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Research Journals

1. 12/1/18

Research Results and Findings: To start off my research, I consulted NASA's website on climate change. In order to gain an understanding of the health implications of climate change, the phenomenon of climate change had to be studied first. I wanted to start with the evidence confirming that climate change is actually taking place and isn't something that can be written off or ignored. The webpage stated, "The current warming trend is of particular significance because most of it is extremely likely (greater than 95 percent probability) to be the result of human activity since the mid-20th century and proceeding at a rate that is unprecedented over decades to millennia." This not only proves that humans have been a direct catalyst to global warming, but the effects of it on our planet are only going to drastically increase further as time goes on. Further alarming data from the webpage states, "Ice cores drawn from Greenland, Antarctica, and tropical mountain glaciers show that the Earth's climate responds to changes in greenhouse gas levels. Ancient evidence can also be found in tree rings, ocean sediments, coral reefs, and layers of sedimentary rocks. This ancient, or paleoclimate, evidence reveals that current warming is occurring roughly ten times faster than the average rate of ice-age-recovery warming. This only goes to prove that human actions are to blame directly for this

damage, furthermore, the release of greenhouse gasses is what is at fault. Statistics such as, “The planet's average surface temperature has risen about 1.62 degrees Fahrenheit (0.9 degrees Celsius) since the late 19th century, a change driven largely by increased carbon dioxide and other human-made emissions into the atmosphere”; “The Greenland and Antarctic ice sheets have decreased in mass”; “Data from NASA's Gravity Recovery and Climate Experiment show Greenland lost an average of 281 billion tons of ice per year between 1993 and 2016, while Antarctica lost about 119 billion tons during the same time period”; “The rate of Antarctica ice mass loss has tripled in the last decade”; “Global sea level rose about 8 inches in the last century. The rate in the last two decades, however, is nearly double that of the last century and is accelerating slightly every year”; “Since the beginning of the Industrial Revolution, the acidity of surface ocean waters has increased by about 30 percent. This increase is the result of humans emitting more carbon dioxide into the atmosphere and hence more being absorbed into the oceans. The amount of carbon dioxide absorbed by the upper layer of the oceans is increasing by about 2 billion tons per year,” all signal toward a changing climate and now that we have the evidence to support this, it's time to think about not only what lies at the root of all these frightening changes to our planet, but how these changes will continue to impact us as humans.

Thoughts On My Progress: I think that I laid a solid foundation to build the rest of my research off of. I wanted to start at a point that painted a much broader picture of the subject before I then zoomed in and focused on a much more compact area. I chose to research the evidence behind climate change, rather than starting with explaining climate

change or it's history, because I feel that one of the biggest controversies behind this topic is that many people do not believe it to be something that's actively occurring and in turn refuse to properly address the growing issue. In introducing this topic with all the evidence and data pulled from a recognized institution, such as NASA, the following information will all be much more relevant. In my project, I also want to show this data exclusively on graphs and charts from the past few decades because I feel that a visual representation of the information is much more engaging. Moving forward, I want to continue to look at the broader picture in pinpointing what human actions have led to climate change before transitioning into the health implications. My goals is to complete these journal entries periodically over a couple of weeks and not leave it all to the end. This way, I can spend more time completing them instead of rushing in the end to get it all done.

2. 12/2/18

Research Results and Findings: Now that the current consequences of global warming have become apparent, it would be beneficial to dial back and look at the causes of the events arising as a result of climate change. Research shows that the main cause of the current global warming trend is human expansion of the "greenhouse effect" — warming that results when the atmosphere traps heat radiating from Earth toward space. On Earth, human activities are changing the natural greenhouse. Over the last century the burning of fossil fuels like coal and oil has increased the concentration of atmospheric carbon dioxide. This happens because the coal or oil burning process combines carbon with oxygen in the air to make CO2. To a lesser extent, the clearing of land for agriculture,

industry, and other human activities has increased concentrations of greenhouse gases. Certain gases, such as water vapor, nitrous oxide, carbon dioxide, and methane, in the atmosphere block heat from escaping, leading to the increase of the greenhouse effect. The continued release of these gases consistent with the increase in human industry will only speed up the effects of global warming and climate change. The industrial activities that our modern civilization depends upon have raised atmospheric carbon dioxide levels from 280 parts per million to 400 parts per million in the last 150 years. It can be concluded from this evidence that the drastic increases in global warming and the subsequent climate change parallel with the uptakes in human industry are no coincidence. Human growth and development as a modern society unintentionally led to such horrifying side effects, and next I want to explore what the consequences will be.

Thoughts On My Progress: The further I get into my research, the more wholesome of a picture I'm getting on the topic. I'm happy that I'm exploring many different avenues of this subject in order to grasp as much information as I can on the more broader aspects before I zone in. I want to be able get as many facts and data because it will just help me analyze my findings better later on. I wish that I could have spent more time just researching climate change on it's own, but my main purpose is to decipher all the health risks that climate change will potentially have, so I have to put more emphasis on the medicine aspect. However, gaining a proper understanding of the basics on the subject is essential to the research. I feel that I am getting just the right amount of information out of my research and I'm not being too vague or too detailed. I also have to be careful as to not take away from the main part of the project, being the health risks. Before utilizing

this background information in analyzing the health risks, I want to take another look at the overall consequences of an altered atmospheric greenhouse. This will prove to be important in understanding the more complex medical problems that arise from this.

3. 12/2/18

Research Results and Findings: In theme with moving forward and looking into the disastrous effects of climate change, it's beneficial to analyze all the potential consequences before we apply these events to the health risks. On average, Earth will become warmer. Some regions may welcome warmer temperatures, but others may not. Warmer conditions will probably lead to more evaporation and precipitation overall, but individual regions will vary, some becoming wetter and others dryer. A stronger greenhouse effect will warm the oceans and partially melt glaciers and other ice, increasing sea level. Ocean water also will expand if it warms, contributing further to sea level rise. Meanwhile, some crops and other plants may respond favorably to increased atmospheric CO2, growing more vigorously and using water more efficiently. At the same time, higher temperatures and shifting climate patterns may change the areas where crops grow best and affect the makeup of natural plant communities. These changes are already realities in the world. Global climate change has already had observable effects on the environment. Glaciers have shrunk, ice on rivers and lakes is breaking up earlier, plant and animal ranges have shifted and trees are flowering sooner. Effects that scientists had predicted in the past would result from global climate change are now occurring: loss of sea ice, accelerated sea level rise and longer, more intense heat waves. Long term effects include continuous increases in temperature, lengthened frost-free and growing

season, changes in precipitation patterns, more droughts and heat waves, stronger, more intense hurricanes, 1-4 feet sea level rise by 2100, and a likely ice-free arctic. Some effects for those living in the Northeast of the United States include heat waves, heavy downpours and sea level rises. Infrastructure, agriculture, fisheries and ecosystems will be increasingly compromised. Many states and cities are beginning to incorporate climate change into their planning. Climate change and global warming will only get progressively worse as time continues. However, what's more relevant to my research is how these worsening conditions will impact human health and subsequently the medical and healthcare system. I wish to explore these aspects much more deeply moving forward in my research now that the proper base has been laid for the future information to make more sense.

Thoughts On My Progress: I am satisfied with where I am right now because now I can begin to explore the main part of my topic: the effects of climate change of human health. I want to analyze each and every different health consequence that I find in my research and be able to use this background information that I've gathered in order to do this. I think that I might want to come back to the more general information and add to it if I find that later in my research I'm not able to understand certain aspects without the more general background information. However, for now I feel that I can move on and start exploring the main parts of my research. I am glad that my research is moving along smoothly and I have yet to hit any dull spots. I think this is due to the substantial amount of information available on the subject, giving to a wide array of material to choose from.

4. 12/6/18

Research Results and Findings: I started my first article, "How climate change will affect your health." There is much more at risk with global warming than an increase in temperature, the health of the human species being one of the more dire consequences. The first major risk to human health is an increase in disease-carrying mosquitoes and ticks. Hot and humid climates provide a perfect breeding ground for insects, and a warming world will put us at greater risk for vector-borne diseases, which are those transmitted by ticks, mosquitoes or other organisms. Mosquitoes that carry diseases like West Nile virus and dengue fever thrive in conditions that are becoming more common, and there is concern that malaria could reemerge in the United States. Environmental changes affect not just the distribution of insects like mosquitoes but also how quickly viruses replicate within them and how long the bugs live. All of that might have contributed to recent Zika virus outbreaks. More than 2,400 pregnant women in the United States have tested positive for Zika since 2015, and the United States has seen a rise in Lyme disease, Rocky Mountain spotted fever and other vector-borne diseases. Only 27,388 such cases were reported in 2004, but that number jumped to 96,075 in 2016. Infectious diseases are one of the biggest causes for concern associated with increasing climate change because they could be fatal to many. The effects of global warming, such as increased temperature, further the spread of vector-borne diseases, and contribute to the different outbreaks and spread of infectious diseases currently observed throughout the world.

Thoughts On My Progress: I have just scratched the surface of the health implications caused by global warming. However, I am glad that I am taking my time in researching

each individual effect and not rushing all the material. I want to be able to make sincere observations for each health effect. With the rise of temperatures seen throughout the earth, an increase in these disease carrying insects is something that is becoming increasingly more frightening as it becomes more and more relevant throughout the planet observed through sharp increases in the spread of diseases just in the past few years. Moving forward, it is also important to note not only the effects that can be seen, but what the primary causes of all these events and where they stem from. This is due to the fact that while researching these different health epidemics, I am also trying to note possible routes of prevention and also analyze what degree of an impact it will have on the future of medical care. For example, with an increase in vector-borne diseases, finding cures and better courses of treatment for these diseases is becoming more important now than ever. It is all the more relevant to find better methods of prevention also, not only is slowing the path of climate change, but in working towards preventing the spread of these diseases. Going through more risks of climate change, I want to make more observations like this and analyze how it will affect the human race in the coming years.

5. 12/8/18

Research Results and Findings: Continuing the article, I moved on to another effect: contaminated water sources and dangerous bacterial infections. Extreme weather and rainfall have contributed to the spread of bacterial infections through contaminated water, especially in summer. Warmer temperatures will only make those storms worse. When increased rainfall leads to flooding, there can be a mixing of stormwater and sewage that

leads to bacterial contamination in the water. That contamination can affect crops too, contributing to foodborne diseases. Heavy downpours and flooding can spread fecal bacteria and viruses into fields where food is growing. Similar to the increase in vector-borne diseases, an increase in temperature directly causes bacterial infections and contaminated water sources. This is especially troubling in third world countries that don't have stable sources of water to begin with, and these contaminations not only ruin what little water is left, but also spread diseases in these small, crowded areas. This makes preventive methods and courses of action more important than ever. Humanitarian efforts in these times will be especially important in supplying clean sources of water. However, the contamination of crops and increase of food-borne diseases is startling because agriculture is a major cornerstone of our society and this could leave that in shambles. Developing alternate methods of growing crops and getting clean water sources are all avenues that need to be explored before these consequences of climate change become a reality and it is too late to change anything.

Thoughts On My Progress: With the potential effects of climate change, comes a more startling revelation of what our world could be like in a few years. This really calls into importance not only prevention of climate change, but taking preventive measures against all these potential human health effects. Being unprepared for such catastrophes could prove to be fatal to the human race as we know it. Digging into all these consequences of global warming is scary with the realisation that there is a very likely chance of this being the foreseeable future if preventive actions are not taken to stop this course that we are on. I am at a very good point in my research in that I am moving at a nice pace and am

accomplishing everything that I want to. I'm taking my time with each different part that I come across and I especially like that each part is so different from the last because every subtopic brings some new aspect with it that makes the whole project all the more interesting. A variety of illnesses and diseases can be explored and researched, there is so much different information to choose from. I am excited to be able to cohesively put all of this together in the end and really tie it into one big piece that just flows. It might seem much more abstract now, but in the end there will be many little similarities that join all these different topics together into a bigger picture.

6. 12/8/18

Research Results and Findings: Continuing the article, I focused on a more abstract aspect, an increase in mental health issues. Even a modest rise in temperatures is associated with an increase in mental health issues. The research, in the journal PNAS, looked at individual cities and found that warming of just 1 degree over five years was linked to a 2% increase in mental health issues. The study also found that an increase in average monthly temperatures to over 30 degrees Celsius (86 Fahrenheit), up from an average of 25 to 30, was correlated with a 0.5% increase in mental health issues. If consistent across the country, it would produce approximately 2 million additional individuals reporting mental health difficulties. A rise of 1 degree Celsius in monthly temperatures correlated with a 0.68% increase in the United States suicide rate. Using that data, researchers estimate that climate change could be linked to over 14,000 suicides by 2050. Mental health is not a direct result of global warming, but rather how our brains are able to process the repercussions of climate change. Many aspects, especially

concerning our brains, are hard to predict, but a worsening global warming epidemic will give rise to a increase in mental health in humans.

Thoughts On My Progress: I am very happy that my research is diverse and addresses many different points of the topic. I'm covering multiple different effects, describing everything from increased disease to worsening mental health. This correlates directly to the climate change epidemic to show how this issue affects so many different parts of our lives. Climate change has the potential to have such a huge impact on human lives. So many different consequences can arise as a result of unchecked global warming and the future is truly frightening. However, this also brings up the argument of how medicine needs to be evolving with these changes, which is another part of my project in which I want to use this research in order to make those conclusions. Healthcare is so complex and fragile in that the full risks of any one events can never truly be mapped out. It might end up that the effect of global warming on mental health turns out to be much worse than what was predicted, but it might also be that mental health isn't affected as deeply as once thought. In either case, the best and only thing that can be done is to be prepared and have the necessary courses of actions set up in order to properly deal with whatever the result might be. Mental health is especially fickle is that it is much more of an unpredictable entity than contaminated water or vector-borne illnesses. Trying to figure out exactly how every individual brain will react to such an event is almost impossible and that's also what makes it that much of a greater cause for concern. As I continue my research, I also want to look into how these effects of climate change can vary in different parts of the world.

7. 12/8/18

Research Results and Findings: In finishing this article, I focused on the two final effects mentioned, an increase in type 2 diabetes and respiratory problems and stroke. Rising temperatures are associated with an increase in Type 2 diabetes. Researchers found that diabetes rates increased by about 4% for every 1 degree Celsius of warming in the United States. Worldwide, glucose intolerance rose by 0.17% per degree Celsius of warming. A 1-degree Celsius rise in environmental temperature could account for more than 100,000 new diabetes cases per year in the USA alone. Although calorie consumption and obesity are likely to be the biggest risk factors for diabetes, the study hypothesizes that warmer temperatures might decrease the activity of brown fat tissue, which burns fat and generates heat in colder weather. In warmer climates, brown fat may be less activated, which may causally lead to insulin resistance and diabetes. In addition, most scientists agree that greenhouse gases like carbon dioxide are contributing to global warming, but those emissions aren't just hurting the planet. Fossil fuel pollutants can also generate a mixture of solid particles and liquid droplets in the atmosphere that can enter your lungs and even your bloodstream. That mixture, called particulate matter, can aggravate asthma, decrease lung function and increase your risk of cardiovascular events such as strokes. Over 8 million people die early due to air pollution every year. A warming planet also means more wildfires, which routinely release smoke that further worsens air quality. A 2011 report from the National Research Council found that a warming of just 1 degree Celsius could lead to a 400% increase in the area of land burned by wildfires. But it's not just smoke and pollutants you're inhaling; it's pollen, too.

Increases in carbon dioxide can trigger plants to produce more pollen, which might explain why the pollen season seems to get worse each year. Pollen counts are expected to reach 21,735 grains per cubic meter in 2040. In 2000, that number was just 8,455. Both type 2 diabetes and respiratory problems are essentially implications resulting from the global changes arising due to climate change. These problems can also be seen in variance in different parts of the world, different regions experience these effects more harshly than others. This is also important to take into consideration because it plays a huge role in how the healthcare aspect will be influenced and what implementations need to be done in different parts of world in order to properly accommodate this changes. For example, an increase of diabetes in warmer climate would call for a greater supply of insulin and hospitals that could properly treat and facilitate diabetic patients.

Thoughts On My Progress: I have finished a good bulk of my research. The two main parts I wanted to cover, climate change and its health implications, I have researched quite a bit and gathered a lot of material on. I want to now focus on looking at other sources to research deeper about each individual health effect that I have already briefed over. I also want to narrow down which of these topics would result in the most serious ramifications and really try to focus on those more than the others. However, when I picked this topic, a major goal for me was to also look into prevention and treatment methods that would be useful with the worsening of these conditions. This is one area I also definitely want to spend some time on moving forward in my research. Being that this about the halfway mark in my research, I feel that I am in a very good place with my progress and at this point, I have covered all the basics and background info and facts

about my research topic. Now, I can use this information to really analyze and draw conclusions in order to answer the major questions I had when I picked this topic. I want to also start looking into finding good visuals to represent the data for my project. I feel that I am progressing at a nice pace that feels comfortable to me. I don't feel rushed and am actually enjoying looking into all this information.

8. 12/13/18

Research Results and Findings: I have started reading my next article, "The Impacts of Climate Change on Human Health in the United States: A Scientific Assessment." I started with the section Climate Change and Human Health. This was mostly a reiteration of the previous article. However, it did present some more in depth information on health impacts in different regions. The influences of weather and climate on human health are significant and varied. Exposure to health hazards related to climate change affects different people and different communities to different degrees. While often assessed individually, exposure to multiple climate change threats can occur simultaneously, resulting in compounding or cascading health impacts. With climate change, the frequency, severity, duration, and location of weather and climate phenomena—like rising temperatures, heavy rains and droughts, and some other kinds of severe weather—are changing. This means that areas already experiencing health-threatening weather and climate phenomena, such as severe heat or hurricanes, are likely to experience worsening impacts, such as higher temperatures and increased storm intensity, rainfall rates, and storm surge. It also means that some locations will experience new climate-related health threats. Climate change can therefore affect human health in two

main ways: first, by changing the severity or frequency of health problems that are already affected by climate or weather factors; and second, by creating unprecedented or unanticipated health problems or health threats in places where they have not previously occurred. This really weeds down the core of climate change on health. While I have previously already researched potential specific health implications, this article presents a more general view on how climate change affects human health. It also goes into aspects about human health not previously mentioned, such as it's varying degrees throughout different regions in the world and how climate changes consequences shift throughout these parts.

Thoughts On My Progress: This article is pushing my research in the direction that I had been wanting to move in. I can now move on to explore the territorial repercussions of climate change which is really just an appliance of both how climate change has been affecting that area and how these varying changes depending on location mean that the effect and degree of the ramifications will also vary. I am finding it hard to go through so many different articles and really just pick out information that is the most relevant to my topic. I am also worried that all these research won't fit together cohesively and I have just bought on too many facts and statistics. I don't want an overload of information that will really stump the message that I am trying to make. However, including more information is always better than not having enough because it is always easy to cut a lot of this out and only take the main points. Moving forward, I want to try not to repeat information that has already been mentioned and want to try to find different perspectives to the topic. For example, one of my major questions going into this research was what

made certain types of infectious diseases more sensitive to climate change than others and that is something I want to be able to answer through my research. Therefore, rather than simply listing a few facts about climate change effects on human health, I am really trying to dig much deeper and understand how and why these occur and going further, how they can possibly be prevented or treated. This is unfortunately the future of medicine and it is important to understand what lies ahead for us as humans.

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9. 12/13/18

Research Results and Findings: Moving further into the article, I touched upon temperature-related death and illness, which I haven't read that much into. I gathered that increasing concentrations of greenhouse gases lead to an increase of both average and extreme temperatures. This is expected to lead to an increase in deaths and illness from heat and a potential decrease in deaths from cold, particularly for a number of communities especially vulnerable to these changes, such as children, the elderly, and economically disadvantaged groups. Days that are hotter than the average seasonal temperature in the summer or colder than the average seasonal temperature in the winter cause increased levels of illness and death by compromising the body's ability to regulate its temperature or by inducing direct or indirect health complications. Loss of internal temperature control can result in a cascade of illnesses, including heat cramps, heat exhaustion, heatstroke, and hyperthermia in the presence of extreme heat, and hypothermia and frostbite in the presence of extreme cold. Temperature extremes can

also worsen chronic conditions such as cardiovascular disease, respiratory disease, cerebrovascular disease, and diabetes-related conditions. Prolonged exposure to high temperatures is associated with increased hospital admissions for cardiovascular, kidney, and respiratory disorders. While I have previously touched upon arising medical issues and the statistics for these, I haven't looked at why this actually occurs as a direct consequence of climate change. The why aspect is just as important, if not more, than the what because this is the part that allows for future prevention and treatment courses to be mapped. Therefore, after explaining all the risks to human health, it's essential to mention what exactly is driving these epidemics. Much of my research is cause and effect, and this part really goes further to explain the cause aspect as being much more than just climate change. While climate change is the driving factor in these illnesses, it's important to understand what exactly about climate change is causing all of this to happen.

Thoughts On My Progress: I am satisfied with the fact that I am able to go much more is depth into the research. I am trying to make sure that all of the causes as well as the effects are fully answered and talked about. The way that I am presenting all this information is in a cause and effect manner, so while I started off my research in the beginning much more generally with simply grasping the basics of the cause, climate change, and the effects, human health epidemics, now I am really trying to go back and explain each of these parts in more detail. I feel that I have covered the evidence portion really well in the inclusion of all the data and statistics, however, now I need to also include the explanations for these facts. Going on in completing my research, I want to

try and include less new information, but really describe all the presented information in a more in depth manner. Overall, I am progressing nicely and am right on track with where I wanted to be in the information that I have gathered. The research is not taking me as long to complete as my previous ones have because it's now flowing a lot more smoothly since much of the foundation has been laid and now I am just building upon everything that I have already presented.

10. 12/14/18

Research Results and Findings: Continuing in this article, I gathered further information on previous mentioned topics such as air quality, extreme events, vector-borne diseases, water-related illnesses, and mental health and well-being. Seeing as how I have touched upon all of these topics before, I tried not to repeat previously mentioned information. I summarized each topic with any new, relevant information I gathered. The changing climate has modified weather patterns, which in turn have influenced the levels and location of outdoor air pollutants such as ground-level ozone (O3) and fine particulate matter. Increasing carbon dioxide (CO2) levels also promote the growth of plants that release airborne allergens (aeroallergens). Finally, these changes to outdoor air quality and aeroallergens also affect indoor air quality as both pollutants and aeroallergens infiltrate homes, schools, and other buildings. Poor air quality, whether outdoors or indoors, can negatively affect the human respiratory and cardiovascular systems. Furthermore, Climate change projections show that there will be continuing increases in the occurrence and severity of some extreme events by the end of the century. While it is intuitive that extremes can have health impacts such as death or injury

during an event (for example, drowning during floods), health impacts can also occur before or after an extreme event, as individuals may be involved in activities that put their health at risk, such as disaster preparation and post-event cleanup. Health risks may also arise long after the event, or in places outside the area where the event took place, as a result of damage to property, destruction of assets, loss of infrastructure and public services, social and economic impacts, environmental degradation, and other factors. Extreme events also pose unique health risks if multiple events occur simultaneously or in succession in a given location. The severity and extent of health effects associated with extreme events depend on the physical impacts of the extreme events themselves as well as the unique human, societal, and environmental circumstances at the time and place where events occur. Moving on, vector-borne diseases are illnesses that are transmitted by vectors, which include mosquitoes, ticks, and fleas. These vectors can carry infective pathogens such as viruses, bacteria, and protozoa, which can be transferred from one host (carrier) to another. The seasonality, distribution, and prevalence of vector-borne diseases are influenced significantly by climate factors, primarily high and low temperature extremes and precipitation patterns. Climate change is likely to have both short- and long-term effects on vector-borne disease transmission and infection patterns, affecting both seasonal risk and broad geographic changes in disease occurrence over decades. Also, water-related illnesses include waterborne diseases caused by pathogens, such as bacteria, viruses, and protozoa. Water-related illnesses are also caused by toxins produced by certain harmful algae and cyanobacteria and by chemicals introduced into the environment by human activities. Exposure occurs through ingestion, inhalation, or

direct contact with contaminated drinking or recreational water and through consumption of contaminated fish and shellfish. Factors related to climate change—including temperature, precipitation and related runoff, hurricanes, and storm surge—affect the growth, survival, spread, and virulence or toxicity of agents of water-related illness. Water resource, public health, and environmental agencies in the United States provide many public health safeguards to reduce risk of exposure and illness even if water becomes contaminated. These include water quality monitoring, drinking water treatment standards and practices, beach closures, and issuing advisories for boiling drinking water and harvesting shellfish. Finally, mental health consequences of climate change range from minimal stress and distress symptoms to clinical disorders, such as anxiety, depression, post-traumatic stress, and suicidality. Other consequences include effects on the everyday life, perceptions, and experiences of individuals and communities attempting to understand and respond appropriately to climate change and its implications. The mental health and well-being consequences of climate change related impacts rarely occur in isolation, but often interact with other social and environmental stressors. The interactive and cumulative nature of climate change effects on health, mental health, and well-being are critical factors in understanding the overall consequences of climate change on human health. This section of the research is a little excessive in information and is clumped together, but I wanted to group all this together because all these topics have been mentioned earlier and this is more of an addition to those already talked about parts. They all really go hand in hand and the information will later be integrated together properly in my project.

Thoughts On My Progress: This research allowed me to take a step back and reiterate the most important information in my research and really just add to the bulk I had already presented. I am finished with talking about these topics in my research because I feel that I have fully explained and researched all these points. I now want to devote the rest of my research on different demographics, such as age, ethnicity, gender, and how climate change effects on health varies among these. This is really the final major part of what I want to look into and after that I will be done with researching. However, while I look into this final part, I want to also look into adding some information possible about future changes in the healthcare system. While this wasn't that big of a part of my topic, it is something I want to touch upon because I think it really helps bring everything full circle in that rather than just presenting hard facts and theories, I can explain beyond that in how the world and medicine has to change with these epidemics in order to accommodate the changing health of humans due to climate change.

11. 12/16/18

Research Results and Findings: In trying to find specific groups of people affected by climate change, I looked into the populations of concern in terms of the health effects on humans. I found that climate change is already causing, and is expected to continue to cause, a range of health impacts that vary across different population groups in the United States. The vulnerability of any given group is a function of its sensitivity to climate change related health risks, its exposure to those risks, and its capacity for responding to or coping with climate variability and change. Vulnerable groups of people include those with low income, some communities of color, immigrant groups (including those with

limited English proficiency), Indigenous peoples, children and pregnant women, older adults, vulnerable occupational groups, persons with disabilities, and persons with preexisting or chronic medical conditions. Characterizations of vulnerability should consider how populations of concern experience disproportionate, multiple, and complex risks to their health and well-being in response to climate change. The reality is that the health implications aren't as simple as a list of possible results, but there is a high degree of variations and factors that need to be taken into consideration when looking at how exactly humans are affected. The complexity of variability needs to be considered because that also determines how different groups are affected more than others.

Thoughts On My Progress: I believe that I have started out nicely in exploring the different demographics concerning human health. Population is a good starting point in beginning to understand how different groups of people will potentially react differently to climate change than others. While there are many different groups and categories that can be looked into, I really just want to research further into a few of these demographics in order to just explain how even with climate change effects, there is a variability when it comes to different groups of people and not everyone is impacted exactly the same. This information is also important in figuring out prevention methods and possible courses of treatment because all variations need to taken into account from the healthcare perspective. Researching further, I want to explore these specific at risk populations further and really try to understand what makes them more susceptible to climate change versus other populations.

12. 12/16/18

Research Results and Findings: I researched further into high risk populations. Some groups are disproportionately disadvantaged by social determinants of health that limit resources and opportunities for health-promoting behaviors and conditions of daily life, such as living/working circumstances and access to healthcare services. In disadvantaged groups, social determinants of health interact with the three elements of vulnerability by contributing to increased exposure, increased sensitivity, and reduced adaptive capacity. Health risks and vulnerability may increase in locations or instances where combinations of social determinants of health that amplify health threats occur simultaneously or close in time or space. For example, people with limited economic resources living in areas with deteriorating infrastructure are more likely to experience disproportionate impacts and are less able to recover following extreme events,, increasing their vulnerability to climate-related health effects. Understanding the role of social determinants of health can help characterize climate change impacts and identify public health interventions or actions to reduce or prevent exposures in populations of concern. In the United States, some communities of color, low-income groups, people with limited English proficiency (LEP), and certain immigrant groups (especially those who are undocumented) live with many of the factors that contribute to their vulnerability to the health impacts of climate change. These populations are at increased risk of exposure given their higher likelihood of living in risk-prone areas (such as urban heat islands, isolated rural areas, or coastal and other flood-prone areas), areas with older or poorly maintained infrastructure, or areas with an increased burden of air pollution. These groups of people also experience relatively greater incidence of chronic medical conditions, such as cardiovascular and

kidney disease, diabetes, asthma, and COPD, which can be exacerbated by climate-related health impacts.Socioeconomic and educational factors, limited transportation, limited access to health education, and social isolation related to language deficiencies collectively impede their ability to prepare for, respond to, and cope with climate-related health risks.

Thoughts On My Progress: As I'm coming to the end of my research, I am finding it increasingly difficult to find more relevant information that I believe would positively contribute to my project. In this journal, I finished researching the final part of what I really want to get done in my research. For the rest of my journals, I am going to continue researching and just add any more information I find on previous discussed topics. I will most likely end up further discussing all the arising health risks of climate change further because this is after all the majority of my project. I also hesitate to venture into more in depth material than what I have already included because I feel that it would begin to take away from the central goals of explaining how climate change affects human health. I don't want to have a bunch of extra information that it is not really necessary to answer and explain this base question. Therefore, in keeping with the issue at hand, I would rather add information and further describe this central question than adding unneeded supplementary information. However, I am very pleased with my progress in finishing everything I had wanted to accomplish in a concise manner. While, there is a lot of information presented in some sections, a lot of this will be summarized as visual elements (charts, graphs, data tables) and that will make it much easier to digest in the presentation.

13. 12/16/18

Research Results and Findings: In this journal, I shifted my attention to a different point entirely in delving into the possible solutions presented in healthcare around the world. In France, the Tiger Mosquito Surveillance Network monitors the tiger mosquito's movements. The Smart Health Facilities Initiative and Smart Hospitals Toolkit is being implemented through the Pan American Health Organization in the Caribbean with the aim of supporting the governments of the selected countries to assess and prioritize vulnerability reduction investments in their health facilities. Some countries integrate health into their national adaptation plans (NAPs) and programmes. For example, Macedonia and six additional countries are part of an initiative of WHO and the German Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety that brings health into adaptation plans. There are also a number of training and awareness-raising activities, including the Self-Learning Course on Climate Change and Health, developed by Mexico's National Institute of Public Health in line with the joint Pan American Health Organization/WHO Strategy and Plan for Action on Climate Change. The training aims at raising awareness and improving knowledge on the health effects of climate change among the general public and other sectors. These show that even through all the risks and dangers mentioned, there are still cautionary actions being taken in order to prevent and essentially track the worsening climate change's effects.

Thoughts On My Progress: It's important to realize that the preventive measures being taken are an essential part in slowing down the ramifications of climate change as much as possible. In highlighting some different global organizations taking charge in

preventative measures, I hope to spread the word of how important recognizing and reacting to climate change is. The more that this is ignored, the bigger the consequences on not only the planet, but on humans as a species. I definitely want to display this information somewhere in my presentation because it displays real examples of the global community reacting something as drastic as climate change. More people need to be aware of how imperative the effects of climate change are and how this threat will only continue to increase.

14. 12/17/18

Research Results and Findings: After looking back at my research, I came back to explain a topic that I only briefly mentioned, but carries a lot of weight in terms of how it affects human health. This topic is food safety, nutrition, and distribution. A safe and nutritious food supply is a vital component of food security. The impacts of climate change on food production, prices, and trade for the United States and globally have been widely examined, including in the recent report "Climate Change, Global Food Security, and the U.S. Food System." An overall finding of that report was that "climate change is very likely to affect global, regional, and local food security by disrupting food availability, decreasing access to food, and making utilization more difficult." There are two overarching means by which increasing carbon dioxide (CO2) and climate change alter safety, nutrition, and distribution of food. The first is associated with rising global temperatures and the subsequent changes in weather patterns and extreme climate events. Current and anticipated changes in climate and the physical environment have consequences for contamination, spoilage, and the disruption of food distribution. The

second pathway is through the direct CO2 “fertilization” effect on plant photosynthesis. Higher concentrations of CO2 stimulate growth and carbohydrate production in some plants, but can lower the levels of protein and essential minerals in a number of widely consumed crops, including wheat, rice, and potatoes, with potentially negative implications for human nutrition. This extra information really clears up any confusion in my not fully explaining this topic. Food has serious potential health implications and those are described above by the way that it is affected by climate change and its subsequent effect on human health.

Thoughts On My Progress: I am at the very end of my research. At this point, I am making sure that no section has been left unexplained and want to ensure that there is a plethora of information for me to be able to refer back to if I happen to need it. This topic that I have picked, climate change, has also been slightly more difficult to research due to its broadness and range of potential things to talk about. However, this freedom of having so much information is also what drew me to this topic. The biggest thing I learned was how to be able to summarize information and also pick out the most important details in pages and pages of research. The freedom of being able to have so much information to look back on will prove to be beneficial in the development of my project when I can then analyze and draw conclusions from this research much more openly than if I had chosen a more rigid topic that was purely just hard facts. I have more room to include my opinions and standing on this topic. This is the main reason I picked a controversial topic such as climate change because I can then make claims and use this research to back them up which is a much more interesting project then just presenting facts. I have

always found the social aspect and public perception, regarding human behavior to medicine, to be particularly fascinating and that's essentially the epitome of this project.

15. 12/17/18

Research Results and Findings: As I wrapped up my research in this final journal, I looked into how this information concerning human health risks due to climate change is gathered in the first place. In recent years, scientific understanding of how climate change increases risks to human health has advanced significantly. Even so, the ability to evaluate, monitor, and project health effects varies across climate impacts. For instance, information on health outcomes differ in terms of whether complete, long-term datasets exist that allow quantification of observed changes, and whether existing models can project impacts at the timescales and geographic scales of interest. These findings represent an improvement in scientific confidence in the link between climate change and a broad range of threats to public health, while recognizing populations of concern and identifying emerging issues. These considerations provide the context for understanding changing health risks and allow us to identify, project, and respond to future climate change health threats. The overall findings underscore the significance of the growing risk climate change poses to human health. Being able to observe how these scientific measurements are taken and where they come from is a nice conclusion to my research. It really wraps up everything and brings it full circle.

Thoughts On My Progress: I am very happy that I have finally finished my research. I also very proud of how much information I gathered and the more importantly the quality of that information. I believe that I was able to represent all aspects of this topic and left

nothing without substantial information. Moving forward in my research project, it will be much easier to complete because I already have much of the information mapped out. Compared to my previous journals, I put much more effort into these because I think that my topic this time was something that was of much greater interest to me. I genuinely enjoyed researching and learning about climate change and I think that was a real motivation to dig deeper and really analyze the information that I was reading. I also came up with many more ideas for my presentation this time around and I basically have a mental picture planned out of what I am going to be creating.The fact that I took a topic I was already really interested in, climate change, and related it to medicine, something I am deeply fascinated in, made the whole research process all more interesting. This research has really opened my mind to more humanitarian work, as well as medical research professions in climate change. In the end, it has only reinforced my basis of the importance of addressing climate change on a global level.

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