able to return to normal activities, the United States can not seem to plateau the daily COVID-19 case count due to ineffective prevention policies. This project will analyze what makes the United States more vulnerable than other countries in an attempt to help prevent future pandemics by providing information for other disciplines to establish effective procedures and policies.

Aims

1. To investigate factors that uniquely make the United States vulnerable to COVID-19.

2. To analyze how and why these risk factors — state heterogeneity, lack of universal healthcare, and rates of obesity and heart disease — affect the rates of COVID-19 in the United States and how they are helping spread COVID-19.

3. To analyze whether the risk factors of state heterogeneity, lack of universal healthcare, and rates of obesity and heart disease are as prevalent in the United States as in other countries.

Objectives

1. Investigating the risk factors that make the United States uniquely vulnerable to COVID-19 will give a basis for what aspects to further analyze and gather more information on. This will provide a foundation for what types of studies the literature synthesis should focus on, as well as help, demonstrate the weak points in the current response of the United States for further research.

2. Analyzing how and why these risk factors — state heterogeneity, lack of universal healthcare, and rates of obesity and heart disease — affect the rates of COVID-19 in the United States would assist in determining the extent of prevalence. This would provide information on which factors would require more focus, and would help in figuring out what could be done to prevent these risks from being so widespread.

3. Analyzing whether the risk factors of state heterogeneity, lack of universal healthcare, and rates of obesity and heart disease are as prevalent in the United States as in other countries will help determine if those risk factors are universal or have more of an impact on the United States only. This will differentiate the factors that are specific to the United States and could use the most adjustment.

Methodology

The first step in this research is to investigate the risk factors that make the United States vulnerable to COVID-19. This will be done by reviewing literature related to COVID-19 and the United States and will give a basis for what risk factors to analyze. I will use the Oakland University Library OneSearch tool to find articles and studies relating to risk factors of COVID-19, and if needed I will expand my search to scholarly articles from other sources. I will use keywords relating to COVID-19 in the United States and the risk factors associated with it to find articles and studies.

The second step in this research will be finding connections as to how and why these risk factors — state heterogeneity, lack of universal healthcare, and rates of obesity and heart disease — affect the rates of COVID-19 in the United States and how they are helping spread COVID-19. This will assist in determining which risk factors are most prevalent in the United States, and will be done by pulling data from the studies gathered in step one and comparing infection rates in areas with and without said risk factors.

The final step in this research will be analyzing the aforementioned factors, which will help determine whether or not the risk factors are universal or have more of an impact on the United States only. This will be done by gathering data from the Oakland University Library OneSearch tool on the risk factors mentioned above in other countries and comparing it to the data from step two relating to the United States.

Introduction

In December 2019, the first known cases of COVID-19 were reported (Centers for Disease Control and Prevention [CDC], 2022). By late January, the first case of COVID-19 was reported in the United States, and on March 13th, 2020, the President of the United States declared COVID-19 a national emergency (CDC, 2022). Since then, COVID-19 has dominated the globe, and policies and restrictions have meant life has not returned to normal by any means.

COVID-19 is an infectious disease that is caused by the SARS-CoV-2 virus. Most people who become infected with this virus experience mild respiratory symptoms and recover without any special treatment, their infections are self-limiting. However, some people will become seriously ill and require medical attention. While there are general risk factors that could make someone more prone to becoming seriously ill, such as old age or underlying medical conditions, anyone can become sick with COVID-19 and become seriously ill or die. This is especially distressing, as COVID-19 is a highly transmissible disease. The virus can spread from an infected person's mouth or nose in droplets when they cough, sneeze, speak, sing, or breathe. Furthermore, many people who are infected with this disease do not show symptoms at all but are still infectious, meaning that they can spread the disease unknowingly. Thus, typical preventative measures include social distancing, mask-wearing, hand washing, and quarantining when exposed or infected (World Health Organization [WHO], 2022).

At only four percent of the global population, the United States accounts for more than 78 million COVID-19 cases, which is more than double any other country, and over seventeen percent of total COVID-19 cases (Johns Hopkins University Coronavirus Research Center, 2022). This discrepancy goes to show that the United States is disproportionately affected by

COVID-19 compared to other countries. This increased spread is likely due to a wide variety of reasons, but three specific aspects that may explain why the United States has higher numbers of COVID-19 cases are state heterogeneity, rates of obesity and heart disease, and lack of universal healthcare.

State Heterogeneity

Each state is wildly different from the next. The differences noticed between different states are what is known as state heterogeneity. It can include differences in population density, movement patterns of residents, environmental conditions for disease transmission, and numerous other factors (White & Hébert-Dufresne, 2020). The lively party culture in Las Vegas, Nevada, for example, is completely different than the relaxed coastal charm of Freeport, Maine. All of these differences help contribute to the spread of COVID-19.

In the United States, the federal government does not enact all laws and regulations. As granted in the Constitution, many laws and regulations are left up to the discretion of the local or state governments (Dave et al., 2021). Because of this, not all states enact laws at the same time or in the same way, which can be considered part of state heterogeneity. Unless something is enacted federally, there is no guarantee that it will be enacted across all fifty states in the same way and at the same time, or even at all (Dave et al., 2021). These differences in policy implementation can cause severe delays, which is exceedingly detrimental in time-sensitive situations like pandemics, specifically COVID-19.

In regards to COVID-19, there are three main precautionary measures enacted by the government: mask mandates, social distancing, and stay-at-home orders. The most common and drastic of these three precautionary measures are stay-at-home orders, also known as

shelter-in-place orders (SIPOs). A SIPO requires residents to stay in their homes unless they have essential activities to complete, such as buying food or medicine, caring for others, exercise, or essential work (Dave et al., 2021). While the federal government is allowed to make recommendations, SIPOs are only enacted by state and local governments and help contribute to state heterogeneity (Dave et al., 2021). In the United States, the adoption of a SIPO had a 9-10% increase in the rate at which people stayed in their homes full time. This resulted in a 53.5% decrease in cumulative COVID cases in the three weeks following the adoption of a SIPO (Dave et al., 2021). This three-week gap can be explained by the incubation period of COVID-19 causing a lag in case numbers. However, a SIPO is only effective if everyone involved or at risk participates, and this is difficult to accomplish since different states adopted SIPOs at different times. The first statewide SIPO was in California on March 19, 2020. Between then and April 19, 2020, 39 additional states enacted SIPOs (Dave et al., 2021). While this may sound great, this means that ten states did not adopt SIPOs during this time, and it took an entire month for other states to do so. For instance, it took Nevada, a border state of California, until April 1, 2020, to adopt a SIPO (Dave et al., 2021). People who live or work near the border of these two states had weeks to travel over state lines and avoid the SIPO, potentially negating its effects in those areas. Another state heterogeneity issue involved in SIPOs is the enforcement of said SIPOs. In some states, violating a SIPO can have punishment as severe as a misdemeanor, or in repeated instances a prison term. In others, it could be as little as a small fine (Dave et al., 2021). This drastic difference in punishment could mean that a SIPO in one state is followed much more closely than in other states, and reduce the effectiveness overall.

SIPOs can not stay in effect forever. However, since different states implemented their SIPOs at different times, they were also lifting them at different times. As certain states began to open up while other states did not, it caused major surges in COVID-19 cases where SIPOs were lifted (see figure 1) and increased fear in places where they were not (MIT Department of Biology, 2020).
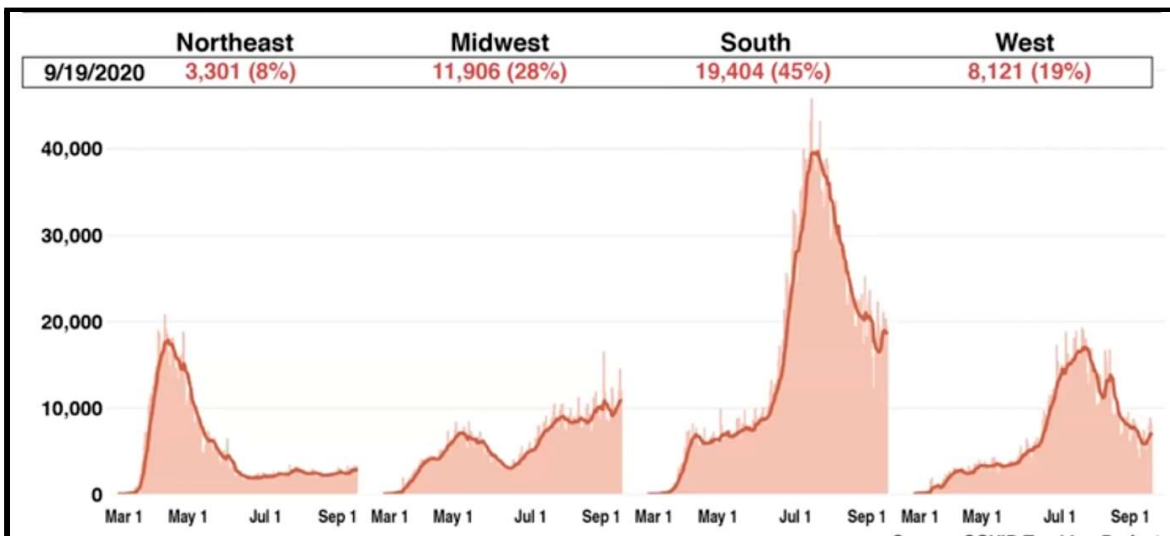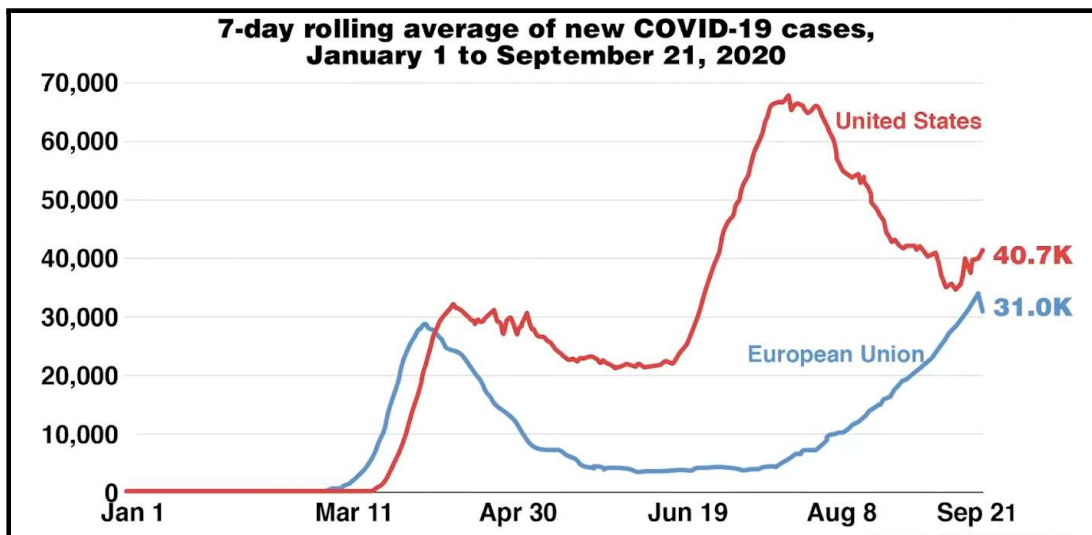

Figure 1

Figure 2

Due to the differences in policy timing and enforcement, different regions of the country peaked at different times and the number of cases never truly went down as much as it did in other countries (MIT Department of Biology, 2020). While other places such as the EU had defined spikes and decreased baselines (see figure 2) the United States shows spikes with more elevated baselines, as the large mixing pot of states meant that the country was spreading COVID-19 from state to state (MIT Department of Biology, 2020). On the other hand, the entirety of the EU shut down very abruptly and continued to do so through Summer 2020, which kept their cases down until they reopened for school in the fall (MIT Department of Biology, 2020). They did not need to deal with extreme differences in SIPO implementation or residents spreading COVID-19 across borders, so they were able to slow the spread of COVID-19 and get a defined spike and fall of cases.

Since many COVID-related restrictions rely on state and local governments instead of the federal government, the federal government has reduced power in these areas and has focused its energy elsewhere in regards to the COVID-19 pandemic. The federal response has mainly been focused on providing funding to states to enact their social distancing, mask mandate, and SIPO policies, as well as policies that help improve the testing and tracking of infections. They have also enacted travel restrictions to prevent international exposure (Dave et al., 2021). The CDC has issued further guidelines on social distancing and personal protective measures that the states can use to educate their policies. Because states were getting information from multiple different sources, including citizens in their specific localities, it makes sense that different states would decide to take different precautions against COVID-19.

Overall, the earliest adopters of SIPOs had the largest declines in the rate of SARS-CoV-2 cases and mortality (Dave et al., 2021). Likewise, states that implemented stronger social distancing restrictions with more enforcement had longer doubling times, or the amount of time it took for the number of cases to double (White & Hébert-Dufresne, 2020). Therefore, the lack of homogeneity in adopting SIPOs across states, as well as the protocol for enforcing said SIPOs meant that the spread of COVID-19, especially near state borders, was higher than in other countries with a more cohesive government policy rollout.

Obesity and Heart Disease

Obesity is defined as abnormal or excessive fat accumulation caused by an energy imbalance that may impair health (Koh et al., 2018). To classify adults as overweight or obese, an index of weight-for-height known as body mass index (BMI) is used. It is the person's weight in kilograms divided by the square of their height in meters. In order to be considered overweight, a person must have a BMI of 25-30kg/m2. To be considered obese, a person must have a BMI ≥30 kg/m 2, and morbidly obese a BMI ≥40 kg/m 2. In the United States, almost three-quarters of adults older than 20 meet the criteria for being overweight or obese, 42% are obese, and more than 9% are morbidly obese (Sanchis-Gomar et al., 2020). Globally, the prevalence of obesity has tripled from 1975 to 2016, and most of the world's population lives in countries where being overweight or obese is a larger cause of death than being underweight (WHO, 2022). In 2016, more than 1.9 billion adults, 18 years and older, were overweight globally. Of these over 650 million were obese. As a percentage, 39% of adults over 18 are overweight, and 13% are obese (WHO, 2022) Compared to the global numbers, the United States has a significantly higher percentage of obese adults (42% in the United States versus 13%

globally). In 2001, the Surgeon General called for nationwide action plans to be implemented, as the prevalence of overweight and obese individuals in the United States had reached epidemic levels (Koh et al., 2018). The United States is currently suffering from an intense obesity epidemic, in addition to most of the westernized world, and has been for over twenty years.

Generally, those who are obese are at a much higher risk for heart disease, with higher blood levels of LDL, triglycerides, and glucose. Heart disease is the number one cause of death worldwide and is typically used as an indicator of the rates of obesity (Kang et al., 2020). A patient does not die of obesity, they die of complications as a result of their obesity such as heart disease, or in this case complications with COVID-19. The number of additional premature deaths due to obesity in 2010 was 400,000 (Koh et al., 2018). Obesity and heart disease are closely related, a common comorbidity in many patients. Obesity is a known influencer of most major heart disease risk factors, including type 2 diabetes, dysglycemia, metabolic syndrome, and hypertension (Sanchis-Gomar et al., 2020). Additionally, obesity has adverse effects on heart structure and function and increases almost all forms of heart disease, including heart failure, coronary heart disease, atrial fibrillation, and peripheral artery disease (Sanchis-Gomar et al., 2020). The CDC has identified obesity as a risk factor for poor prognosis of COVID-19, and severe or morbid obesity as a risk factor for higher mortality in patients with COVID-19. (Sanchis-Gomar et al., 2020). Poor prognosis is partially due to the metabolic abnormalities associated with obesity, which can cause tissue stress and dysfunction (Kang et al., 2020). Equally important, obesity is related to a chronic inflammation state, which combined with COVID-19 can lead to an exhausted immune system, ineffectiveness of certain treatments and prevention measures like vaccines, and can lead to severe organ damage (Kang et al., 2020).

Obesity has also been correlated to an increase in blood coagulation, which increases thrombus formation and subsequent pulmonary embolisms, a serious and oftentimes fatal complication commonly associated with COVID-19 (Kang et al., 2020). The mechanism of entry of COVID-19 could further explain why the prognosis in obese patients is worse. The virus that causes COVID-19, severe acute respiratory syndrome coronavirus-2 (SARS-COV-2), infects and penetrates human cells by directly binding with receptors on the cell surface known as angiotensin-converting enzyme 2 or ACE2 receptors. Patients with obesity typically have an overactive renin-angiotensin-aldosterone system, which is associated with worse outcomes in a COVID-19 infection. Furthermore, adipose tissue has a higher expression of ACE2 receptors than the lung (the target tissue of COVID-19), meaning that adipose tissue cells are more vulnerable to SARS-COV-2. Adipose tissue would essentially act as a reservoir for COVID-19 infection, allowing spread to other organs and worsening the prognosis of the disease (Sanchis-Gomar et al., 2020). Because the obese population has more adipose tissue, they have higher ACE2 levels and are more vulnerable to COVID-19.

Since the United States has a higher proportion of the population that are overweight or obese, they will have more patients that have a worse prognosis with COVID-19. This worse prognosis can include respiratory and multiple organ failure, severe tissue damage, excessive immune response, as well as higher mortality rates (Kang et al., 2020). It has been shown that asymptomatic individuals can still transmit COVID-19. However, those who do show symptoms and are coughing and sneezing more would therefore be more infectious to others, as COVID-19 is mainly spread through respiratory droplets. The increased rates of obesity and heart disease may be increasing the spread of COVID-19 due to the increased number of symptomatic

individuals in the United States compared to other countries with lower obesity incidences. Consequently, the increased number of obese individuals in the United States is also increasing the mortality rate and the number of severe cases of COVID-19.

The prevalence of obesity in the United States has been increasing drastically since the early 2000s (Koh et al., 2018), which will only continue to get worse and exacerbate pandemics in the future. Obesity is preventable, with the simple solution being to correct the energy imbalance. The obesity epidemic, on the other hand, is not so simple. The increased intake of energy-dense foods high in sugars and fats, in conjunction with the decrease in physical activity associated with sedentary lifestyles and increasing urbanization, is prevalent in the United States (WHO, 2022). Sedentary lifestyles, as well as the appetite for sugary and fatty foods, are not habits that can easily be changed overnight. These behaviors are rooted in American society and are much more difficult to adjust without making major societal changes. However, in order to protect against future pandemics, something must be done.

Universal Healthcare

Universal health coverage means that all people have access to the health services they need, when and where they need them, without financial hardship. It encompasses the full range of essential health services including health promotion, prevention, treatment, rehabilitation, and palliative care. Protecting people from the financial consequences of paying for health services out of their own pockets reduces the risk that people will be financially exhausted. Unexpected illness requires them to spend their life savings, sell assets, or take out a loan– negatively impacting their futures and often those of their children as well (Zieff et al., 2020). The U.S. has historically utilized a mixture of public and private approaches to healthcare. This way, citizens

or businesses can obtain health insurance from private insurance companies like Blue Cross Blue Shield, or individuals may also qualify for public, government-subsidized health insurance like Medicare or Medicaid. While the Affordable Care Act (ACA) helped move the United States closer to universal healthcare by expanding healthcare for millions of Americans through Medicaid expansion and health insurance marketplaces, the United States is far from the definition of universal healthcare (Zieff et al., 2020). On the other hand, most of the post-industrial, westernized nations of the world have some form of universal healthcare that is largely governmentally subsidized. All of their citizens have access to universal healthcare regardless of socioeconomic status, employment status, or ability to pay (Zieff et al., 2020). However, not all universal healthcare is the same. The UK's system has mainly universal healthcare with minimal privatized care, while countries like Switzerland, the Netherlands, and Germany have a blended system with government and market-based components (Zieff et al., 2020). Although many post-industrial westernized nations have some type of universal healthcare model, none of those countries are as geographically large, populous, or ethnically and racially diverse as the United States. This refers back to the state heterogeneity mentioned previously. Heterogeneous climates and population densities bring different health needs and challenges across the U.S (Zieff et al., 2020). Thus, the mixing pot of the United States means that not all healthcare options will work for all areas of the United States.

Because of COVID-19, healthcare systems across the globe are facing increased demands for healthcare services, with the main limiting factors being healthcare personnel and hospital beds (Tikkanen et al., 2020). In the United States, due to the lack of universal healthcare, it is not easy to adjust healthcare services and the number of beds on a large scale because most

healthcare is privatized, and it is up to individual businesses to make these adjustments. Additionally, workforce and hospital bed capacity are much lower than in other countries with universal healthcare, since many people in the United States are less likely to seek out medical care due to the cost. This causes the perceived demand for medical care to be lower. Many studies suggest that United States healthcare resources will be stretched to a greater extent than in other countries (Tikkanen et al., 2020). Fewer resources to treat patients means fewer resources to slow the spread of COVID-19 in the United States.

There are additional factors to take into account. First, more than two-thirds of adults in the United States say that cost would be a major factor in their decision to seek medical attention if they had symptoms of COVID-19 (Tikkanen et al., 2020). While federal legislation was passed that requires health insurers to cover COVID-19 testing services, most US adults are more likely to forgo medical care, from doctor's visits and tests to treatments and medicines, than in other countries (Tikkanen et al., 2020). U.S. COVID-19 deaths have been higher among people with low incomes, as they are less likely to have health insurance and therefore less likely to seek medical care due to the cost. (Mena et al., 2021). Second, policies such as SIPOs may affect people's choice to get medical care. Individuals complying with a stay-at-home order, those fearful of getting exposed at a medical facility, or people who are asymptomatic staying at home may not seek out medical care (Dave et al., 2021). Overall, even though people may be complying with the stay-at-home order, if they have COVID-19 and do not seek medical attention, they could further spread the virus when going to places that are allowed under the SIPO such as grocery stores or essential work. Finally, if people do not go to the doctor, they can not get informed about COVID-19 treatment and prevention. 36% of people in the United States

still have not been vaccinated. In contrast, China, a country with universal healthcare, has only 16% of its population unvaccinated (WHO, 2022). The herd immunity rate for COVID-19 is predicted to be between 70 and 90% (WHO, 2022), so while China is well within that range, the United States still falls short. All of these factors point to universal healthcare being essential to slowing the spread of COVID-19.

Overall, the current cost of healthcare in the United States reduces the number of people seeking medical care. The lower demand leads to fewer resources available in times of need, and consequently, people who do not seek treatment or get tested for COVID-19 could potentially further spread the virus unknowingly. Furthermore, the lack of education on treatment and prevention methods due to patients not seeking medical attention increases the spread of COVID-19.

Future Research

Due to the fact that COVID-19 has only been around for a short amount of time, the findings of this essay are preliminary. As COVID-19 is spreading so rapidly across the United States, and most research is focused on halting the spread, it was difficult to determine factors that would increase it. Akin to determining which materials burn most quickly when one is standing in the midst of a wildfire, it has been exceedingly difficult to determine which specific factors increase the spread of COVID-19.

Early exploratory research suggests that political affiliation, which would further contribute to the state heterogeneity discussed in this paper, may contribute to the spread of COVID-19. The study, conducted mainly at the University of Kentucky, found that those who identified as Republican were less likely to practice preventative behaviors (Kiviniemi et al.,

2022). This means that there could be some correlation between Republican states and the adoption of preventative policies such as SIPOs, which would contribute to state heterogeneity and the spread of COVID-19.

Additionally, much of the current literature relating to the spread of COVID-19 focuses on the disproportionate spread to certain racial and ethnic groups. Due to a wide variety of societal factors, research shows that there are higher rates of obesity in those groups (Townsend et al., 2020). Since obesity has been shown to be such a large determining factor in the outcomes of COVID-19, further research should be done to examine the relationship between race and obesity and relate it to the spread of COVID-19.

Conclusion

First, state heterogeneity increases the spread of COVID-19 in the United States. The inequality in terms of policy implementation and enforcement leads to hot spots that are constantly on the move in the United States and therefore lead to less defined drops in the number of COVID-19 cases. In areas where policies are not enacted at all or are enforced poorly, the spread will not only affect their locality, but resident migration and movement will affect the entire United States. Other countries that do not exhibit these kinds of policy inequalities have more defined peaks and valleys in the number of cases. While not all state differences can be changed overnight, focusing on more federally enacted policies and regulations regarding pandemics may help reduce the spread of infectious diseases for future pandemics. Noticing the patterns from the current pandemic could also help predict how best to prevent them in the future. For example, densely populated areas (i.e. large cities and metropolitan areas) appeared to

have larger health benefits after adopting SIPOs (Dave et al., 2021) and would benefit more greatly from their implementation.

Second, the rates of heart disease and obesity increase the spread of COVID-19 in the United States. Obesity is known to worsen the prognosis of COVID-19 and increase the number of symptomatic individuals. These symptomatic individuals will produce more respiratory secretions due to their increased coughing and sneezing, and will therefore be more infectious and increase the spread of COVID-19. The United States has a significantly higher proportion of obese individuals compared to the global population, and consequently is more affected than other countries around the world.

Finally, the lack of Universal Healthcare in the United States increases the spread of COVID-19. Healthcare in the United States is expensive, and the cost is a major factor for many people when deciding whether or not to seek medical care. When a global pandemic strikes, it is important for people to seek medical attention to get treated for the disease and get tested to ensure they are not unknowingly spreading the disease. Additionally, not seeking medical attention decreases the education available to many individuals and greatly increases the spread of COVID-19. This is due to uneducated individuals who may not be aware of the risks of certain activities or the benefits of vaccination in prevention. Furthermore, other countries that have Universal Healthcare have better control over their medical facilities and resources when they are controlled by the government. More resources are also available since the demand for medical care goes up when there is no monetary inconvenience to the patient. In the United States, many private corporations control the medical resources, and in times of dire need such as a global pandemic, it is difficult to incentivize these private corporations to mobilize their

resources quickly and efficiently to better help the greatest number of people. Also, it is difficult to have more medical resources available when demand skyrockets so drastically while having a lower baseline than other countries. Thus, implementing a Universal Healthcare system would overall increase the demand for medical care, and better prepare the United States healthcare system to handle pandemics in the future. It would also give the government more control over allocating medical resources in times of great need.

Some of these issues are interrelated. Implementing a universal healthcare system in the United States would incentivize the federal government to spend more money on preventative care, as preventative care is cheaper in the long run than treating chronic illnesses such as diabetes, kidney failure, and heart disease. In 2005, the cost associated with adult obesity and obesity-related illnesses was $190.2 billion, or about 20% of the annual healthcare spending (Koh et al., 2018). Since the prevalence of obesity has only increased since then, the annual spending related to obesity has also increased. Preventative care would help reduce the number of obese individuals, as more people would seek medical attention and be educated on the negative health risks of being obese and possible treatment and prevention options. Reducing the number of obese individuals would also reduce the overall price of healthcare in the United States, as the cost for obesity and obesity-related complications would decrease.

In summary, all three of these factors; state heterogeneity, rates of obesity and heart disease, and lack of universal healthcare, increase the spread of COVID-19. They would also increase the spread of future infectious diseases, and thus should be heavily considered when preparing for future pandemics. Equally important, these factors are not as prevalent, or not present, in most other developed countries, meaning that the United States may be behind the

rest of the world in terms of pandemic preparedness. There are many things about the United States that can not change, such as the diversity of its population and its vastness in size. However, many things could change to better improve the health outcomes of its citizens and prevent harmful pandemics like COVID-19, such as using more federal instead of state pandemic regulations, reducing the rates of obesity, and implementing universal healthcare. These would all help prevent future diseases from spreading so intensely and upending the lives of Americans.

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