

THE EFFECTS OF COVID19 IN A HYPERCONNECTED WORLD



(Art editing by Destiny Coley)

LEAD EDITORS:

Gabriel Castro
Destiny Coley
George Desjarlais
Emily Lysakova
Brian Mejia
Jasmine Mendoza
Katherine Mumford
Sunita Pearson-Siegel
Dayanara Sanchez
Tyler Scott Simpson

CONTRIBUTIONS by Scholars of the MBRP Class of 2020, 2021, and 2022.

Chief Advisor: MAURICIO GONZALEZ, M.Sc.
Editor-In-Chief: ANITA MORAWSKI, B.A.

MARINE BIOLOGY RESEARCH PROGRAM
NEW YORK HARBOR SCHOOL
NEW YORK
2020 (Second Edition)

CONTENT

1. Life and COVID19
 - 1.1. Introduction
 - 1.2. Staying Healthy during a Pandemic by Malik Ford, Dakota Rogers, and Oliver Lieber
 - 1.3. Caring for Sick Ones during a Pandemic by Daniel Picarello
 - 1.4. Caring for Healthy Ones during a Pandemic by Susan Look
 - 1.5. Caring for Pets during COVID-19 by Oliver Lieber
 - 1.6. Chores & Routines during a Pandemic by Yiorgos Alexandrou & Lisette Mejia
 - 1.7. Changes in Communication with Family during a Pandemic, by Maddie Dominguez
 - 1.8. Managing Private Space & Time during a Pandemic by John Quentin Seery
 - 1.9. (Clean) Humor in Trying Times by Ronnie Warren
 - 1.10. Special Case Example: Italy, by Sara Mezzoli
2. Science of COVID19 (Sunita Pearson-Siegel & Brian Mejia, Co-Editors)
 - 2.1. Introduction
 - 2.2. What is a Coronavirus? by Jonah Florholmen-Bouman
 - 2.3. What is the Origin of COVID19? by Gideon Brown
 - 2.4. What are the impacts of COVID19 on the Planetary Environment? by Matthew Aviles & Quinn Lavelle
 - 2.5. What are the Effects of the COVID19 Pandemic on Captive Animals by Jonah Florholmen-Bouman
 - 2.6. COVID19 Transmission
 - 2.6.1. How can COVID19 be Transmitted from Animals to People? by Max Feldman
 - 2.6.2. How can COVID19 be Transmitted from Animals to People? by Miriam Katz
 - 2.7. How does COVID19 Spread in Populations and What are the Symptoms?
 - 2.8. How can COVID19 be Treated and Contained?
 - 2.9. How does COVID19 Compare and Contrast with Flu Viruses? by Giovanni Nunez
 - 2.10. How can the Genetic Engineering of Viruses Potentially be used for Biological Warfare?
 - 2.11. How is COVID19 Affecting the use of Disposable items (*i.e.* Plastics)? by Jayda Alcott
 - 2.12. Special Case Example: Venice fish returning due to decreased boat traffic, by Dayanara Sanchez
 - 2.13. Special Case Example: Global Air quality improvement due to China Factories Shutting Down, by Dayanara Sanchez
3. Geographic Information Systems (GIS) and COVID19 (Gabriel Castro, Editor)
 - 3.1. Introduction
 - 3.2. Patterns in Geographical Distribution of COVID19 By Faith Yee
 - 3.3. Displaying the Rate of Global COVID19 Spread Using GIS
 - 3.4. Use of GIS to track COVID19 by Karla Cortes-Reyes
4. Art and COVID19 (Destiny Coley, Isabella Karsch, & Luke Sampton, Co-Editors)
 - 4.1. by Destiny Coley,
 - 4.2. by Luke Samton
 - 4.3. by Isabella Karsch
5. Education and COVID19 (Emily Lysakova, Editor; Karina Deolarte, Nicholas Dilella, Nyle Kapoor, and Miriam Katz, Contributors)
 - 5.1. Introduction
 - 5.2. Pros of On-line Learning
 - 5.3. Cons of On-line Learning
 - 5.4. The Latest Apps. and Software for On-line Learning
 - 5.4.1. Student-Teacher Communication
 - 5.4.2. Academic Online Resources
 - 5.5. How COVID and On-line Learning have Exposed Inequities in Education

6. Power and Politics in the Age of COVID-19 (Tyler Scott Simpson, Editor; Giovanni Nunez, & Bryant Soriano-Alonso, Contributors)
 - 6.1. Introduction
 - 6.2. Global politics
 - 6.2.1. The Richman's Disease
 - 6.2.2. Anti-Asian Racism
 - 6.2.3. Global-political Effects of COVID-19
 - 6.3. Regional Politics Effects of COVID-19
 - 6.3.1. China
 - 6.3.2. A Divided United States
 - 6.4. Power in the Future Effects of COVID-19
 - 6.4.1. America
 - 6.4.2. Iran
 - 6.4.3. France
7. Economy of COVID19 (George Desjarlais, Editor)
 - 7.1. Introduction
 - 7.2. COVID19 and Trade
 - 7.2.1. Effects of COVID19 on Trade by John Quentin Seery
 - 7.2.2. Effects of COVID19 on Trade by Prophet Davison
 - 7.3. Effects of COVID19 on Food Supply
 - 7.4. Effects of COVID19 on Medical Supplies by Malik Ford
 - 7.5. Effects of COVID19 on Transportation System
8. Public Health & Safety and COVID (Jasmine Mendoza, Editor)
 - 8.1. Introduction
 - 8.2. Effects of COVID19 on Crime by Susan Look
 - 8.3. Effects of COVID19 on Fires by Lisette Mejia
 - 8.4. Effects of COVID19 on other Locally Related Emergencies
 - 8.5. Effects of COVID19 on Public Transportation & Workers
 - 8.6. Special Case Study: Sacrifices made by Medics and other Health Care Workers in Wuhan, China, by Emily Shi
9. Past and Future of Pandemics (Kate Mumford & Dayanara Sanchez, Co-Editors; Prophet Davison, Aiyana Avery, Karla Cortes, Max Feldman, Contributors)
 - 9.1. Introduction
 - 9.2. Relationship Between Trade and Pandemics (Black plague, Spanish flu, etc.)
 - 9.3. Role of Pathogens in Conquest Attempts (*i.e.* Native Americans, Europeans in Africa)
 - 9.4. Effects of Empire and Pandemics
 - 9.5. Effects of Globalization on Pandemics
 - 9.6. Virtual Connectivity (Isolation) and Pandemics
 - 9.7. Rogue Scientists, CRISPR, Bioengineering and Biological Warfare

Preface

In early May, 2020, Governor Andrew Cuomo of New York announced a partnership with the Bill and Melinda Gates foundation to “reimagine education.” The details of this initiative remain uncertain, as do most future prospects during this calamitous era of Covid-19. But from the few hints that Cuomo dropped about his hopes, the plan is to borrow from the current state of virtual learning that was imposed on students, families and educators in an abrupt and chaotic fashion in March 2020 - nearly overnight - and utilize technology in a much more predominant way moving forward, even after the dust of the pandemic settles. Cuomo and Gates, together with an advisory committee of a few dozen players from school administration and educational policy sectors, and a couple token teachers and parents (notably no students are on the council), will explore how “the cloud”, digital platforms, video chat software, and other web-based features can and ought to transform the learning environment, and radically alter education as we know it for the long haul.

Does this shift in schooling portend a much larger cultural shift that involves not just how we educate our children, but how we construct our entire social, economic and political realities? Are we in the midst of a revolution of sorts that we didn’t even see coming? It is hardly a new phenomenon for governing bodies to exploit crises to radically change the social order in ways that wouldn’t survive the democratic process during ordinary times. Naming the Great Depression as reason to give undue power to banks, the Pearl Harbor attack as pretext to enter World War II, the threat of nuclear weapons to endorse testing the effects of nuclear radiation on unconsenting persons, an urban drug crisis to defend mass incarceration of African Americans, the September 11th strikes as justification to limit personal freedoms, Hurricane Katrina to excuse the collapse of the entire infrastructure of the Ninth Ward, caravans of illegal immigrants to rationalize putting children in cages... the list goes on. Whether or not one buys into the conspiracy theories that suggest that Covid was planned or at least known in advance to be a major threat is irrelevant to the possibility that it may serve as a trigger point to instigate larger social changes.

Education can be considered a microcosm of our cultural reality, and Cuomo’s plans to reimagine it may well be a signal of greater changes to come. History often provides examples to learn from, so it is worth looking for a moment at a previous transformation in education that occurred in this country. Mass public education in large school buildings with certified teachers is a relatively young phenomenon, before which most learning happened at home, under the purview of parents, or at best in single room schoolhouses with all ages of children learning together. Compulsory schooling in a classroom setting, grouped by age and led by a single teacher, only became law in the mid-1800s starting with Massachusetts and it wasn’t until 1918 that the entire country required a minimum of elementary education for all its children. Designed after the Prussian model of schooling of the mid-1700s, there are different theories as to why this shift was adopted by the U.S., hook, line and sinker. The obvious answer would be to create a standardized curriculum and qualified instruction for all students. Horace Mann, Secretary of Education in Massachusetts, led the “common school movement” in his development of a statewide system of schooling, uniform learning content for all elementary age children, and compulsory attendance. This idea of a standardized curriculum eventually became the norm for all states, with each state owning the legal authority to oversee the curriculum in all its public schools. (The movement for establishing *national* standards and accountability came

much later, beginning in the 1990s, largely under the pretext that American students were falling behind in global academic measures. By 2010, forty-one states adopted what became known as the Common Core State Standards Initiative, which was *also* heavily financed by the Gates Foundation, and got a great deal of political momentum from Michael Bloomberg. It was met with heated controversy on various levels for different reasons, but that is a complex topic which this short prologue will not delve into.)

So while standardized learning seems like a valid reason to implement mass public education, might there be other not-so-innocent, ulterior motives in the historic shift to compulsory, school-based learning, which was designed around groups of similarly achieving youngsters all following the undisputed authority of a single classroom instructor, trained in the behavioral formalities and orderliness of rank and file, answering to a hierarchy of school leadership? Some academics, like John Gatto, American author and award-winning teacher of the late 19c and early 20c, offers some possibilities: like to prepare citizens from a young age for the new era of industrialized mass-production of goods that depended on repetitive tasks, scheduled bells and whistles, and unquestioned oversight by a foreman; to easily train young men into docile troops who would carry out military orders without protest as America was entering the age of global hegemony; to tear up the tight-knit social fabric of family life so that its pull would never exceed allegiance to one's country; to break the dominance of religious influence; to enforce distinction among those of varying social, economic or achievement level (hence the the school designation we refer to as "class"); or to ensure compliant civic engagement that doesn't challenge governing authority too much. These are all good reasons to believe that the transition wasn't just about the desire for a standardized curriculum; it served a larger purpose that aimed to meet the changing needs and signs of the time.

Could Cuomo's intention of rethinking schooling today be an indicator of a modern-day transformation that we are undergoing as a country, even as a world? If the first dramatic shift in education was a response to the urgency of American industry and expansion, we can say that the current shift is being necessitated by the new demands of the digital age, with Covid offering the perfect storm of a pretext for the massive and swift overhaul we saw when schooling went online in March. For public education to catch up to the current needs of globalization and internationalism, it must embrace 21st century reality in order for the United States to maintain its position in the global balance, and that reality is largely digital. Only big data can manage to administer global resources and populations, and the U.S. is falling behind its competitors. China is racing ahead in high-tech fields such as robotics, IT, aerospace, semiconductors, automotives, and pharmaceuticals, and in order for us to stay in the global game of competition, we need to maintain steady advances. The need for social distancing may be as nominal a justification for remote schooling today, as was standardized curriculum for mass schooling in the 1850s. The rapid adjustment to online learning is poignantly suited to this new digital information age, and chances are it will not go away even after Covid-19 is a long-forgotten memory. The shift happened at lightning speed - teachers had to adapt entire curriculums in a matter of days, administrators needed to configure connectivity and other logistics almost overnight, and sure there were bumps, but once all the kinks are ironed out, what compelling reasons are there to return completely to in-class instruction, designed mostly around rote learning? How efficient or effective is an education that focuses largely on memorization of facts, when information is literally at our fingertips? How useful is teacher-led lecture when businesses of the future rely on worker creativity? How important is individual assessment of students and cutthroat competition, when twenty-first century success depends on teamwork

and collaboration? How necessary is it for schoolkids to meet in a classroom if colleagues around the world connect virtually via Zoom, Meet or Teams? What benefit is there to live lessons with plentiful not-so-great teachers, when they can be recorded by only the best, edited to perfection, watched at one's convenience, and Q and A can happen via video chat? Colleges and universities have been toeing the waters of online instruction for twenty years, and by now have proven that it can be as valuable as traditional learning. As for the trade industries, how many workers do we need anyway once most mechanical tasks are taken over by robots, and those that require human intervention are better taught by apprenticeship anyway?

The reasons to stick to virtual learning for good, or at least integrate it in some major fashion, are myriad. But there's an alternative viewpoint. Those who are skeptical of making the current trend more permanent claim that remote education will never replace the valuable interaction that a classroom offers: face to face encounters, live debate, hands-on learning, small group teamwork, and let's face it, being among friends. Then there is the child supervision purpose that no one wanted to admit is a big part of schools' offering to the public, but it was laid bare by Covid-19. Schools allow parents of young children to go to work, or at least not lose their minds as they try desperately to facilitate their children's learning and welfare while they themselves are working from home. NYC Mayor Diblasio's refusal to implement stay-at-home orders early on (at the cost of 17,000 lives, had the city closed just one week earlier, according to the New York Times) was by his own admission due in large part to the concern that if schools were not in session, parents who worked in medical, emergency, law enforcement, transportation and food sectors would have to abandon their posts, and the economy would come to a screeching halt. As far as older youth, when he finally announced school closures on March 15, he quipped that anyone who has a teenager knows better than to expect them to stay home, and having them run the streets is not a risk communities wanted to take. Then there's the added fact that over half of American public-school students receive free or reduced lunches and other meals, so school-at-home would be a financial hardship, even impossibility, for millions of Americans. Other reasons to be dubious about remote schooling include its inability to address the needs of students with learning disabilities and other special education profiles; the elimination of a whole class of workers as teachers become obsolete; the lack of access to the internet or computer devices among economic disadvantaged youth; the painfully disruptive glitches in connectivity and lags in information processing that occur when millions of users are on the same platform simultaneously; the ever-increasing invasion of privacy as our personal identities are ever-more algorithmized, collected and tracked, and our internet exploration is no longer controlled by our own volition but funneled into whatever the calculation thinks we want to or *ought to* discover; the higher chance that opportunistic hackers will steal information or spread computer viruses; and the chaos that would ensue if the internet suddenly went dark, similar to but arguably much worse than the Northeast Blackout of 2003 when states in the northeastern and midwestern US fell off the electric grid.

While we may not have felt ready for the shift to remote learning or Cuomo's thoughts about integrating it into the new normal, we must admit that it is only a reflection of the larger cultural shift toward digitization that has been happening since the turn of the millennium. Today's students cannot read cursive or write essays by hand. We're experiencing the last spasms of handwriting as pen and paper are quickly becoming obsolete and nearly everything is digitized – emails took over written correspondence, e-books took over hardcopies, news media is on the web, even legal documents can be signed digitally and a signature feels like an archaic relic of some distant past. We're losing the attention span needed to analyze articles as everything

comes to us in 280-character-or-less bites, videoclips have supplanted reading, and words and grammar are being replaced by emojis. It's becoming impossible to secure the privacy of one's own work anymore as everything is being saved to the cloud. People are traceable by their cellphones, maps have been supplanted by global positioning systems, facial recognition software can identify humans quicker than our own minds often can, and even surgery is done by robots. Voting, the census, and most any other form of civic engagement can be administered electronically, trade and capital exchange can happen with a swipe or a click, goods are tracked in real time making resource distribution increasingly automated, and cash is quickly becoming another dinosaur of the past. In this context, almost all of which we subjected ourselves to willfully, even *paid* to participate in, it is not a big stretch to imagine schooling being digitized for good. Once a degree from the University of Phoenix became as credible as any other, we should have guessed that online learning would eventually trickle down to lower levels of education. The quicker the young can be trained to learn remotely, to collaborate at a distance, and to master all the features that various platforms have to offer, all thanks to the medical crisis that pulled the trigger, the better equipped they'll be to take on this new economy and forge it ahead. Covid-19 may well be the nail in the coffin of an antiquated reality and the harbinger of a whole new world.

This book is written by the generation of students who grew up with electronic devices in their hands and knew how to use them before they even knew how to speak. The thoughts they share in this collection of essays is a peek into the thoughts, concerns, and opinions of how the pandemic is shaping their adolescent lives, for better or worse. This is the generation that will one day be governing us, managing our economy, providing services, and caring for our health in our elder years. I hope you take the time to explore what they're saying, what they're not saying, and what is said in between the lines. It was pulled together as abruptly as was the shift to move learning online, and so while it may be a bit rough around the edges and not entirely complete, there may be no better example of what the new normal may look like: creative, chaotic, collaborative, and compellingly honest.

Anita Morawski
Editor-in-Chief

<https://thecity.nyc/2020/05/cuomo-and-gates-reimagine-schools-bid-snubs-nyc-teachers.html>

<http://tsd.naomiklein.org/shock-doctrine/reviews/it-takes-crisis>

https://en.wikipedia.org/wiki/Criticism_of_government_response_to_Hurricane_Katrina

<https://people.howstuffworks.com/public-schools1.htm>

https://en.wikipedia.org/wiki/Prussian_education_system

https://en.wikipedia.org/wiki/History_of_education_in_the_United_States

https://en.wikipedia.org/wiki/Common_Core_State_Standards_Initiative

https://en.wikipedia.org/wiki/John_Taylor_Gatto

<https://www1.nyc.gov/office-of-the-mayor/news/150-20/mayor-de-blasio-holds-media-availability-covid-19>

<https://www.npr.org/sections/ed/2015/01/30/379330001/true-or-false-free-and-reduced-price-lunch-poor>

<https://www.nytimes.com/2020/05/20/us/coronavirus-distancing-deaths.html>

Chapter 01. Life and COVID

1.1 Introduction

“Live the questions now. Perhaps you will then gradually, without noticing it, live along some distant day into the answer.” – Rainer Maria Rilke

I’ve followed the guidelines given to me through the screen of a laptop. I’ve ordered food and tools through this same screen. I’ve spoken to my loved ones by virtue of digital connections anxiously not knowing if they’ll be there next week. I’ve felt compelled to put my senses in pause from the familiar world. “Virtuality” has become an extension of my appetites, my creativity, my will, my Love, my work.

When I understood that teaching virtually was going to be expected by my work, I pondered heavily what I could do. I didn’t want to waste anyone’s time. After all, it wasn’t clear this virus would get under control (and it still isn’t at the time of writing this, months after the initial outbreak). Moreover, I wanted to bring the *now* to consciousness - make this “earthquake” of an event relevant and ask, if possible, what could be asked. Therefore, Marine Biology Research Program scholars were asked to read, ponder, and write about various topics that would somehow be affected by the pandemic. This wasn’t hard to imagine since it was evident that most everything we could think of would be. Daily home life, caring for loved ones, caring for pets, communicating with family, chores, science, politics, economics, art, education would all be turned on their heads. So how could we capture it? Experience it? While at the same time fulfill the role of research which is the content of the class I teach? Maybe, more importantly, how could we stay sane/safe and not pretend this is just a passing inconvenience to be ignored with busy work? Hence this book.

Eight weeks after the closure of schools, the world is clamoring for answers and making predictions of the devastating effects of the pandemic. The academic and pundit consensus is to claim how much society is falling behind. They assert that all students will have to work overtime to catch up to where we were. A whole generation of students will suffer the consequences. At no point are the premises being questioned. We may have lost time with algebra, but we have gained time to ourselves. We have been able to stop and look at other aspects of our lives – what makes us tick. We have been able to confront the most basic of questions that are normally not questioned by our modern conscious: food safety, death, family, progress.

Our value systems are being put into question whether we think about it or not. And the true believers and pundits are fast to distract us in to believing where we need to move next: extended summer school, extended school days, back to the malls, back to having others cook the same fatty foods for us, back to over-crowded subways, back to contaminating the air and water, back to business as usual which is what got us here in the first place. Whatever New

York City does was a breeding ground, a culture broth for the pandemic. If I may ask, will the result from all this be to learn that our society needs to change? That people need to spend more time with their families, cook for themselves, read, care for plants, draw with their siblings, think about who they are? The guideposts for business as usual are climate change, nuclear war, or the next pandemic. How far down that trail will we march in the name of “progress.” No one can take away the walk I had today with my wife and daughter on the beach, the heartfelt email I wrote to my science community, the cleaner air I breathed today, this introduction.

This book does not pretend to be exhaustive of the topics that have been affected by COVID19 nor of an intensely academic nature. Nor is it a prescription for what anyone should do or count on to be the case. It's, rather, our attempt to make sense out of our lives in the time of COVID19. So thank you scholars for contributing to this book and readers for sharing in our thoughts. Godspeed.

1.2 Staying Healthy During a Pandemic

1.2.1 Staying Healthy During a Pandemic by Malik Ford

This Coronavirus pandemic has altered the lifestyles of many people. Despite these changing conditions, continuing to maintain a healthy lifestyle is required in order to thrive. For respiratory pandemics, the CDC recommends basic action like washing your hands often and coughing or sneezing into a tissue. While these are important recommendations in the effort to keep members of your household from getting sick, they won't be enough to keep you healthy.

Firstly, a healthy diet is key. Healthy foods are essential to your overall health, especially at a time like this (Bruzuda, 2020). Being stuck at home means most people are likely to burn fewer calories than they normally do. Besides supporting physical health, keeping a nutritious diet helps combat depression. There is a connection between physical and emotional well-being, and when you feel good in one regard, it's easier to feel good in the other (Bruzuda, 2020). Nuts are an important food source to keep on hand, as they are shelf stable, and they are a great source of protein, unsaturated fats, and electrolytes (Bruzuda, 2020). In order to safely prevent monotony in your meals, food scientists and nutrition experts suggest utilizing different frozen fruits and vegetables, as well as freezing meat, poultry, and dairy to get a longer shelf life out of the product (Bruzuda,2020).

Exercise is an effective way to manage stress and has the added benefit of keeping one's immune system healthy (Bruzuda,2020). Trying to stay motivated to exercise can be challenging, especially at a time when you can't surround yourself with people who have similar goals. But, social media can be leveraged to connect you with people trying to get exercise during this pandemic (Bruzuda, 2020). An alternative to taking a trip to the gym is going out for a run, so long as it is appropriately distanced from other people (Bruzuda, 2020). Many gyms have also provided free access to instructional videos for workouts, which people can utilize as well.

It is undoubtable that a healthy diet and exercise are both very valuable during this coronavirus pandemic. But one's creativity can go even further in staying healthy and sane during these times. Finding a hobby one can realistically do at home is an excellent idea. While watching the news all the time can lead to paranoia and catastrophic thinking, finding an activity to do that takes your mind away from everything else is incredibly useful. Creating a daily routine and trying new and unfamiliar activities are recommended, to make the most of the time that the population now has on its hands.

1.2.2 Staying Healthy During a Pandemic by Dakota Rogers

Many people around the world, especially New York, are feeling the effects of the coronavirus. Of course, individuals do get affected physically due to their health, but people can also be affected mentally because of the amount of stress that they are under throughout this time. Humans can pass on this virus when particles of their respiratory fluids make contact with someone through sneezing, coughing, or even talking. This can lead to symptoms such as fever, a dry cough, diarrhea, and others. Mentally, our health can be depleted by things we are exposed to everyday such as the media. Reading false information and ignorant posts, or just being overwhelmed by the constant flow of virus information can lead to changes in sleep and eating patterns, difficulty concentrating, and even worsening underlying medical conditions one already has.

There are many ways to avoid falling into those patterns and staying healthy. There are two key suggestions that government officials advise that we follow. One is to minimize contact with people and to stay out of crowds. A staff member from the department of infectious disease at the Cleveland Clinic states, "If you are part of an at-risk group, such as if you are immunocompromised or have a chronic health condition, it's reasonable to rethink going out in large crowds (Migala, 2020)." Whether you have underlying problems ranging from asthma to cancer, it is best to stay away from others. It is recommended that people form groups of no more than ten people and to social distance by staying a minimum of six feet apart. Multiple concerts, venues, and even fast food places have been closed to ensure that the public can safely maintain such distance. The second key suggestion to stay safe is to cover one's nose and mouth with some sort of material barrier. During the height of the pandemic in New York City, Mayor Bill De Blasio issued a requirement that all residents wear such coverups when outside (Bursztynsky, 2020). The same requirement was issued in Los Angeles, another major metropolitan center of infection. A coverup can include a medical grade mask, to something as simple as a bandana. Wearing gloves to prevent manual contact with infected surfaces is also a good idea. Procedures upon returning home include disposing of gloves and masks (or washing cloth products) and washing hands for at least twenty seconds and drying your hands using disposable paper towel.

Mental health and the myriad of emotional problems that people suffer from are often considered secondary in gravity to physical illness. There is the well known saying that you have nothing if you lose your health, namely physical health. But the devastation that mental health problems can cause should not be underestimated. In this particular time, being stuck at home can make one stir crazy and cause overwhelming emotions, which is completely understandable. A way that people all around the world are coping is taking up new hobbies, such as working out. Dori Rosenberg, PhD, affiliate associate professor at the University of Washington School of Public Health says that, "Physical activity improves mood and well-being

and reduces stress and anxiety (Carter, 2020).” A survey in February showed that 42.6% of Chinese respondents experienced anxiety related to the coronavirus outbreak (Ponte, 2020). Doing exercises such as yoga, zumba, or even jogging, can help boost the spirits. Another tip that can benefit mental health is to break nervous habits, such as stress eating, nail biting or even smoking. Such habits usually arise when a person is trying to cope with undesirable, negative emotions. In the case of emotional eating, according to multiple studies, these emotionally-based changes in behavior range from overeating to binge eating to severe caloric restriction or not eating enough (Epel, Laipdus, McEwen, & Brownell, 2001) (Warren, 2020). Some helpful points that experts recommend to curb this habit is to be more aware of one’s feelings and to learn to recognize the emotional triggers that cause one to want to participate in disturbed eating behavior. If one is unable to identify these triggers on their own, they should seek support from friends, family, or mental health professionals.

References:

Carter, K., & Carter, K. (n.d.). How to Exercise During the Coronavirus Outbreak - and Why You Should (Video). Retrieved from <https://www.travelandleisure.com/trip-ideas/yoga-wellness/how-to-exercise-from-home-coronavirus>

Coronavirus: Mental Health Coping Strategies. (n.d.). Retrieved from <https://www.nami.org/Blogs/NAMI-Blog/March-2020/Coronavirus-Mental-Health-Coping-Strategies>

Jbursz. (2020, April 3). Here's the study behind why NYC Mayor de Blasio now recommends masks in public. Retrieved from <https://www.cnn.com/2020/04/03/heres-the-study-behind-why-nycs-mayor-now-recommends-masks-in-public.html>

Migala, J., & Migala, J. (n.d.). What You Need to Know If You're Going to Be in a Crowded Space Amid Coronavirus Concerns. Retrieved from <https://www.travelandleisure.com/travel-tips/coronavirus-going-to-events>

1.2.3 Staying Healthy During a Pandemic by Oliver Lieber

Staying healthy during an epidemic can be a challenging endeavor. According to the U.S. Center for Disease Control, things people can do to stay healthy include taking breaks from watching, reading, or listening to the news and instead occupying oneself with exercising regularly, participating in hobbies, and eating healthfully. In a hyperconnected world, it is also extremely easy and inexpensive to be in touch with loved ones through voice or video conferencing. Checking in with at-risk and elderly friends and family and sharing useful information with them can help relieve not only one’s own but others’ stress. Making oneself useful by volunteering to do the grocery shopping of those who should not risk exposing themselves to potential infection not only is a great service to those in need but it can alleviate one’s one stress by doing something productive, according to the CDC. Finally, individual hobbies such as listening to music, watching TV (other than the constant stream of Covid

news), playing with pets, gardening, or playing an instrument, can help calm the anxiety that is caused by a global pandemic and the threat of illness and death.

1.3 Caring for Sick Ones During a Pandemic by Daniel Picarello

As our country's healthcare system is ravaged by this disease, sickness is more dangerous than ever. It's critical that sick ones are treated properly to avoid the infection of others and further damage to their health. If a loved one is sick with something not urgent (flu, cold, etc.) contact your a medical professional, stay home and monitor your symptoms. Emergency rooms and urgent cares are overrun with COVID-19 and it is important they aren't tasked with taking care of smaller, treatable illnesses and can focus on the pandemic. If you worry you or a loved one are sick with COVID-19 there is a set of precautions you must take to prevent its spread to your loved ones. Have the person you suspect of infection avoid contact with other family members. Immediately contact your doctor so they may plan if you need to visit their practice. Begin wearing a cloth over your mouth, even at home. Stop sharing household items, and clean frequently used items daily. Monitor your symptoms and remain in contact with healthcare professionals. Even if you feel you may have the disease there is no need to panic, following proper procedures will keep everyone safe and healthy.

References:

What to Do if You Are Sick. (2020, March 25). Retrieved April 3, 2020, from <https://www.cdc.gov/coronavirus/2019-ncov/if-you-are-sick/steps-when-sick.html>

1.4 How to Care for Healthy Ones During a Pandemic by Susan Look

During a pandemic such as the COVID-19 that has taken over the globe, there are several recommendations being made by medical and public health professionals to avoid the spread of infection. Healthy people must avoid close contact with those who are sick or at high risk for infection and death. In severe cases such as the current one in which the virus is a novel phenomenon and authorities are not entirely clear on how the virus behaves, or it is spreading at a rate that is difficult to control under normal social circumstances, extreme measures must be taken by all persons, both healthy and ill. Persons are strongly advised to stay home and only leave for essential reasons, such as food shopping. If one does go out of the house, they must wear a mask and gloves. When outside, it is critical that people avoid touching their eyes, nose, and mouth, as contact with surfaces can contaminate the hands, and contagion can swiftly spread internally via those orifices. Stay six feet apart from others prevents respiratory droplets, the carriers of the virus to spread among people. Taking off shoes upon entering the house and immediately washing hands and even showering are strongly recommended. Those who feel unwell shouldn't leave home under any circumstances, and must call their doctor or arrange a telehealth appointment, as most doctors will be seeing their patients virtually, to avoid the spread of infection in clinics. Social gatherings should be postponed, hands should be scrubbed frequently for 20 seconds, and hand sanitizer that has 60% alcohol should be used when soap and water is not immediately available. When at home, people should avoid sharing food and drinks, in the event that someone is carrying the virus but not yet showing symptoms.

Homes should be cleaned regularly and frequently touched surfaces and objects should be disinfected daily.

References:

Get Your Household Ready for Coronavirus Disease 2019. (2020, March 27). Retrieved from https://www.cdc.gov/coronavirus/2019-ncov/daily-life-coping/get-your-household-ready-for-COVID-19.html?CDC_AA_refVal=https://www.cdc.gov/coronavirus/2019-ncov/prepare/get-your-household-ready-for-COVID-19.html

1.5 Caring for Pets During COVID-19 by Jayda Alcott & Oliver Lieber

During a Pandemic many people are stressed and worried for their safety as well as their families. While there are many at home in quarantine, there are also front line workers still risking their lives for society. Now, while these people are at work supporting our country, their animals are at home all alone. The article <https://spectrumnews1> recommends at this time that front line workers contact their usual vet and inquire about boarding their animals. If the local vet is not offering that people should search to find another close vet and look for possibilities. It is better for the owner to not have to worry about their safety at home while they are doing work that is necessary for our country's survival at this time.

When caring for pets during a pandemic pet stores and other places that supply animal food are considered an essential business so they can stay open. According to the CDC if you have been confirmed to have the disease or you suspect you may have it you should stay away from your pets as much as possible. While there are no confirmed cases in animals and we do not know if they can get it, people still recommend limiting contact with your pets. They also say that if you have to because nobody else can take care of them that you should wash your hands before and after you feed them. Also, because of social distancing, when you walk your dog you need to keep a distance from people just like everybody else.

Make sure that animals are still getting enough food. It can be worrisome that food will run out and the animal will starve. But this does not mean go to the stores and empty the shelves. There are other people with animals out there and they need it too. Instead get enough for a week or so at a time, or the usual amount you get normally. That leaves enough for everyone and gives stores enough time to stock their shelves for next time everyone needs more food

Try to limit your trips to the pet store by purchasing everything online. This is to limit contact with people and touching supplies at the store. While the food and other supplies ordered online are still being handled, you can just take the stuff out of the box and immediately throw the box away. For some, caring for pets has not really changed.

1.6 Chores and Routines During a Pandemic

1.6.1 Chores and Routines During a Pandemic by Yiorgos Alexandrou

During this time of uncertainty and the social isolation caused by the COVID-19 pandemic. Being stuck at home can take a toll on a person's mental and physical health. Daily routines and structures have been disrupted and uncertainty has become the new normal. It is very easy to fall victim to bad habits, such as overeating, drinking, and doing wrong things. It is very important now, more than ever, in the absence of normal work and academic routines, to create a new routine. Routine creates structure and predictability. Structure gives a sense of safety. Routines help promote physical and mental health. Even a rough day to day schedule is useful. Schedules should include healthy activities, such as exercise, time set aside for distance learning, remote work, house chores, and family time. Chores can also be something that everyone can do together, such as big projects like sorting out closets and giving away gently used items that are no longer being used. When creating a schedule for routines and chores, there are a few things to keep in mind in order to make sure that one doesn't fail in carrying them out: For example, don't get carried away and over-commit to an extensive schedule that is far from realistic. It is best to start small and gradually build up. The schedule should be something that everyone agrees upon and can understand. If there are young children in the house maybe the use of visual aids such as a clock with activities written next to the hour may prove useful. It is also important that expectations are communicated properly. The goal is to stay as close as possible to the routine they had prior to the disruption caused by COVID.

These are some things to keep in mind when creating a daily routine and chores during any pandemic. School routine is one that can be kept, even in the home. Children can be encouraged to change out of pajamas and into day clothes and follow basic routines such as brushing teeth and bathing. Children should do school work during the same time as if in school. Meals and snacks should also be part of the schedule just like in school. During stressful times it may be needed to add additional breaks. Chores are something children may not often have time to do because of busy school schedules. Now is the time to allow such chores to be done and allow for a child's creative side to take over and experiment with things such as cooking, painting, woodworking, or even walking the family dog. Screentime is something that every family member desires but should also be limited. Too much time in front of a television, laptop, phone, or any digital device, can cause one to become agitated, edgy, and high strung. It can also lead to further anxiety and isolation from other members of the family. Social media, texting, should be limited, and scheduled to avoid this potential downfall. Above all, the proper amount of sleep is needed, as insufficient rest can affect mood, energy level and learning ability. As far as exercise, most private gyms are closed, and with schools being closed, the physical activities that children normally participate in have also stopped. But this does not mean one cannot exercise. Physical activities can be done outside, if weather permits, such as hiking, walking or riding a bike. If the weather does not permit then basic exercise routines can be followed by all age levels from simple sit ups and push up to exercise videos available on the internet.

Finally in this time of pandemic it is necessary to make it part of the daily routine to review some basic facts and new details about the pandemic. Staying up to date with the guidelines set by the Center for Disease Control will help avoid the spread of the virus. This can be regarded

as a lesson of preparedness for the future. Handwashing is very important and proper technique is to be reviewed by all family members. Wiping down of high-touch areas needs to be part of the daily chores. Elderly and people that have other immune-compromising conditions need to be isolated in order to prevent them from becoming sick. Social distancing needs to be practiced. One may consider mindfulness exercises, the practice of how we relate to whatever is happening in real life, moment by moment. There is a great deal of uncertainty that adults and children are faced with, and that can be a cause of tremendous stress. Focusing on one's breath, and counting to seven during each inhalation and exhalation, can help alleviate the anxiety that sometimes becomes overwhelming during times of uncertainty. One can also practice mindfulness by relating consciously to whatever thoughts or feelings are experienced in the moment. There are several resources online to help those who are new to mindfulness practice these techniques until they become part of their daily behavior.



References

<https://www.psychologytoday.com/us/blog/nurturing-resilience/202003/what-teens-need-during-pandemic>

<https://blog.chocchildrens.org/establishing-structure-and-routine-for-kids-during-covid-19/>

<https://www.medstarhealth.org/medstar-blog/8-tips-for-staying-active-during-the-covid-19-pandemic/>

<https://chadd.org/resilience-and-routines-for-families-during-the-pandemic/>

1.6.2 Chores & Routines During a Pandemic by Lisette Mejia

As the COVID-19 pandemic spreads, self-isolation or quarantine is one of the key strategies in “flattening the curve” of infection rates. Knowing how to be both mentally and physically prepared to stay at home all day may be challenging to a lot of people, especially families living in apartments with tight spaces, or no safe way to be outside compared to homeowners that have a private garden. Most would agree that life has changed dramatically from the time before this pandemic started, to life now during the pandemic’s growth and spread. Being in quarantine is not like most people’s day routine. Staying at home to work, providing children education, being unemployed, or spending excessive time alone, can present challenges for many families and individuals. One way to handle this new challenge is to create new routines like the example provided below:



COVID-19 Daily Schedule for Your Family

Time	Activity	Examples
Before 9:00 a.m.	Wake up	Make bed, freshen up, get dressed, eat breakfast
9:00 to 10:00 a.m.	Get active	Cosmic Kids Yoga, GoNoodle, Just Dance Kids
10:00 to 12:00 a.m.	Academic time #1	ELECTRONICS NOT ALLOWED: Work on what they've been learning or what teachers sent home; do crafts, LEGO etc. with spare time
12:00 to 12:30 p.m.	Lunch	Remember to wash your hands first
12:30 to 1:00 p.m.	Chore time	Wash dishes, disinfect surfaces
1:00 to 2:00 p.m.	Quiet time	Nap, puzzles, read, journal
2:00 to 4:00 p.m.	Academic time #2	ELECTRONICS ALLOWED: Educational games or resources like Prodigy, Khan Academy, PBS Kids Games, etc.
4:00 to 5:00 p.m.	Get outside	Sports, tag, hide'n'seek, lawn games, frisbee, bicycle
5:00 to 6:00 p.m.	Dinner	Remember to wash your hands first
6:00 to 8:00 p.m.	Free time	Showers, shows, mobile devices, games, books
8:00 to 8:30 p.m.	Bedtime	Brush teeth; well-behaved kids get to go to bed later

COVID-19-Daily-Schedule-for-Families.com

Being able to maintain a new routine reduces the need to make decisions each day. It enables us to know exactly what tasks we need to do each day without having to contemplate, decide or think too much. When we are finished with one task, we know what comes next without much thought. Activities become standardized and we become more efficient as a result. It can help us to cope with change, to form healthy habits, and to reduce our stress levels. In the article "How To Protect Your Mental Health During Quarantine" Clinical psychologist Claudia W. Allen talks about how having a routine especially during quarantine is a combination of structure and variation keeps people settled but stimulated – both important for emotional well-being.

References:

Kelly , J. (2020, March 16). HOW TO PROTECT YOUR MENTAL HEALTH DURING A QUARANTINE. Retrieved April 2, 2020, from <https://news.virginia.edu/content/how-protect-your-mental-health-during-quarantine>

COVID-19-Daily-Schedule-for-Families

1.7 Changes in Communication with Family During a Pandemic

by Matthew Aviles & Maddie Dominguez

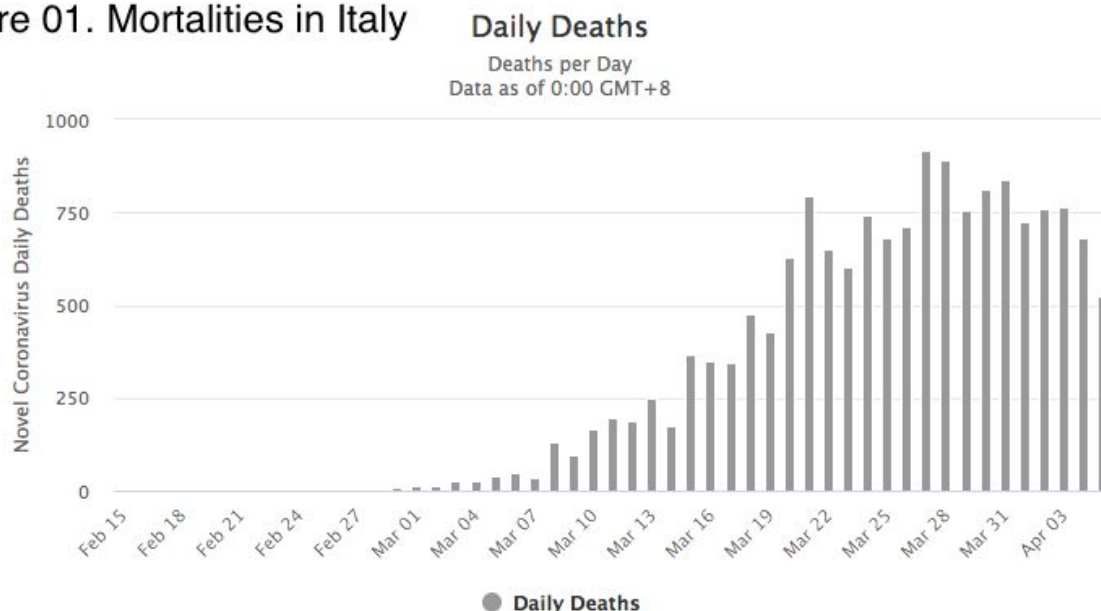
During pandemics such as the current COVID-19, quarantine measures require that people remain home more than usual. This results in entire families spending more time together in closer, confined spaces, which will inevitably have an impact on how family members interact with one another. One major aspect of interaction is communication, both with one another, and from the outside world. Parents have been given the new challenge of keeping their children healthy and mentally safe.



Figure. This is a perfect example of what family dinner looked like before COVID19 (top) and how my life is right now (bottom).

Something important to consider in this effort is the amount of news media that children are exposed to. Parents may rely on television to keep children entertained while bored, but they must keep in mind the quality of programming that they are watching. While the media tries to keep the public informed with information about the virus and to filter out the false myths being circulated, children may be very susceptible to the constant reel of virus news, which can cause fearfulness and anxiety. It has been reported that children have been struggling with sleep. This could be caused by overexposure to the news. “The bedtime advice in Italy — as here — is to minimize the child’s exposure to news, to do quiet and pleasant activities for an hour or two before bedtime, reading books, listening to music, playing quiet games”(Perri Klass, The New York Times). Besides helping calm children, these same activities have the added benefit of keeping families active at home, instead of falling into patterns of boredom.

Figure 01. Mortalities in Italy



worldometers.info

As seen in the figure above, the mortality rates in Italy had spiked around 800 deaths in one day. With such a high volume of deaths, as well as social distancing requirements, families have not been allowed to even have funerals for their loved ones. This can be confusing and distressing to children who are not given the chance to say goodbye to or grieve the people they care about. "Most of the people who die are the elderly, and most of these people die without being assisted by the family, due to the absolute emergency in the hospital, and then can't even have a funeral. Families need to find ways to explain this to children... and they need to find ways to acknowledge, salute and celebrate the people they are losing." (Dr. Tamburlini). However, people are finding new ways to approach this challenge, using modern day technology. "Today I watched my grandfather's funeral via live stream.... His service was only my grandmother and his three daughters in attendance, all of which couldn't stand within 10 feet of each other. It was awful to watch over a smartphone, completely dystopian actually, for a family that has valued each other's presence for almost 100 years." (Daniel, Comments of NYTimes article). While this may be a creative way to adjust to the lockdown measures, it doesn't isn't a sufficient way to mourn the dead, and the emotional toll is a hard one to bear. Perhaps there will be some way to celebrate the lives of those who passed once the stay at home requirements are lifted and families are able to gather and provide the much needed emotional support that many are needing at this time.

References:

https://www.huffpost.com/entry/how-to-co-parent-coronavirus-pandemic_l_5e7d1cc7c5b6256a7a27685a

1.8 Managing Private Space & Time During a Pandemic by John Quentin Seery

Did you know that space and time are like money? They are valuable and limited and must be managed, used wisely, and budgeted. When used properly and wisely, good management can lead to a bright future. To manage time well, one must first start with setting a goal that he or she is interested in reaching, and then organize their time to ensure that they do not procrastinate too much. If something seems challenging or overwhelming, it is useful to try breaking it down into smaller segments that require less time commitment and can be specific, realistic deadlines. It is also important to stay organized and focused throughout the process, and setting up a reward system to stay motivated with each step achieved helps do just that. Last but not least, scheduling high priority tasks during times of day that one knows they are at peak performance, as well as scheduling in proper rest to recover and rejuvenate ones batteries, are critical to effective time management.



Figure 1. The steps employees take to manage their time.

Space management is the control and supervision of physical space, and is as important as good time management. There are a few steps that personal coaches recommend to maximize private space. When dealing with space, it is beneficial to start small. In order to protect your personal space you have to feel happy to accept it. To be polite but firm is also good so you have the right attitude towards a situation you may come across. Communication is also essential when it comes to space management because it is a part of your body language and will make your receiver get more clarity.

2009 Content Technology Vendor Map

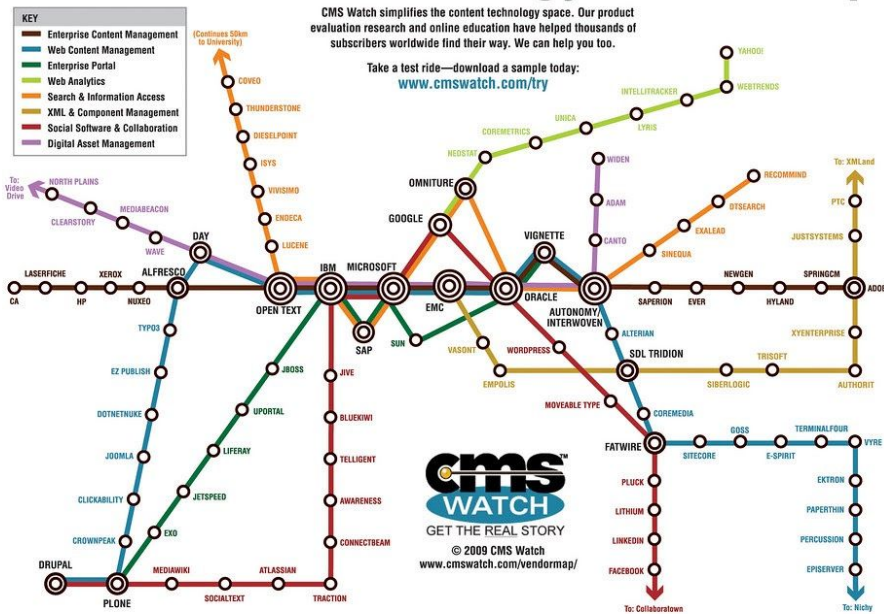


Figure 2. Space management can often involve expansion like in 2009. The people had to account for the sheer amount of diversity, particularly for the regional differences. And so the map is still changing.

When one starts to feel disorganized or unmotivated in the tasks they set out for themselves, they can probably be sure that it has something to do with the way they've managed their time or space (or failed to). Use all the resources and tools available to stay alert and focused. And above all, stay positive. Beating yourself up when you fail is more destructive than constructive. Get right back up and start again. As the old Japanese proverb says "fall down seven times, get up eight."

References:

1. Taking Care Of You and Your Family

Christa Campbell -
<https://extension.uga.edu/publications/detail.html?number=C1042&title=Time+Management%3A+10+Strategies+for+Better+Time+Management>

2. What Is Space Management?

James McDonald -
<https://www.iofficecorp.com/blog/what-you-need-to-master-the-space-management-process>

1.9 (Clean) Humor in Trying Times by Ronnie Warren

The constant stream of information that the public is being exposed to regarding the COVID-19 virus, its spread, health outcomes and impact on society, are indeed scary. In order to alleviate some of the seriousness of such times, governments and citizens around the world are using quirky and even funny viral photos/videos to educate the public on how to stay safe. History has shown that its darkest moments are often lightened through the use of humor and laughter as conscious choices. Humour can relieve stress and although many may not like the idea of making fun during tough times like the world under the COVID-19 attack, it is an effective way to cope when life is not moving along as desired. A good sense of humor can't cure everything, but data is mounting about the positive things laughter can do. Laughter can stimulate many organs, soothe tension, relieve pain, and even improve your mood.

As millions of people are asked to stay home, they have used the spare time on their hands to flood social media platforms with funny memes, jokes, videos, GIFS. With the government requiring people to work or study from home worldwide, people have less time interacting with others, and more personal time with their digital devices, and they are using them to express their thoughts and feelings in creative ways. People will sometimes turn to laughter or sarcasm in stressful times because laughing makes them happy. Rather than a means of escape or way to make light of a serious situation, it is rather a way to communicate with people about shared values and bring lightness into a difficult time. Laughter isn't merely the best medicine. It's the best way to help diffuse our worries to take the edge off our sense of dread.

References [Time.com](https://www.time.com) [Flipboard.com](https://www.flipboard.com) [Chicagotribune.com](https://www.chicagotribune.com) [Mayoclinic.org](https://www.mayoclinic.org)

1.10 Special Case Example: Life in Italy and COVID-19 by Sara Mezzoli

Stay at home orders have been in place in Italy for over a month now, and it is making life there hard. Residents are forced to remain indoors with the possibility of going outdoors only for limited essential reasons. Tickets with fines are being issued to those who violate these rules, as or for not wearing face masks when shopping for food. Hospitals are overcrowded with patients with the virus, to the point that doctors are having to choose who they admit and treat and who they let die. Schools moved online and jobs are being done from home. This chapter will look at how COVID-19 is affecting Italy.

The first known cases of the new coronavirus in Italy were diagnosed on 31 January 2020 in the capital city of Rome. Two Chinese tourists tested positive. The third case occurred a week later, an Italian national who was returning from China and was hospitalized. Sixteen cases were presented on 21 February in Lombardia "Lombardy, and on 22 February, 60 additional cases and the first death. By the beginning of March, the virus had spread throughout Italy. The national government's response to the virus was immediate: when the two first cases were

determined to be coronavirus, Italy suspended all flights to and from China and declared a state of emergency.

Antonella Garna lives in Lombardia close to Lago Di Garda and Brescia. She is a pharmacist working in hospitals, distributing medicine and other medical supplies (needles, IV equipment, masks, gloves, etc) to doctors and nurses on the floor. Antonella works 10-12 hours a day, seven days a week. For the last five weeks, coronavirus patients have completely taken over the hospital, and other illnesses and patients have been pushed to the back of the line, so to speak. Antonella is scared because of the surroundings she is in, but must continue doing her work in masks and gloves. Doctors, nurses and aides who are in direct contact with virus patients wear masks, gloves, hats, and other personal protective equipment.



The woman in the middle is Antonella Garna. The two men in military uniforms are army pharmacists who are filling in for Antonella's colleagues who got sick with coronavirus and cannot work. The military provides relief and support not only to the hospital staff but ordinary citizens as well.

In times of crisis such as COVID-19 and the social isolation and lockdown requirements, human relationships become critically important, even if you can't hug or shake hands or kiss someone. During crises, people turn to each other to help out those in need. Antonella tells of transplant

patients stuck at home who need their medicines but it is too risky for them to go to the hospital to get them. Friends and even strangers have been volunteering to pick up these medicines and deliver them to the patients who need them.

References:

Antonella Garna

Anna Garna

Wikipedia. (6 April 2020). https://en.wikipedia.org/wiki/2020_coronavirus_pandemic_in_Italy

Chapter 02. Science of COVID

2.1 Introduction by Sunita Pearson-Siegel & Brian Mejia, (Co-Lead Editors)

Coronavirus, or COVID-19, is affecting life in ways that recent history has never seen. Supplies like toilet paper, tissues, hand sanitizer and sanitizing wipes are low in stock, and some of the fresh foods we know and love are no longer safe to consume. In times of emergency, the natural human instinct is to hug and cry on each other's shoulders, and tell one another that everything will be okay. But due to social distancing regulations that require individuals to stand at least six feet apart, these gestures of camaraderie are being repressed.

Humans are not the only ones being affected by COVID-19, the environment is also taking a toll. Due to the virus, people are concerned about the consequences of exposing reusable items to the germ-filled atmosphere. As Jayda Alcott writes in this book's subchapter, *Effects of COVID on the use of disposable items (i.e. plastics)*, "Habits of promoting zero or less waste that many of us have adopted, now evoke fear of contamination and ultimately sickness. This fear is causing many people to go back to using disposable items to protect themselves and decrease their chances of getting sick." The world has finally come to the understanding that we need to reduce, reuse, and recycle in order to preserve and protect the environment. But due to the pandemic, people have become so focused on the virus, that these measures have been eclipsed. Even after the pandemic ceases, people's fears of the virus cycling back will cause them to take any kind of precaution necessary to prevent a second wave of infection. This is bound to have an impact on our environment, which will suffer even more than it did before COVID surfaced.

With this being said, the changes in the environment caused by the virus haven't all been negative. According to Matthew Aviles from the chapter *Impacts of COVID on the Planetary Environment*, it is clear that Wuhan is finally seeing light through their sky which used to be engulfed in smog, "NASA satellites reported a decrease in industrial, transportation, and business activity since the coronavirus outbreak. This leads to reduced levels of atmospheric nitrogen dioxide over China." Could there be something beneficial toward the environment that resulted from this pandemic? It is possible. Aviles says that if we continue to keep China's skies clear as day, there is hope for our planet. Short term solutions won't fix the problem, but it is a start.

This chapter discusses the science of the virus, including what a coronavirus is in general, the origin of COVID-19, the impacts on the planetary environment, how it can be transmitted through animals, how it spreads in populations (together with symptoms), how it compares with the flu, how it can be treated, the genetic engineering of viruses and how they can be used for biological warfare practices, the effects of the virus on the

use of disposable items like plastic, and a few surprise entries toward that the reader will certainly appreciate.

2.2 What's a Coronavirus? By Jonah F. Bouman

Coronaviruses are a family of enveloped RNA viruses that mainly cause respiratory or enteric diseases but have been shown to in some cases cause neurological illness and hepatitis (Lai and Holmes, 2001). They have the largest genome out of all RNA viruses which allows for more gene expression strategies (Masters 2006). The unique spiked structure of the virus gave it its name as it resembles a solar corona. Research of the Coronavirus family intensified after it caused the 2002-2003 Severe Acute Respiratory Syndrome (SARS) outbreak (Peiris 2003).

These roughly spherical viruses, as seen in figure 1, have average diameters of 80–120 nm and projections known as peplomers that extend around 17–20 nm from the virus's surface (McIntosh 1974). The peplomers are narrow at the base but wider at the top. Some Coronaviruses have a second set of projections that are 5-10 nm known as the hemagglutinin-esterase protein (Guy 2000).

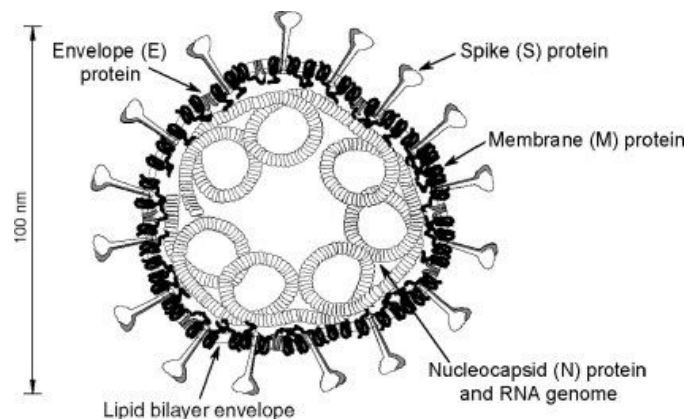


Figure 1. "Schematic of the coronavirus virion, with the minimal set of structural proteins." Retrieved from (Masters, 2006)

There are three main proteins in the viral envelope. The most prominent of the three is the spike protein, the S glycoprotein which is responsible for the attachment of the virus to the host cell (Cavanagh, 1995). The S proteins are the spikes shown in figure 1. The membrane protein, the M glycoprotein, is the largest part of the virus and gives it its spherical structure (Sturman 1980). M protein is important in envelope formation and budding (Pervushin, Tan, Parthasarathy, Lin, Jiang, Yu, Vararattanavech, Soong, Liu, Torres, 2009). The M protein is labeled in figure 1. The Envelope protein, E protein, is a thin membrane and a small part of the virion and therefore wasn't discovered until after the other proteins (Masters 2006). The E protein is not necessary for binding to a host cell and replicating, but Coronavirus cells lacking the membrane or with dysfunctional membranes have been attenuated (Pervushin, Tan, Parthasarathy, Lin, Jiang, Yu, Vararattanavech, Soong, Liu, Torres, 2009). The E protein can be seen in figure 1. The Nucleocapsid Protein, or N protein, is the protein

component of the nucleocapsid and mainly has the function of binding to viral RNA (Masters, 2006). The N protein can be seen in figure 1.

Coronaviruses have large unsegmented genomes, among the largest mature RNA molecules known to biology. All of the above-mentioned proteins make up less than a third of the genome's coding capacity (Masters, 2006).

References:

Cavanagh, D. (1995). The Coronavirus Surface Glycoprotein *The Coronaviridae* Volume NA Page 73-113

Guy, J.S. (2000). Characterization of a coronavirus isolated from a diarrheic foal *Journal of Clinical Microbiology* Volume 38 page 4523-4526

Lai and Holmes. (2001). Coronaviridae: The viruses and their replication *Fields Virology* 4th edition Page 1163-1185

Masters, P. (2006). The Molecular Biology of Coronaviruses *Advances in Virus Research* Volume 66 Page 193-292

McIntosh, K. (1974). Coronaviruses. A comparative review *Current Topics in Microbiology and Immunology* Volume 63 Page 85-129

Peiris, J.S.M (2003) Coronavirus as a possible cause of severe acute respiratory syndrome *Lancet* Volume 361, Page 1319-1325

Pervushin, K., Tan, E., Parthasarathy, K., Lin, X., Jiang, F. L., Yu, D., Vararattanavech, A., Soong, T. W., Liu, D. X., & Torres, J. (2009). Structure and inhibition of the SARS coronavirus envelope protein ion channel. *PLoS pathogens*, 5(7), e1000511. <https://doi.org/10.1371/journal.ppat.1000511>

Sturman, L.S. (1980). Isolation of coronavirus envelope glycoproteins and interaction with the viral nucleocapsid *Journal of Virology* Volume 33 Page 449-462

2.3 What is the origin of COVID19? by Gideon Brown

The question of the origin of COVID-19 does not have a definitive answer available to the public at this time. However, there are multiple ongoing studies investigating this matter. The Proceedings of the National Academy of Sciences (PNAS) study has delved into an investigation of a 'A' 'B' and 'C' variant of COVID-19. The 'A' variant has been seen to be primarily located within China, though patients with a mutated form of 'A' have been found in the U.S. and Australia. The 'B' variation is concentrated in the

East Asia region, with barely any 'B' variation patients outside of it. The 'C' variant is most prevalent in Europe and America, but appears sparingly in East asian samples. The 'C' variant is also completely absent in the PNAS' mainland China sample. The 'A' variant is closest to the COVID-19 found in bats and pangolins, and while type 'A' was found in Wuhan, type 'B' is actually more prevalent in the city. Type 'A' is likely to be the original form of the virus within humans, with 'B' being a mutation of 'A', and 'C' being a mutation of 'B'. This suggests that COVID-19 started in China, specifically the Wuhan area, and most likely came directly from bats and/or pangolins in the region.

2.4 What are the impacts of COVID19 on the planetary environment? by Matthew Aviles

With the rise of COVID-19, governments across the world have implemented large scale lockdowns. Such measures have caused the shutdown of many factories leading to a decrease in nitrogen dioxide (NO₂) emissions. On February 28, NASA satellites reported a decrease in industrial, transportation, and business activity since the coronavirus outbreak. This caused reduced levels of atmospheric nitrogen dioxide over China. However, researchers note that a "...measurable change in one pollutant does not necessarily mean air quality is suddenly healthy across the country."(earthobservatory.nasa.gov).

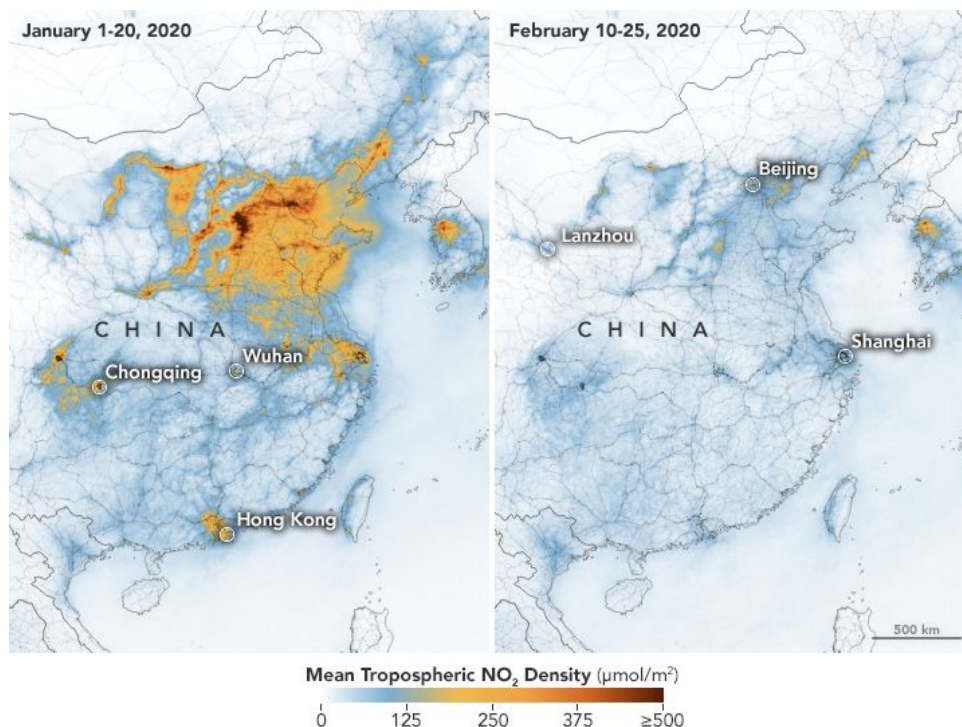


Figure 01. NO2 density levels, in China (earthobservatory.nasa.gov).

The large reduction in travel has also resulted in an overall carbon dioxide (CO2) decrease. As mentioned by carbonbrief “Overall, the figures reinforce my estimate that China’s carbon emissions fell by around 25% over a four-week period, as outlined below, equivalent to around 200m tonnes of CO2 (MtCO2).” ([Lauri Myllyvirta](#)). With the data shown on figure 02, it is apparent that the lockdown has the short term effect of significant decrease of carbon dioxide in the atmosphere. This is also not only shown in China, it is a pattern that is observed in many other regions. “The Copernicus Sentinel-5P satellite has recently mapped air pollution across Europe and China and has revealed a significant drop in nitrogen dioxide concentrations – coinciding with the strict quarantine measures. Scientists from the Royal Netherlands Meteorological Institute (KNMI) have been using data from Copernicus Sentinel-5P satellite to monitor both weather and pollution over Europe. The new images clearly illustrate a strong reduction of nitrogen dioxide concentrations over major cities across Europe – specifically Milan, Paris and Madrid.” ([esa.int](#)). The visuals spotted by The Copernicus Sentinel-5P satellite spotted are shown on figure 03.

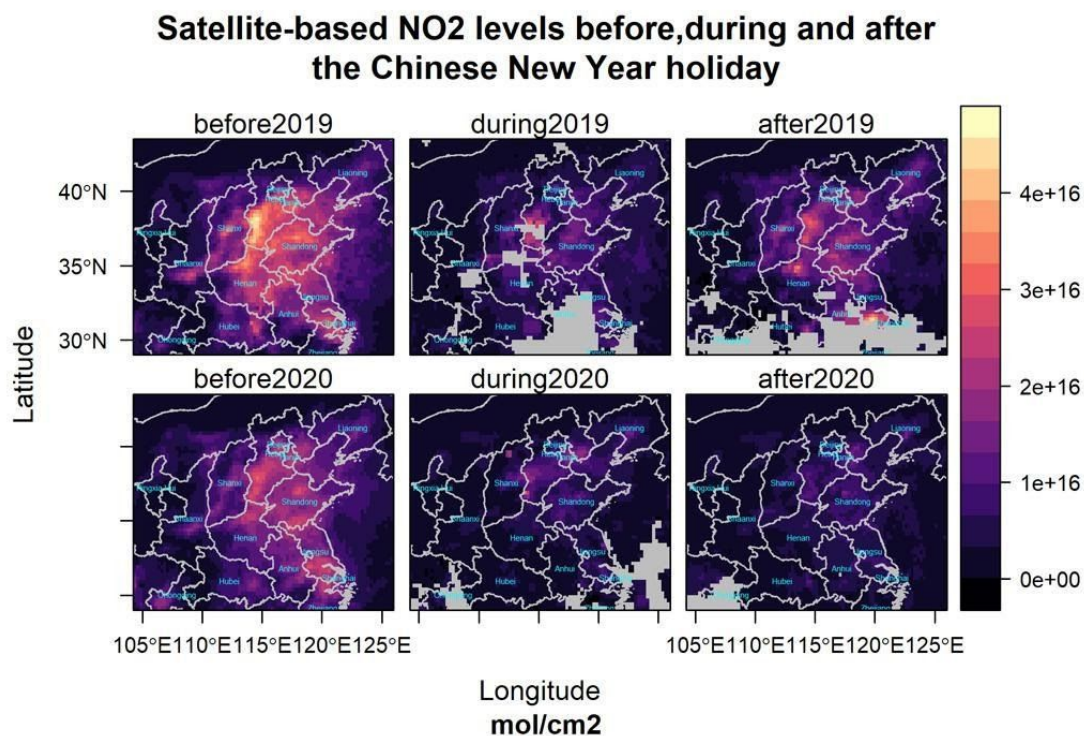


Figure 02. Satellite-Based NO2 Levels Before, During, and After the Chinese New Year Holiday (Carbonbrief.org)

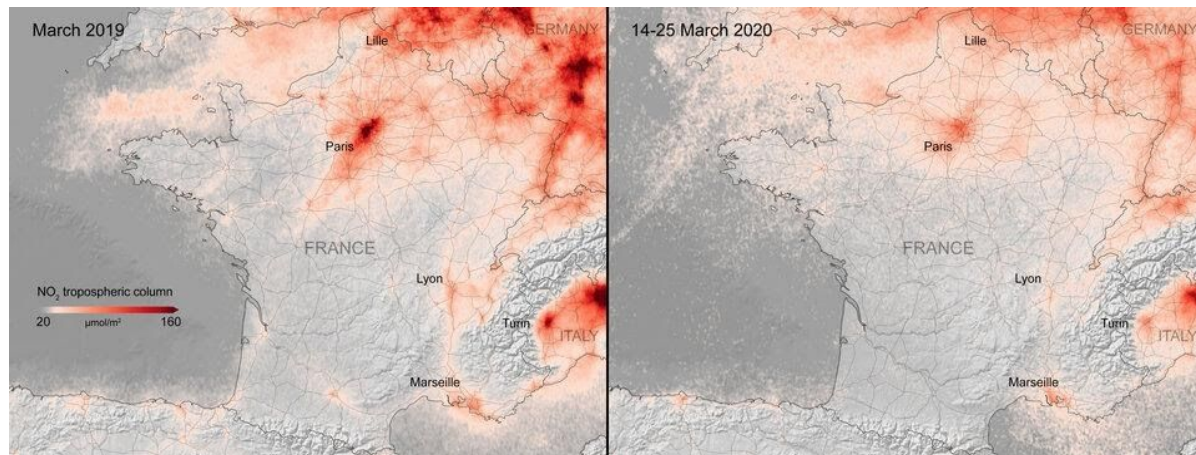


Figure 03. Nitrogen Dioxide concentrations over France (Esa.int).

All of the decreases in NO₃ and CO₂ are still short term effects of the lockdown, and will most likely spike upwards after lockdown. According to earthobservatory.nasa.gov, the drops in these two pollutants is not all it takes to improve air quality. In February, news outlets reported unhealthy air pollution in Beijing, which was largely affected by airborne particulate pollution known as PM 2.5. “NASA satellites also showed a high load of airborne aerosols.” (Kasha Patel). Overall, it appears that the air quality has not improved in Earth's atmosphere, and that the observed decrease in CO₂ and NO₃ will most likely only last as long as nationwide lockdowns are in place, and rebound after restrictions are lifted.

2.5 The Effects of the COVID-19 Pandemic on Captive Animals by Jonah Florholmen-Bouman

The COVID-19 pandemic has left zoos devoid of visitors. The consequential effects on the animals in captivity vary in severity around the world. The pause of visitor-provided revenue greatly lowered the ability of zoos to sustain their animals. This is an issue experienced by many zoos, but the Neumünster Zoo in Germany now needs to take drastic action. According to the New York Post, the zoo has suggested that they may need to feed some of their animals to each other. This is a grim decision, but they risk having all of their animals starve if they don't act. According to BBC, because the zoo belongs to an association, it is not eligible for financial relief from the state. The zoo has decided that penguins and seals will have to be the first to be slaughtered because they require the most food to sustain, while other animals are more likely to make it through the crisis.

Although zoos around the world are empty of visitors, they are not empty of staff. According to KSDK News channel, 5 in an interview with the Vice President of the Animal Collection at the St. Louis Zoo, Luis Padilla; zookeepers, veterinarians and veterinary technicians are all essential workers and show up for shifts where they do their regular routines. They complete their work while maintaining their distance from other workers. After the CDC report of a tiger testing positive for the virus in the Bronx Zoo, workers also remain wary of the animals. According to ABC channel, 7 News, the sudden disappearance of previous crowds has made noticeable changes in the animals' behaviors at the Los Angeles Zoo. The animals now come up to the fence and look at the keepers, sometimes vocalizing. The zoo has also implemented 6-foot, social-distancing between staff and great apes due to their biological resemblance to humans and consequential susceptibility to COVID-19. Many zoos provide viewers with updates and videos of their animals on social media. One viral trend consists of zoos letting their animals, primarily penguins, walk the halls and view the other exhibits.

The COVID-19 pandemic has undoubtedly changed zoos and their animals' lifestyles. A much deeper look can be taken to view animal health and psychology. Researching animals during the pandemic is important for understanding how to properly sustain them. Without proper care, the controversy surrounding the holding of animals in captivity may be exacerbated. One could draw a parallel between the animals in captivity and the growing issue of prisoners getting COVID-19. Both cases involve involuntary placement into a system that is vulnerable to the effects of the virus. This may be considered as cruel and unusual punishment to prisoners, a violation of their rights. Similarly, zoos should be considered in similar ways as animals suffer in captivity.

Sources:

<https://nypost.com/2020/04/14/zoo-may-feed-animals-to-each-other-to-stay-afloat-during-lockdown/>

https://www.bbc.com/news/world-europe-52283658?at_custom4=586F4C8A-7E65-11EA-84F8-B7233A982C1E&at_medium=custom7&at_custom2=twitter&at_custom3=%40BBCWorld&at_campaign=64&at_custom1=%5Bpost+type%5D

<https://www.ksdk.com/article/news/health/coronavirus/essential-workers-st-louis-zookeepers-coronavirus/63-d6698007-1d99-4a57-a92f-1ad9589f4c19>

<https://www.cdc.gov/coronavirus/2019-ncov/daily-life-coping/animals.html>

<https://abc7news.com/zoo-la-coronavirus-pandemic/6066239/>

2.6 COVID19 Transmission

2.6.1 How is COVID Transmitted from Animals to People? By Max Feldman

COVID-19, also known as The Coronavirus, suspected to have originated in Wuhan, China in an exotic meat market has infected both humans and animals. While it is suspected that the virus originated in the environment of food production involving bats, it remains unknown whether it started in an animal or human. Due to bad sanitary conditions and poor management in these markets, the virus was much more easily transmitted from animals to humans and from humans to other humans (Gulland, 2020). In addition, past Coronavirus outbreaks such as SARS (Severe Acute Respiratory Syndrome) originated from “zoonotic reservoirs, including bats, Himalayan palm civets (*Paguma larvata*), and raccoon dogs (*Nyctereutes procyonoides*)” which were also sold in exotic meat markets in the Guangdong Province in China (Graham, 2010). However, while COVID-19 has different viral tropism than past Coronavirus strains, it's quite possible that they could infect cross-species similarly.

COVID-19, like other Coronaviruses, transmits usually from droplets of infected individuals entering another individual's system who is not yet infected. Once the virus enters the respiratory system it attaches itself to receptors on the lungs which infect the host. COVID-19 can be transmitted from animals to humans in different ways. Scientists believe that the most likely transmission is due to either eating infected meat or coming into contact with droplets from infected animals and proceeding to either touch one's face (eyes, mouth, nose, etc) which would result in infection by the virus.

References:

Graham, R. L., & Baric, R. S. (2010). Recombination, reservoirs, and the modular spike: mechanisms of coronavirus cross-species transmission. *Journal of virology*, 84(7), 3134-3146.

Gulland, S. N. A. (2020, April 1). What is coronavirus, how did it start and how big could it get? Retrieved from

<https://www.telegraph.co.uk/news/2020/04/01/what-is-covid-19-virus-coronavirus-pandemic/>

2.6.2 How is COVID Transmitted from Animals to People by Miriam Katz

A zoonosis is a disease or infection that transmits from animals to humans. It is widely understood by scientists that this is precisely what happened with COVID-19, the virus that causes the Coronavirus disease. According to an article from Live Science “[A] cross-species

infection can originate on farms or markets, where conditions foster mixing of pathogens, giving them opportunities to swap genes and gear up to infect (and sometimes kill) previously foreign hosts.” The article goes on to say “Diseases passed from animals to humans are called zoonoses. There are more than three dozen we can catch directly through touch and more than four dozen that result from bites.”

According to an Op Ed piece in the Los Angeles Times, “Scientists suspect that COVID-19, like SARS, is caused by a coronavirus that jumped from bats to humans (perhaps via pangolins or another kind of animal) at a live animal market in Wuhan, China.” In animal markets such as that in Wuhan, many animals that would not ordinarily cohabitate end up in close proximity to each other. “You have a bird pooping on a turtle that poops on a civet,” Dr. Christian Walzer of the Wildlife Conservation Society told The New York Times. “For getting new viruses to emerge, you couldn’t do it much better even if you tried.”

Once a virus enters the human population it is easy for it to gain foothold and spread rapidly, particularly in areas with dense populations. This is precisely what is happening in large cities like New York City, Seattle, large cities in Italy, Spain, etc. Once established and flourishing in cities it is not difficult for a virus to spread to less populated areas as well.

References:

<https://www.livescience.com/amp/12951-10-infectious-diseases-ebola-plague-influenza.html>

2.7 How does COVID19 Spread in Populations and what are the Symptoms of Infected people? By Karine Deolarte

COVID-19 is a newly discovered respiratory illness that spreads from person to person, there was a virus that was involved which increased the risks of it. The COVID-19 spreads through droplets of saliva or discharge from the nose when an infected person coughs or sneezes. It can be spread through close contact, this virus can be severe where some cases lead to death. There are many different kinds of coronaviruses, they can be common in animals where rare animal coronavirus can infect humans or some that can cause colds or other mild respiratory illnesses. There are serious cases including SARS, severe respiratory syndrome and MERS, Middle East respiratory syndrome. According to John Hopkin’s Medicine, the research on COVID-19 is based on their appearance. As it states “Coronaviruses are named for their appearance: Under the microscope, the viruses look like they are covered with pointed structures that surround them like corona, or a crown.” We can determine that there are several different viruses that surround corona.

References:

<https://www.mayoclinic.org/diseases-conditions/coronavirus/expert-answers/novel-coronavirus/fdq-20478727>

<https://www.cdc.gov/coronavirus/2019-ncov/downloads/2019-ncov-factsheet.pdf>

<https://www.hopkinsmedicine.org/health/conditions-and-diseases/coronavirus>

2.8 How can COVID19 be treated and contained? By Karina Deolarte

Furthermore, in 2019, a new coronavirus was identified as the cause of a disease breakout that originated in Wuhan, China and later on affected so many people that it spread globally. It became aware that it was getting serious. In March 2020, WHO, the World Health Organization, declared COVID- 19 to be a pandemic. There is a certain severity of COVID-19 symptoms where it can range from very mild to severe. There has been data shown where it spreads from a person among close contact within 6 feet, and through respiratory droplets. It can be prevented such as social distancing, avoiding large events and mass gatherings, washing hands often with soap for at least 20 seconds, covering your mouth and nose, and avoiding touching your face. It affects a wide range of people, mostly who already suffer from illnesses, someone with a weak respiratory system, or older aged people. There have been many outbreaks, but there are many ways to prevent and treat yourself.

References:

<https://www.mayoclinic.org/diseases-conditions/coronavirus/expert-answers/novel-coronavirus/fdq-20478727>

<https://www.cdc.gov/coronavirus/2019-ncov/downloads/2019-ncov-factsheet.pdf>

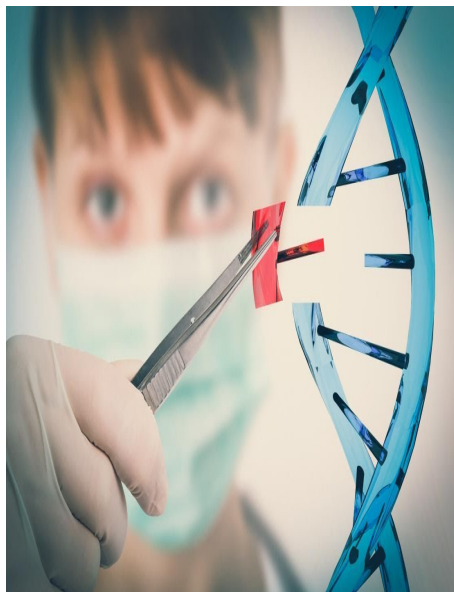
<https://www.hopkinsmedicine.org/health/conditions-and-diseases/coronavirus>

2.9 Compare and contrast COVID with Flu viruses by Giovanni Nunez

With the recent outbreak of COVID-19, a majority of people have made the assumption that COVID -19 and the seasonal flu are very similar to each other. This is true to a certain degree, for instance the Flu and COVID-19 have similar symptoms such as fever, dry cough, body aches, fatigue, in some cases they can both cause pneumonia¹, which is a common cause of death in these viruses.

However the differences between these two viruses far outweigh their similarities. The Incubation period for the flu is 2-5 days (the period of time before symptoms show up), while that of COVID-19 is up to 14 days,² which means more people can get infected by someone else before that person even realizes s/he is a carrier. COVID-19 is also more dangerous than the flu since it has a higher reproduction number compared to the Seasonal Flu.*COVID-19 (R_0 2-2.5)* Seasonal Flu*(R_0 1.3). To explain this difference in lay terms, after 10 rounds of the virus spreading, the seasonal flu only gets around 56 people sick (and likely much less since most people get the vaccine against each year's flu). On the other hand, COVID-19 after ten rounds of spread can affect up to 2047 people. COVID-19 also has a much higher mortality rate, nearly ten times greater than the flu (1-3%*estimated* for COVID-19 vs 0.1% for the flu). The seasonal flu kills approximately 60,000 Americans a year. COVID-19 has the potential to kill hundreds of thousands of people.³

2.10 Genetic engineering of viruses and potential for biological warfare



One of the most remarkable advancements in the modern world is the discovery of how to manipulate DNA and modify it. This process is known as genetic engineering . DNA is used to replicate cells of every organism, thus it is commonly referred to as the organism's blueprint . The ability to modify this very structure allows the possibility to

<https://www.cdc.gov/symptoms-testing/symptoms.html>

(video)

<https://www.youtube.com/watch?v=1Ghz3uwuQ&t=1s>

(article)

<https://www.cdc.gov/coronavirus/treatment-prevention-cure-vaccines/2020/4/1/21203242/coronavirus-treatment-prevention-cure-vaccines.html>

create something new. This potential can be used for a lot of good. One of the biggest advantages in genetic engineering is its use to eliminate diseases: by genetically mutating certain genes, scientists might be able to completely eradicate illness such as diabetes, heart disease, and cancer. In addition it can be used to make people healthier by improving their immunity so they can block certain illnesses from occurring.

Biotechnology is also another benefit of genetic engineering. Scientists are reviewing the possibility of transplanting living tissue from one organism to another, making the possibility of organ transplants from animals to humans more likely. This would drastically reduce the time that persons in need of kidneys, hearts or lungs, for instance, would have to wait for transplants.

Finally genetic engineering can be used to help with the ever-growing global population and the food shortage that nations will undoubtedly face in the near future. Plants can be made to carry more nutrients, grow faster and widen their availability. This would decrease food prices and possibly eradicate hunger and related diseases around the world.

However in spite of the many benefits that may be achieved with genetic engineering, there is a very dark side to its potential, and that has brought to light the possibility that all which has been discovered to bring good and to preserve the human race can be the same reason the human race will disappear. It is the modern day nuclear reactor, and weapon.



Biological warfare: the words alone are scary. Genetically modified or engineered viruses, bacteria and fungi may be made resistant to everything available that can kill them. When unleashed in the world they can effectively destroy living things such as animals, plants, and humans, and change life as we know it. Because these living organisms can be unpredictable and incredibly resilient, they are difficult to control, and the results can be devastating to the world. The Center for Disease Control states that bioterrorism is the intentional release of viruses, bacteria or other germs to sicken or kill, people, livestock or crops. Many treaties are in place to prohibit this, but they are still being reviewed. One of the main reasons why a lot of focus has been placed on bioterrorism is the fact that it can cause great harm, and it is fairly cheap to implement compared to missiles and other hi-tech forms of weaponry. It takes a long time to take effect, which gives those who use biological arms plenty of time to escape its wrath.

The history of biological warfare though is not something that came to existence in recent years. It can be traced back to about 2 and ½ millennia when Assyrians put rye ergot fungus in their enemy's water supply which altered their mental state and caused some deaths. The spread of Black Death plague in Europe into the 1300s that killed 25 million Europeans was believed to have originated from the plague that came over the Tartars when they took over the city of Kaffa. In World War II, investigations began on how to use Anthrax, botulism and brucellosis. The Japanese dropped ceramic bombs full of fleas carrying bubonic plague on Ningbo, China. Today some of the biological weapons already known that can be used include anthrax, the most likely used weapon. Anthrax is a bacteria that is easily produced in a lab, and is widely found in nature. It can be released in many forms such as sprays, water, food, and powder and

lives a very long time. Smallpox is another, and even though there is a vaccination for the virus, the contagion is stored in one lab in the US and one in Russia. If released it can spread quickly and easily and cause a lot of deaths. The third is the plague, that can be transmitted with a bite of a flea. The plague known as *Yersinia pestis*, has the potential to create pneumonic plague which is a lung disease and this plague does not respond well to antibiotics and can rapidly spread. The fourth is Cholera, a deadly gastrointestinal disease when released to a water source can cause a lot of deaths. These biological weapons are mainly natural in existence, but what if they can be genetically modified? Imagine the potential. It is quite staggering.

CRISPR IS genetic modification technology for bioterrorism that alters the current bioweapons to superweapons by making them drug-resistant strains of the diseases or turning them into forms that have never been seen before. According to the European Bioinformatics Institute, as of 2012 scientists have sequenced the genomes of 3139 viruses, 1016 plasmids, and 2167 bacteria. This makes it possible for scientists to create synthetic versions of them, and



or create new organisms known as designer genes. Binary biological weapons can also be made from a technology that involves inserting small bacterial DNA into other bacteria in order to make the bacteria live longer in other pathogens or its host. Gene Therapy is a way of permanently replacing a gene of an organism. Finally, there are the stealth viruses that are viral infections that enter the cells and stay dormant for a period of time until triggered to cause disease. These can be used to spread across a large population and are very deadly.

Such information and knowledge of the potential of biological warfare can lead to questions or theories, like whether the current COVID-19 is a biological weapon that was accidentally (or purposely?) released? According to Dr. Francis Boyle a professor of international law at the University of Illinois College of Law, and the man who drafted the U.S. domestic implementing legislation for biological weapons convention known as the Biological Weapons Anti-Terrorism Act of 1989, COVID-19 is a bioterrorist weapon that was being created in Wuhan China category 4 bioterrorism lab, which leaked out and caused the current pandemic. We will probably never really know for sure, but in light of how these weapons are created, the idea has much validity.

2.11 Effects of COVID on the Use of Disposable Items (*i.e.* Plastics) by Jayda Alcott

HCoV-19			
half-life (hrs)			
<i>Material</i>	<i>median</i>	<i>2.5%</i>	<i>97.5%</i>
Aerosols	2.74	1.65	7.24
Copper	3.4	2.4	5.11
Cardboard	8.45	5.95	12.4
Steel	13.1	10.5	16.1
Plastic	15.9	13	19.2

The recent outbreak of COVID-19 in the United States has caused much suspicion about whether it is safe to be using reusable items at this moment. The growing global awareness of the need to reduce dependency on plastics is certainly a move in the right direction, but during an epidemic it is worth reconsidering whether communities should expose reusable products to unwanted germs. Many large companies such as Starbucks and Dunkin even stopped accepting

reusable cups and are beginning to take extra precaution in order to not spread the virus. Habits of promoting zero or less waste that many individuals and nations have adopted, now evoke fear of contamination, sickness, and possible death. This fear is causing many people to go back to using disposable items to protect themselves and decrease their chances of getting sick.

When speaking about disposable items, coffee containers are not the only concern. According to the New England Journal of Medicine, March 17, 2020 issue, the virus can live on things like, copper, cardboard, plastic, stainless steel, and aerosols. The half lives of the virus on each of these materials are stated in the graph from medrxiv.org to the left. While it can last longer on some surfaces than others, there are still a large amount of materials that we encounter in our everyday lives. Many people have taken this information seriously and returned to relying on disposable items. Items such as disposable masks, gloves, food containers, and others. This is causing environmentalists to worry that even after the pandemic is over, these habits will continue and the campaign to “reduce, reuse, recycle” will come to an end.

The entire world is going through a new experience and is unsure of how to deal with it. Businesses are being forced to adapt their policies and some must shut down. People are being forced to stay in their homes and are figuring out on their own what to do next. Fears are causing many to rely on disposable products that may reduce exposure

to germs. They come to the conclusion that if the virus is on it, they will just throw it out at the end of use and lower their chances of exposure. While this may be true, we are already in an environmental crisis caused by the myriad of disposable everyday items and this is adding to it deeply.

2.12 Case Study: Venice Fish Return Due to Decreased Boat Traffic by Dayanara Sanchez



Before COVID-19 hit the city of Venice, the waterways were murky and cloudy and almost seemed to be abandoned of any inhabiting life such as fish. Once COVID-19 started wreaking havoc and destruction on the world, Venice was left with no other option but to shut down their waterways which are the city's daily form of transportation.

During the time that the boats were stopped, marine sediment, which is typically kicked up by the movement of the vehicles, finally settled to the canal floor, and fish began to come back to their habitat. Locals of the area reported how they were finally able to see how the water in its natural, crystal clear form, as seen in the image above.

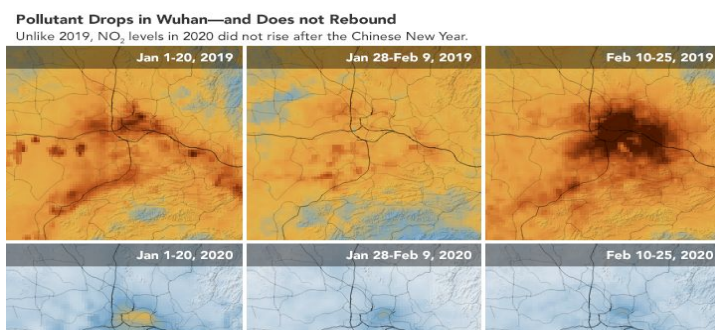
Reference:

<https://abcnews.go.com/International/venice-canals-clear-fish-coronavirus-halts-tourism-city/story?id=69662690>

2.13 Case Study: Air Quality in China Improved due to COVID-19 by Dayanara Sanchez

China's been long-known for not having the best air quality due to the carbon exhaust from their vast number of manufacturing companies and factories. Populations in certain parts of China are recommended to wear face masks due to high concentration of smog. In November 2010, one third of China's 113 cities failed to meet national air

quality standards. "Only 1 percent of China's 560 million urban residents breathe air considered safe by European Union, according



to a 2007 World Bank study” (Huang 2013). However when the outbreak of COVID-19 took the world by storm, many manufacturing companies needed to be shut down in order to prevent more people from being exposed to or spreading the virus.. During that period of time air quality has drastically changed in over the span of 3 months, compared to the air quality during the same time the year prior. The chart to the left describes the changes in nitrogen dioxide in the atmosphere in Wuhan in 2019 vs 2020. In the previous year there was a very high concentration of nitrogen dioxide. However in 2020 the levels of nitrogen dioxide were near the middle of the spectrum and continue to decrease. After Chinese New Year the nitrogen dioxide levels can even be seen to slightly decrease even more which is completely different from the measurements of the year prior. It is reasonable to conclude that measures taken to stop the spread of COVID-19 have contributed to such drastic differences

Chapter 03. GIS and COVID

3.1 Introduction by Gabriel Castro (Lead Editor)

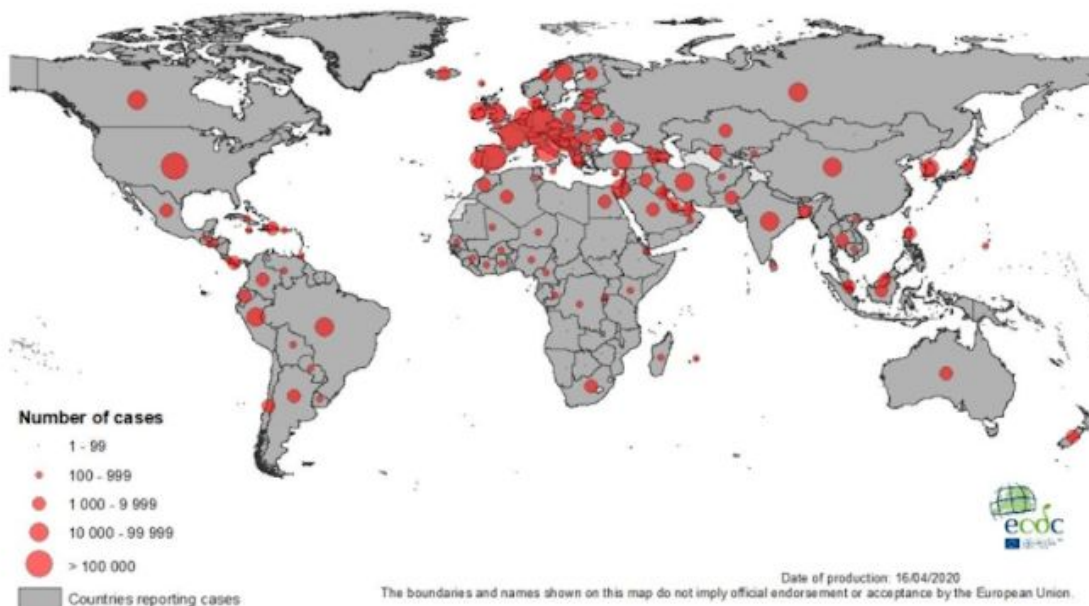
As the last few months have proven, there is no limit to how and where COVID-19 can spread. Using GIS (geographic information software) linking health reports around the world, we can track data on recurring patterns that affect countries hit with the most cases of COVID-19. For these last few months since the virus started, different institutions around the world such as John Hopkins University have been tracking the spread of COVID-19 using GIS. Most of these maps stem from January of this year and are updated daily to keep a constant stream of info available to the general public.

3.2 Patterns in geographical distribution of COVID-19 by Faith Yee

The geographical distribution of COVID-19 is a worldwide pandemic that has been increasing in numbers around the world since it started in December 2019 and spreads at a fast pace. The following information is current as of 16 April 2020.

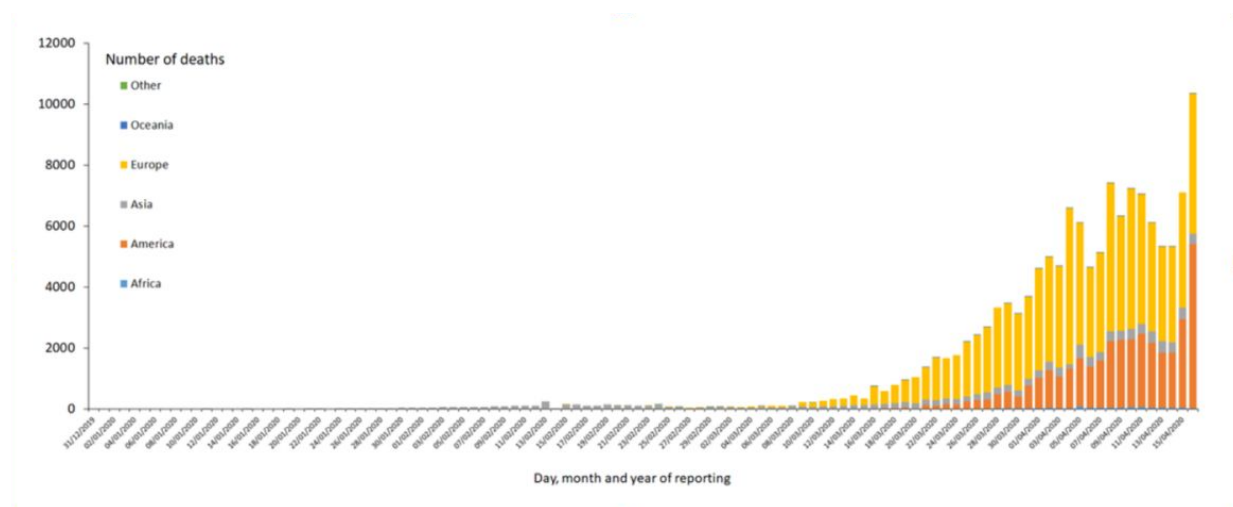
The geographic distribution of COVID-19 cases have been spreading vastly in many regions in Africa, America, Asia, Europe, Oceania and others with 2,029,930 globally. In Africa as of now there are 17,243 cases; the five countries reporting most cases are South Africa (2,506), Egypt (2,505), Algeria (2,160), Morocco (2,024) and Cameroon (855).

In Asia there are 329,971 cases; the five countries reporting most cases are China (83,402), Iran (76,389), Turkey (69,392), Israel (12,501) and India (12,380). In America there are 748,256 cases; the five countries reporting most cases are the United States (639,664), Canada (28,364), Brazil (28,320), Peru (11,475) and Chile (8,273). In Europe there are 925,536 cases; the five countries reporting most cases are Spain (177,633), Italy (165,155), Germany (130,450), France (106,206) and the United Kingdom (98,476). In Oceania there are 7,781 cases; the five countries reporting most cases are Australia (6,458), New Zealand (1,084), Guam (135), French Polynesia (55) and New Caledonia (18). Other: 696 cases have been reported from an international conveyance in Japan.



The geographical distribution of deaths from COVID-19 as of now in total is 136,320 in Africa, America, Asia, Europe, Oceania and other regions. In Africa as of now there are 911 deaths; the five countries reporting most deaths are Algeria (336), Egypt (183), Morocco (127), Tunisia (35) and South Africa (34). In Asia there are 11,993 deaths; the five countries reporting most deaths are Iran (4,777), China (3,346), Turkey (1,518), Indonesia (469) and India (414).

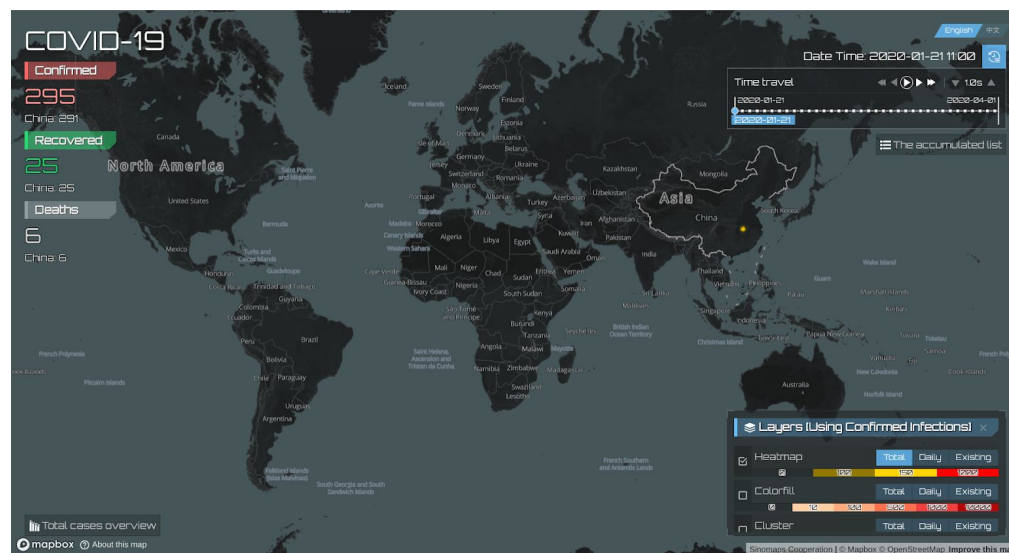
In America there are 35,688 deaths; the five countries reporting most deaths are United States (30,985)*, Brazil (1,736), Canada (1,010), Mexico (449) and Ecuador (388). **According to the US CDC, from 14 April 2020 case counts and death counts for the United States include both confirmed and probable cases and deaths.* In Europe there are 87,629 deaths; the five countries reporting most deaths are Italy (21,647), Spain (18,579), France (17,167), United Kingdom (12,868) and Belgium (4,440). In Oceania there are 79 deaths; the four countries reporting most deaths are Australia (63), New Zealand (9), Guam (5) and Northern Mariana Islands (2). Other: 7 deaths have been reported from an international conveyance in Japan.



Sources:

<https://www.ecdc.europa.eu/en/geographical-distribution-2019-ncov-cases>

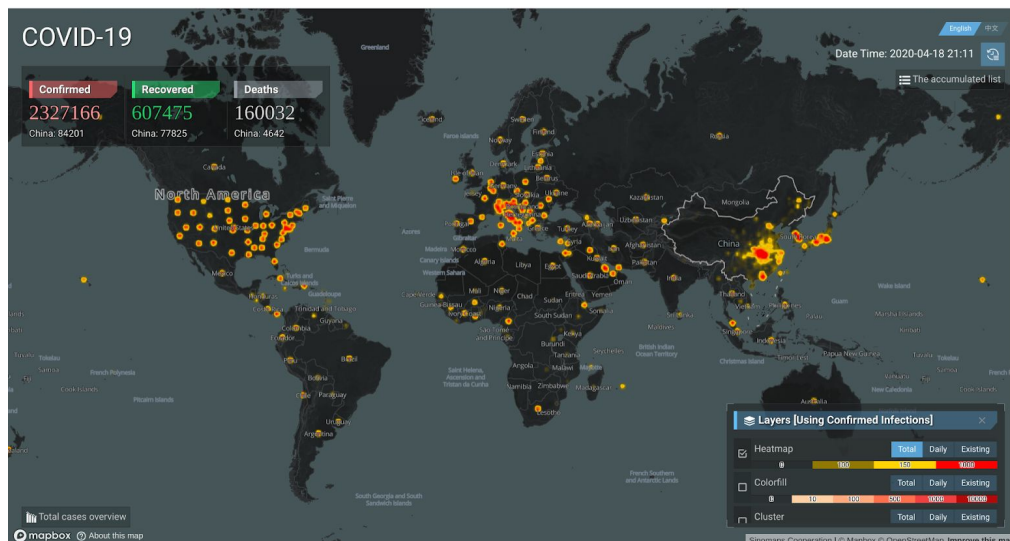
3.2 Displaying the rate of global COVID19 spread using GIS



January 21, 2020

Figure 1: Covid-19 spread January 21, 2020

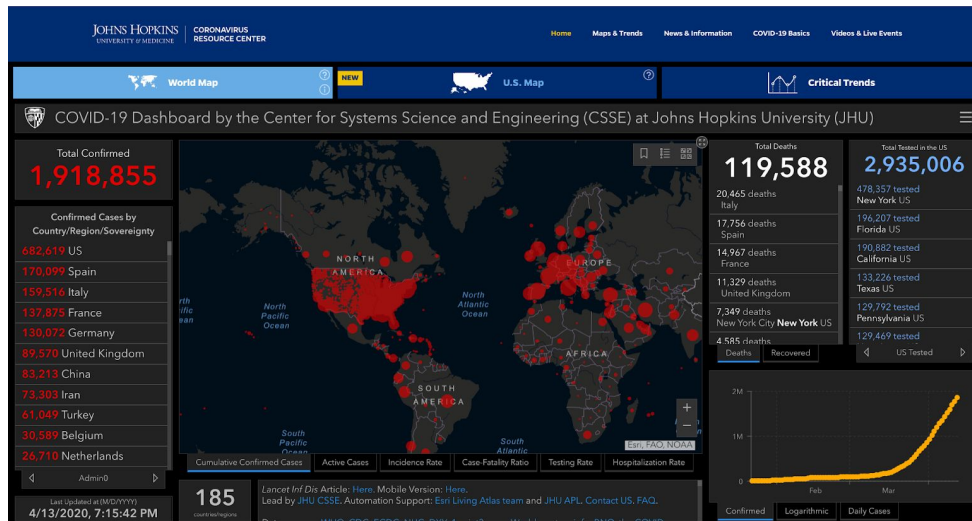
Source: Mapbox.cn



March 31, 2020

Figure 2: Coronavirus Spread March 31, 2020

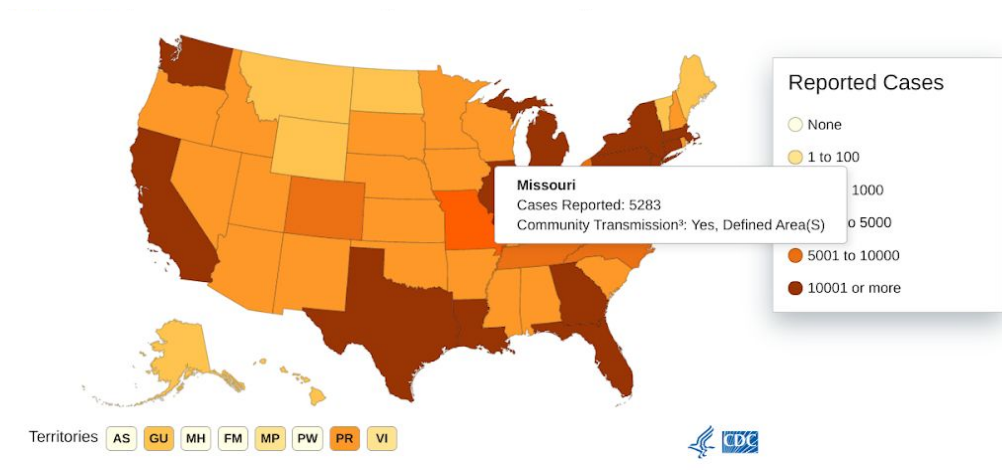
Source: Mapbox.cn



April 13, 2020

Figure 3: Coronavirus Spread

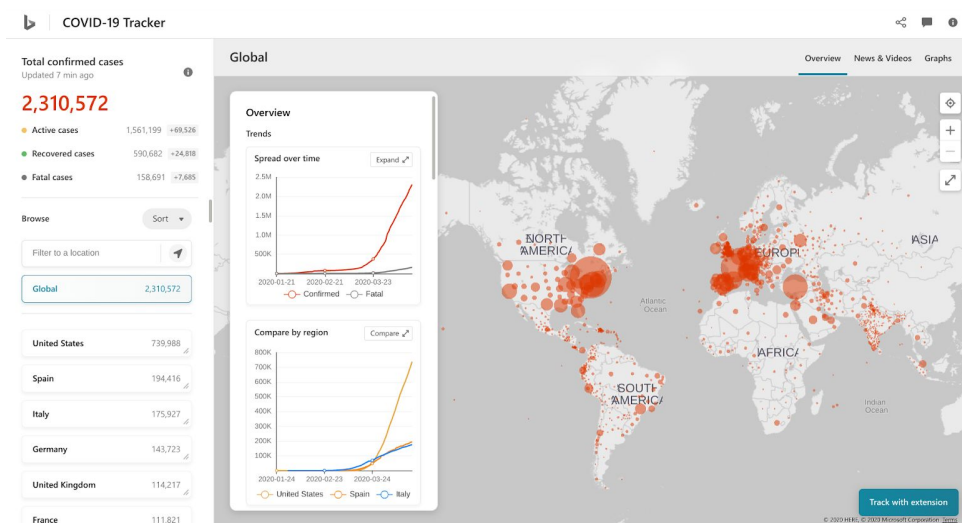
Source: John Hopkins Coronavirus resource center



April 18, 2020

Figure 4: COVID-19 in the U.S

Source: cdc.gov



April 18, 2020

Figure 5: Spread of COVID-19

Source: Bing.com

3.4 Use of GIS to track COVID-19 by Karla Cortes-Reyes

It is quite difficult to identify and grasp all the latest information surrounding COVID-19. The introduction of a novel virus is worrying, as scientists and public health professionals don't entirely know everything about COVID-19. But in these times the key to managing ourselves as individuals, communities, nations and a planet, is by keeping concrete data, more importantly, visual data. While the spread of COVID-19 is on the rise, the CDC, as well as institutions around the world, have been creating maps to track the spread of the virus using the cases reported. While there are many maps on the web that use GIS, a certain map that is in the center of this pandemic is an interactive map formed by John Hopkins University, presenting live tracking of the novel virus. Their resource center contains live information about confirmed cases with graphs indicating the daily increase since COVID-19 became more prominent in January 2020.

Like the maps in the figures in the previous sub-chapter, the purpose of mapping is to provide a tool to monitor the outbreak for experts, public officials and the general public. In the data timeline, it was used as a plugin for pure manual data to purely automated data input but it does so depending on the source so there's a combination of both, depending on the region of the outbreak. Manual input data takes time and precision which can easily be affected during this crisis, and there is no time for human error. There is a consent comparison to the ARCGIS dashboard with the data being provided by WHO reports. This data is then input into ArcGIS and becomes a GitHub repository. A Github is a hosting service that provides a web-based graphical interface, its features, and management tools are used to enhance the dashboard. All the data sources listed include the World Health Organization, DXY.cn., BNO News, China CDC, European Centre for Disease Prevention and Control. A large number of relying sources are then linked to the ArcGIS dashboard automatically. In response, mapping tools are being used to help understand and monitor the coronavirus.

References:

Retrieved from <https://coronavirus.jhu.edu/map.html>

Dempsey, C. (2020, March 29). This Map is Tracking the Novel Coronavirus (COVID-19) in Near-Realtime. Retrieved April 1, 2020, from <https://www.gislounge.com/this-map-is-tracking-the-novel-coronavirus-in-near-realtime/>

GeoNet. (n.d.). Retrieved April 1, 2020, from <https://community.esri.com/community/gis/applications/operations-dashboard-for-arcgis/blog/2017/12/07/configure-your-first-dashboard>

CSSEGISandData. (2020, March 29). CSSEGISandData/COVID-19. Retrieved April 1, 2020, from <https://github.com/CSSEGISandData/COVID-19>

Altaweel, M. (2020, February 21). Mapping Epidemics. Retrieved April 1, 2020, from <https://www.gislounge.com/mapping-epidemics/>

Dempsey, C. (2020, March 29). Mapping the Spread of the Novel Coronavirus: COVID-19. Retrieved April 1, 2020, from <https://www.geographyrealm.com/mapping-the-spread-of-the-novel-coronavirus/>

Gardner, L. (2020, January 23). Mapping 2019-nCoV. Retrieved April 19, 2020, from <https://systems.jhu.edu/research/public-health/ncov/>

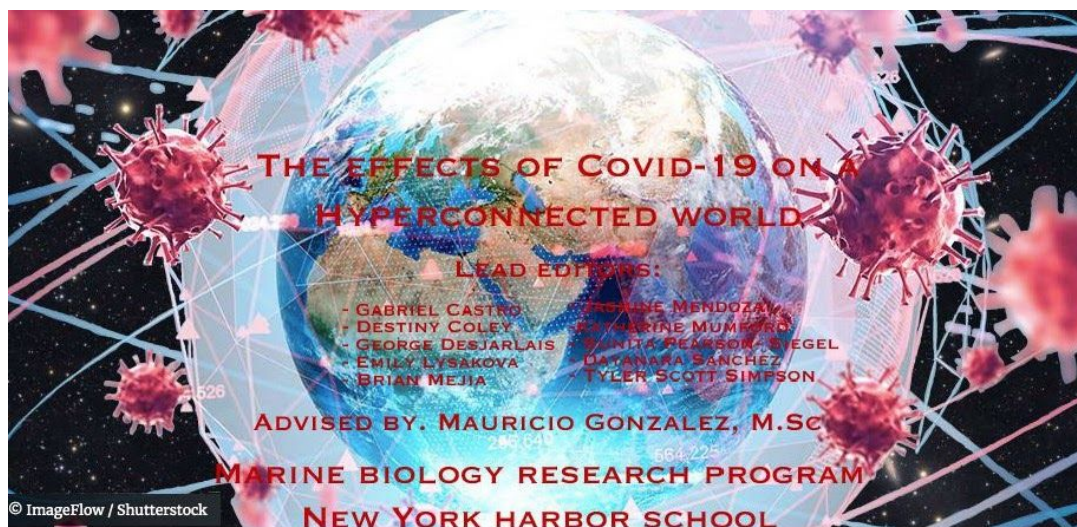
Chapter 04. Art and COVID

Introduction by Destiny Coley, Isabella Karsch, & Luke Samton (Co-Editors)

Title Image Paragraph:



Art is an essential way in which people make sense and express the sentiment of what they're experiencing. In times of uncertainty such as those the world is facing under Coronavirus, the art world is a place to which many retreat. Global humanity is at a pause. In the time of waiting and reflecting, people are turning to different techniques and methods of expressing themselves creatively, using unique modalities to transform images in their minds into visual forms of art.



ne reason to practice art and produce the designs that emanate from the imagination is because of the power it has to transcend language and culture, and capture the essence of the emotion at the moment. The title image pictured above can do just that. The title page represents how Coronavirus, though minute in size, has completely taken over every aspect of the world. The image does not emphasize the human-created aspects of the world. The image has been able to recenter the viewer in the current reality, delivering a sobering reminder that human beings are not in full control. The universe and the inevitable disasters of the virus are the controlling factors. In the end, it is the whim of Mother Nature which is in command.

Image source:

<https://phys.org/news/2020-03-mystery-expansion-universe.html>

<https://www.livescience.com/coronavirus-math.html>

Poems:

COVID NYC by Luke Samton

The sounds of the city are gone

Wind blows through barren trees

Clouds blot out the sun

Time slows down, we can't see the sun

We cant smile at the stars We can't feel the breath of wind in our faces

Red and Blue lights, Screeching sirens, these are the noises that fill our lives

Hospitals overflow like a rising tide

New York is a sandbar, struggling beneath the water

COVID--19 Inspired That's That by Luke Samton

Covid woke. Don't come too close.lost my job, now I'm broke

Stared at folks when properly provoked

Don't come close

Here, stay in all morning,

Going nowhere is important

New York shelter in,

Get Cuomo sworn in

Empty streets

Switching couch positions

Auditioning morticians

Saw it in a vision, releasing people from prison

Ignoramuses stay six feet back dont act dumb

Found 'em, coughing out they lung, germs flung

Presidential fail

Stocks, as frail as a fingernail

Oh well, guess we should sell

Lost Seven figures

Invigor

Release them from out the jail, we'll prevail

Sickest disease we've seen this century, enter plea

Lend sympathy to limp sick coughing dying NYCs

Stifling a sneeze is free, please cough away from me

That meagre sneeze, hits the breeze

Need more TP

Vitamin C

Sad face emoji

Walmart, shopping sprees, buy febreze

Stock up please, stop diseases, ACHOO

Corona rock you like Flu

Mama sniffing

Papa outta toilet paper rolls

Fedex deliveries

These little microparticles abilities riddle me

Watch out for the C

Until we receive the check as well as the collection fee

More wipes than mama and me

Wait and see this will go down in history
Pandemic grew like our collective misery
Get away don't be neighborly
The fake news is not true,
Big prob, lost the job
Already woke ,lost my job, now I'm broke. Don't come too close.
Stared at folks when properly provoked

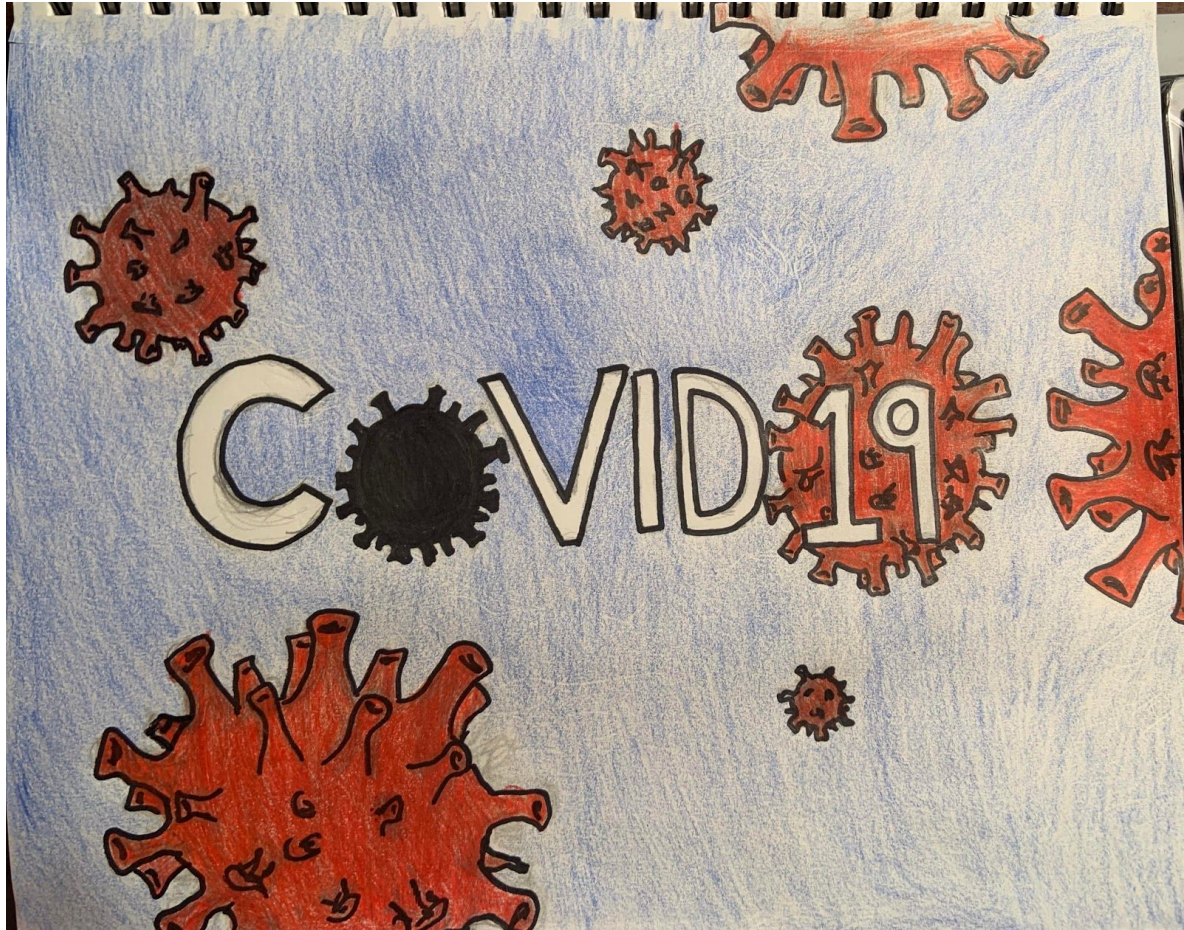
Don't come close
Here, stay in all morning, going nowhere is important
New York shelter in,
Get Cuomo sworn in
Empty streets
Switching couch positions
Auditioning morticians
Saw it in a vision, releasing people from prison
Ignoramuses stay six feet back dont act dumb
Found 'em, coughing out they lung, germs flung
And that's that

ART by Isabella Karsch

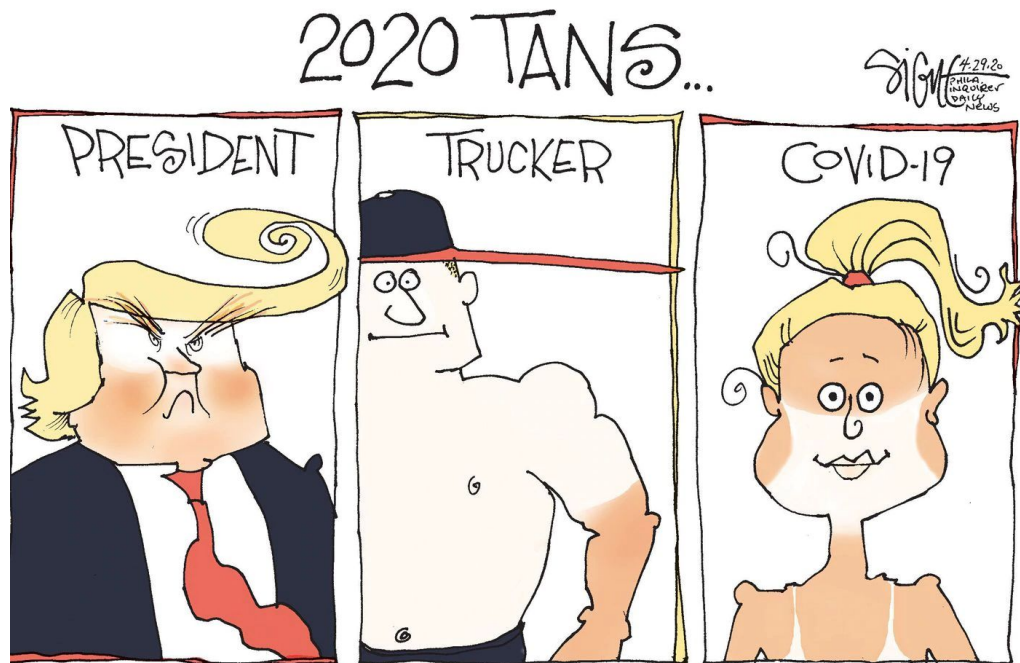
Title: COVID in the Ether

Theme: Omnipresence of COVID

Media: colored pencil, pencil, charcoal, sharpie on Strathmore cotton rag paper, 9x12



AIDS: the modern pandemic, and how fear, exclusion and stigma were combatted through art



SIGNE WILKINSON

<https://www.inquirer.com/opinion/cartoons/coronavirus-masks-trump-tans-truckers-20200429.html>



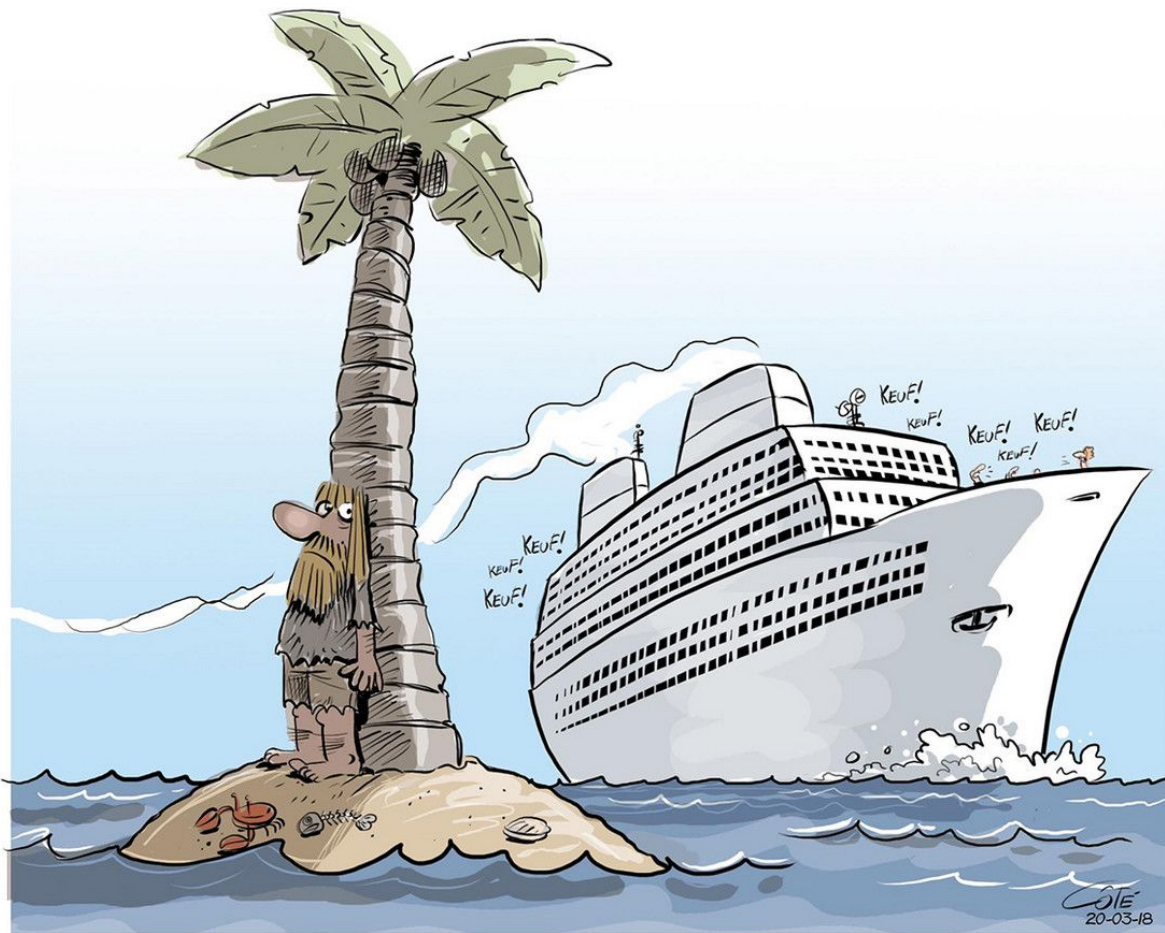
New Yorker Magazine cover

March 9, 2020

STAR TRIBUNE
SACK

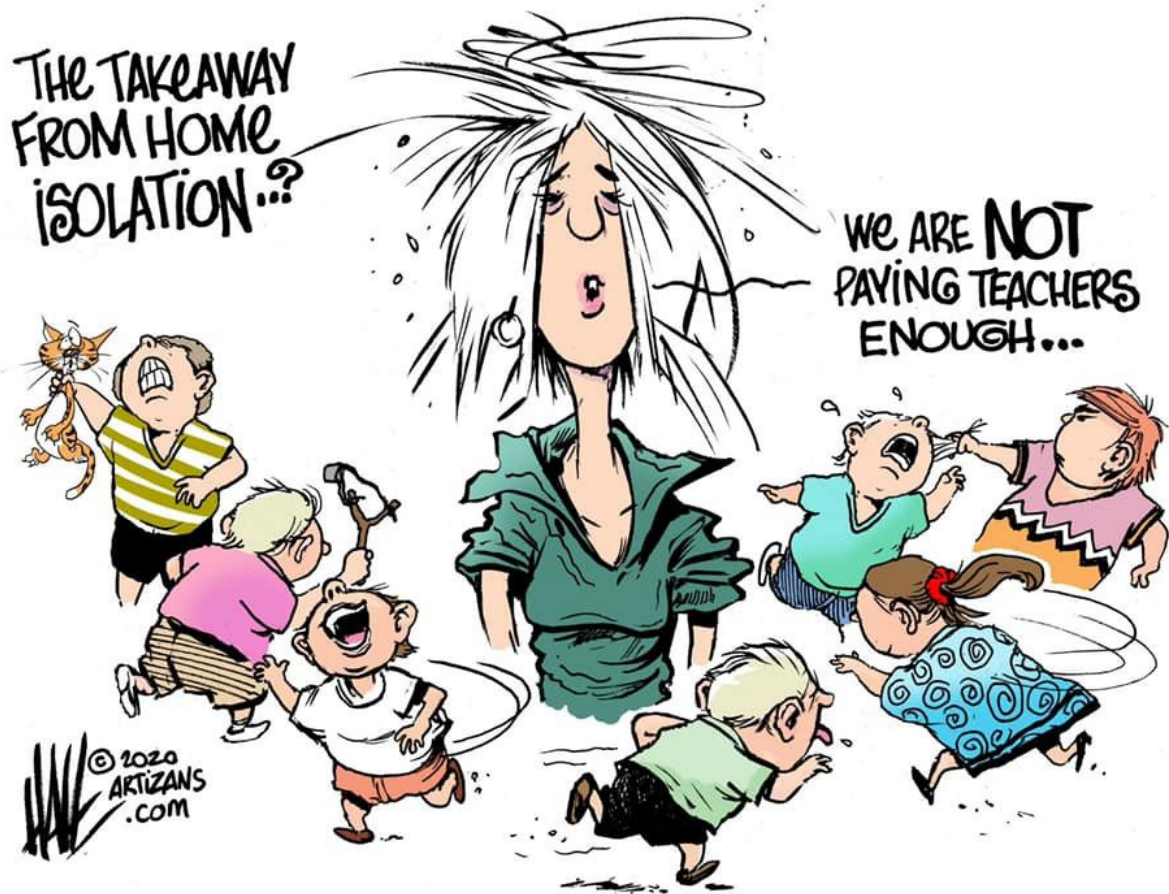


<https://www.politico.com/cartoons/2020/03/26/cartoonists-around-the-world-take-on-a-global-pandemic-000141?slide=11>



Andre-Phillipe Cote

<https://static.politico.com/dims4/default/dbcf9cf/2147483647/resize/1160x%3E/quality/90/?url=https%3A%2F%2Fstatic.politico.com%2F34%2Ff4%2F76c8038648f4904772c67cc74443%2F1-andre-philippe-cote-canada.jpg>



Ed Hall

<https://www.politico.com/cartoons/2020/03/26/cartoonists-around-the-world-take-on-a-global-pandemic-000141?slide=15>



Michael Kountouris

<https://www.washingtonpost.com/arts-entertainment/2020/03/18/coronavirus-political-cartoons/>



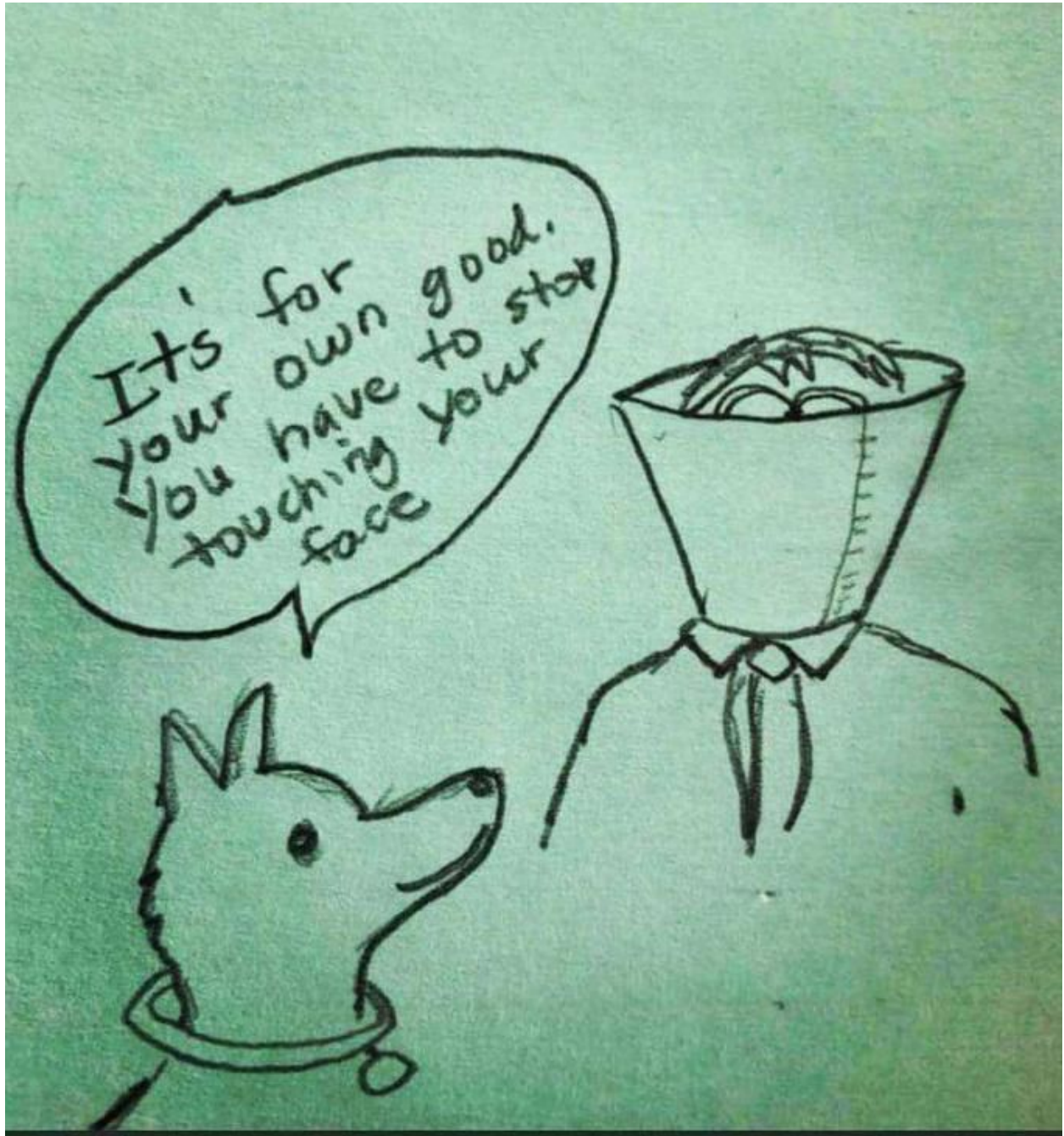
Gatis Sluka

<https://www.washingtonpost.com/arts-entertainment/2020/03/18/coronavirus-political-cartoons/>



Osmani Simanca

<https://www.washingtonpost.com/arts-entertainment/2020/03/18/coronavirus-political-cartoons/>



<https://knowyourmeme.com/photos/1781438-wholesome-memes>



“Hand over your Purell.”

<https://www.newyorker.com/cartoons/daily-cartoon/tuesday-march-3rd-purell-thief>

Chapter 05. Education and COVID

Introduction: Emily Lysakova (Lead Editor)

Section Contributions: Karina Deolarte, Nicholas Dilella, Nyle Kapoor, and Miriam Katz

5.1 Introduction

The disruption of daily life is a very broad statement, as “daily life” has many important parts and all affect each other, especially in high functioning communities. The decision to have people stay in their homes for the safety of their own and others’ health does not only affect business and the people they employ, but those in schools from K-12, higher education and their families. In many countries around the world, and mainly the United States, millions of students have access to the internet, and due to social distancing restrictions that forbid congregating in school buildings and classrooms, most are continuing their learning through laptops and smart devices. How does the continuation of learning through video calls and online assignments compare to the “normality” of sitting in a classroom and working with peers? The use of new online communication technology is now being tested to see how remote learning and academic support from educators at a distance will impact the citizens of the future. The new normal is learning through the screen, a massive adjustment that the current generation of students had to make within a matter of days. This chapter evaluates these changes and the effect they’ve had on schooling and education.

5.2 Pros of Online Learning by Karina Deolarte

The use of online learning within our environment and community has shown many beneficial results for students or anyone that utilizes it. Not only does it provide effective academic training and skills, but it offers many other advantages to students. An obvious benefit to online learning is the ease and speed with which course materials are made available to students. But a pupils ability to learn depends on more than just course content. One’s mental state can often dictate whether someone can absorb even well delivered material. While many students feel anxious or concerned in a school setting, online learning from the comfort of one’s home provides a more pleasant, familiar environment, allowing them a greater chance to achieve their academic and future career goals.

As students begin to shift from school to online learning, we can expect to see a decrease in mental health issues. American Psychological Association surveys demonstrate that college students who participate in mental health counseling are seeking treatment for anxiety (61%), depression (49%) and stress (45%). Commonly reported sources of stress among highschool teens are school workload (83%), deciding about colleges/what to do after high school (69%), and family financial concerns (65%) (apa.org). Because of all these sources of stress, a presumption can be made that there would be less worry if students were in a comfortable environment and had the ability to obtain different resources that would help towards academic growth.

Another factor to consider is that during normal school hours, there is a scheduled amount of time to work on specific assignments, and some students are not always able to complete them on time, which puts them at a disadvantage academically. Using the benefits of online learning, those at home have more time flexibility to complete tasks, as well as the opportunity to grow in time management skills and their ability to communicate effectively with teachers about certain assignments, questions or concerns. Overall, the transition to online learning and online resources for further education can be a break for many, as well as a chance to improve their work ethic, relieve stress, and complete their workload in a flexible manner.

References:

Appanna.S,2008: “A Review of Benefits and Limitations of Online Learning in the Context of the Student, the Instructor, and the Tenured Faculty”, Queensland University of Technology

https://www.researchgate.net/profile/Subhashni_Appanna/publication/237143888_A_Review_of_Benefits_and_Limitations_of_Online_Learning_in_the_Context_of_the_Student_the_Instructor_and_the_Tenured_Faculty/links/5c0741efa6fdcc315f9de15a/A-Review-of-Benefits-and-Limitations-of-Online-Learning-in-the-Context-of-the-Student-the-Instructor-and-the-Tenured-Faculty.pdf

5.3 Cons of Online Learning

While the concept of online learning is a widely accepted alternative to in-school education, there are many problems and disadvantages to the less fortunate members of school communities. Without access to the actual school building, many services and provisions are lost and things become more difficult for students who would need to transition to staying home. Many working parents rely on the school systems to provide meals for their children, and even a form daycare so that youth wouldn't be left unsupervised while parents are at their jobs. Students new to remote learning would come across many challenges as it requires special skills to use online learning effectively.

Each day the United States National School Lunch Program serves over 30 million students, while the School Breakfast Program serves over 14.7 million students. These numbers emphasize the dependency many students have on their schools for nutrition. 22 million low-income kids rely on school-provided lunch and breakfast (Congressional Research Service,2019). Now all of these students, along with many more around the globe, have been transitioning to online learning and no longer have access to this vital lifeline. Millions of people may be now without meals, and this puts a burden on both parents and students. Hungry children cannot learn if their basic needs are not being met.

To effectively be able to utilize online learning, students need skills that many may have not developed yet, such as staying motivated, practicing time management, and learning/working independently. These problems affect everyone but are more prominent in younger students . Being in charge of the timing of one's own lessons often results in a habit of procrastination. This can easily escalate to falling behind and/or dropping out. This tends to be a major trend and problem with online learning. Many students feel that they are able to access more information and have a better understanding of material through teachers' body language and voice, as well as the interaction with their peers. It is difficult to make up for this lost interaction through online learning as group work is lost, and there is much less face to face with teachers. Without this type of engagement, many young students are missing an important aspect of their academics that they could have obtained in the classroom.

2019: "School Meals Programs and Other USDA Child Nutrition Programs: A Primer"
<https://fas.org/sqp/crs/misc/R43783.pdf>

Estroff D.S: "The Age-by-Age Guide to Teaching Kids Time Management", scholastic.com
<https://www.scholastic.com/parents/family-life/parent-child/teach-kids-to-manage-time.html>

Pychyl D.T, 2011: "Procrastination and Performance in Online learning", psychologytoday.com
<https://www.psychologytoday.com/us/blog/dont-delay/201107/procrastination-and-performance-in-online-learning>

Kumar.D, 2010: "Pros and Cons of Online Learning", North Carolina State University
<https://www.ies.ncsu.edu/resources/white-papers/pros-and-cons-of-online-education/>

5.4 The latest apps and software for online learning

During the COVID-19 pandemic, students are expected to participate in online learning through many digital applications and websites that are available to both students and educators. The latest apps and software used during COVID-19 for online learning are Google Classroom, Zoom, Buncce, Cisco Webex, Edmodo, Flipgrid, Khan Academy, and Parlay. These are free to students, parents, and teachers to access on their devices from the safety of their home environments.

5.4.1 Student-Teacher Communication

Google Classroom is a free web service and app used to share assignments with students in a paperless way. In the article "10 Benefits of Google Classroom Integration," the author states that students are able to share their classwork and assignments, and are also able to communicate with their teachers more efficiently and directly. Google Classroom is easily accessible on mobile devices, computers, and laptops, which is important for those who may only have one device to connect with, often a phone. Zoom is an online virtual classroom where

students and teachers have the ability to communicate and see one another through video calls, with each zoom meeting being able to host up to 16 people.

5.4.2 Academic Online Resources

Buncee, Cisco Webex, Edmodo, Flipgrid and Parlay are all free online resources to expand scholastic options for families transitioning to online learning. Edmodo, Flipgrid, and Parlay are free social learning platforms that allow students to access the content uploaded by their teachers, and platforms like Buncee specialize in multimedia presentations. According to “National School Choice Week”, each online platform provides communication, virtual lessons, and assignments with a range of grades from elementary to high school. One of the most popular for online courses is Khan Academy, a website that offers a variety of subjects, courses, instructional content, exercises, quizzes, and unit tests that teachers can assign to students and monitor their progress. These examples of online resources and others are effectively being used by students and teachers across the country and around the globe to continue their education.

References:

Lynch.M,2018:“10 Benefits in Google Classroom Integration”, thetechadvocate.com
<https://www.thetechadvocate.org/10-benefits-of-google-classroom-integration/>

“Free Resources, FAQ for Families Educating at Home During Corona Virus Pandemic”
<https://schoolchoiceweek.com/parent-resources-during-coronavirus/>

“Overview of Khan Academy Content”
<https://www.khanacademy.org/resources/teacher-essentials/our-content/v/overview-of-khan-academy-content>

5.5 How COVID and On-line Learning have Exposed Inequities in Education

There is no doubt that the Coronavirus pandemic has impacted members of all classes of society. From the wealthy to those living in poverty, no single person or group of people is left untouched by its effects. When it comes to education - and particularly public education - sharp differences are being exposed between the “haves and the have nots”. While school districts have attempted to supply laptop computers and help with access to high speed internet, even when that happens it's often not enough to level the playing field.

In the article “Coronavirus is Poised to Inflame Inequality in Schools”, Tara Garcia Mathewson quotes information from the Pew Research Center stating that while “92 percent of adults from households earning \$75,000 or more per year say they have broadband internet at home, just

56 percent of adults from households earning below \$30,000 say the same.” This highlights the discrepancy in access between families from different economic classes. It has also been noted that students from families with more than one child and only one computer find themselves at a disadvantage as they attempt to rotate usage in order to get their work done.

Computer and internet access aside, financially struggling school districts find themselves unprepared to provide online learning for their students, and while many schools are attempting to provide an adequate curriculum and experience, many are coming up short. According to Dan Domenech, Executive Director of the American School Superintendents Association in Alexandria, Virginia, “the reality is that probably the majority of school districts, and there are more than 13,000 of them, don’t have the ability to provide continuous virtual online instruction” (“U.S. Schools Trying to Teach Online Highlight a Digital Divide”). “This experience may accelerate virtual learning in schools, but right now it is definitely inequitable for students without internet access or a computer at home.” This problem further illustrates the divide between students who come from families with economic resources and those without.

References:

Matthewson G.T, (2020) Coronavirus is Poised to Inflamm Inequality in Schools. hechingerreport.org

<https://hechingerreport.org/coronavirus-is-poised-to-inflamm-inequality-in-schools/>

Woolley.S, Sattiraju.N, Moritz.S, (2020) “.S Schools Trying to Teach Online Highlight a Digital Divide. [bloomberg.com](https://www.bloomberg.com)

<https://www.bloomberg.com/amp/news/articles/2020-03-26/covid-19-school-closures-reveal-disparity-in-access-to-internet>

Chapter 6: Power and Politics in the age of COVID-19

Introduction and Articles by. Tyler Scott-Simpson

Contributions by Giovanni Nunez & Bryant Soriano-Alonso

6.1 Introduction

In an ever-increasingly connected world, catastrophe is scaled to encompass nearly the entire far-reaching network of human civilizations. Now, in the 21st century, more than any time throughout modern history, the world's interconnection is shown as an integral yet dangerous part of our day-to-day livelihoods; where globalization has helped us reduce the cost of essential foods to the lowest they've been in anytime throughout history⁴, regional and even local health pandemics can quickly spread to become global threats to the entire world's status quo. Threats, such as COVID-19, can dismantle the framework of the globalized network, turning even the superpowers of the world away from the world they govern and toward themselves as they grapple to survive. On a national level, COVID-19 is the great equalizer, forcing the nations of the world to rely on not their might but their leadership and wit to survive. The streets of Manhattan are empty, the stock exchange quiet; the globalized economy built the world around us, but has halted it in its tracks as that same structured web attempts to kill us.

6.2 Global Politics

6.2.1 The Rich Man's Disease

Notably, it is the continent of Africa that has fared most well in this global pandemic, followed closely by South America. While numbers of infection and death have steadily increased throughout the past few days, countries like South Africa have only in the past few days 6.2.2 reported an instance of an attributed fatality⁵. Many of the 52 African nations have not reported any case of the COVID-19 virus at all. While there are many factors at play here - one such being that the COVID-19 virus has a far greater impact on the health of older individuals, and

⁴ "Think food is more expensive today than in the past? It's not" 28 Oct. 2012, <https://www.aei.org/carpe-diem/think-food-is-more-expensive-today-than-in-the-past-its-not-its-now-cheaper-than-ever-before/>. Accessed 30 Mar. 2020.

⁵ "Coronavirus: South Africa reports first deaths as ... - BBC." 27 Mar. 2020, <https://www.bbc.com/news/world-africa-52058717>. Accessed 30 Mar. 2020.

Africa is on average a young continent⁶ - it should be noted that the COVID-19 is not hitting Africa because Africa is not an incredibly economically rich continent. Through nearly five centuries of European involvement, the nations which we now refer to as the civilized world have raped and pillaged the continent to its bare bones, leaving the resource-rich nation with scraps to build a society out of. Taking the mineral wealth out of the country and using it elsewhere, the continent of Africa now stands as an economically (and by proxy geopolitically) weak nation. The country of Nigeria, the continent's richest nation by GDP, still is only 27th in world ranking⁷, making the continent, as a collective, the poorest in the world⁸.

People move where money moves, and in the industrialized global economy money moves to and from a diverse range of locations on the globe. It is no surprise that the disease, having started in the densely packed city of Wuhan - a city that is home to a massive international airport and over 11 million people - would be ground zero for a widespread pandemic. China, the second largest economy in the world and the largest in population, is an incredibly rich and trade-invested nation. In 2018 alone, over a tenth of all global trade went through the singular country of China alone⁹. After China, nations such as the US, UK, Italy, and Japan have all experienced massive outbreaks of the COVID-19 virus. It's no surprise that all of those nations are all in the top ten global GDP rankings¹⁰.

6.2.2 Anti-Asian Racism

America's (and the rest of the developed world's) relationship with racism towards those of an Asian background has historically been a fluctuating topic. On one side of the pendulum, the wide-held American belief in the "model minority", the "Japanese master", and the "Chinese math-whizz" could trick some into thinking that the white world's attitude towards the Asian community is a positive and mutually respectful one. Stereotypes and racial comments to which Asian communities are subjected in the western world are often related more to "how good they should be at... (ig math, science)", in stark contrast to those of black and brown communities - lazy, thieving, uneducated. While modern Asian stereotypes are problematic in their own right, they pale in comparison to the historical instances and views of racism towards Asian communities in the white world.

⁶ "The countries with the youngest populations in the world" 6 Sep. 2019, <https://www.businessinsider.com/countries-youngest-populations-most-children-2019-9>. Accessed 30 Mar. 2020.

⁷ "GDP Ranked by Country 2020 - World Population Review." <https://worldpopulationreview.com/countries/countries-by-gdp/>. Accessed 8 Apr. 2020.

⁸ "The Continents Of The World Per Capita GDP - WorldAtlas.com." 1 Aug. 2017, <https://www.worldatlas.com/articles/the-continents-of-the-world-by-gdp-per-capita.html>. Accessed 8 Apr. 2020.

⁹ "Is China the world's top trader? - China Power Project - CSIS." <https://chinapower.csis.org/trade-partner/>. Accessed 8 Apr. 2020.

¹⁰ "GDP Ranked by Country 2020 - World Population Review." <https://worldpopulationreview.com/countries/countries-by-gdp/>. Accessed 8 Apr. 2020.

Much to the way black and (mostly) white working class American's in 2016 identified with (now) President Donald Trump's scapegoating of Mexican and Southern American immigrants in the United States, Asian-American communities during the late 19th and early 20th centuries faced incredibly similar rhetoric. Whereas modern right-wing media describes Latin-x communities with headlines such as *The Immigrant Gang Plague*¹¹, the United States restricted Chinese Immigrants for over 10-years and legally harassed Asian communities of all ethnicities in the late 19th century with the Chinese Exclusion Act¹². The widespread belief, popularized by British propaganda during their Opium Wars¹³, brought about the stereotype of "Chinamen" as a drugged-out plague of no-gooders. Anti-Asian racism and violence similar to such faced by black communities in the South became widespread and rampant in all of America, though especially the Pacific Coast¹⁴. Mark Twain, even, in his 1872 book *"Roughing it"* describes the public (equivalent to lynching) execution of a young man in San Francisco: "As I write, news comes that in broad daylight in [San Francisco], some boys have stoned an inoffensive Chinaman to death, and that although a large crowd witnessed the shameful deed, no one interfered." Most famously, however, was the 1871 Los Angeles Chinese Massacre, in which over 500 white and mixed-race Americans sacked the Chinese quarter of "Negro alley" killing around twenty unarmed Chinese citizens.

Racism reveals itself to be a poignantly political issue more than most in this sense. What happened between 1872 and 2020 that would cause such a dramatic shift in America's view of Asian Americans? The answer of progression should be found incorrect as the same racist beliefs plaguing African American and Latin-x communities has stayed true throughout that time, and the answer of superiority in culture is, while racially ignorant, also incorrect as black and brown Americans have time and time again displayed their ability to succeed both economically and socially just the same as any white or Asian American. The answer lies in cold-war politics and China's growth into a world superpower during the latter half of the 20th century.

In the aftermath of World War II, the ideologies of Soviet-era communism began to quickly spread across the globe, engulfing most of eastern Europe and sparking dissent in the oppressive imperialist governments of Korea and Vietnam. China as well, devastated by Japan in the years prior, was a major target for Soviet pro-communist propaganda. Eager to boost the voices that would eventually turn into the leaders of people's revolution, Russian outreach widely criticized and called attention to the capitalist world's epicenter, America's, blatant and historic racism towards the Chinese. In order to combat this, America's state department led a national campaign (and promoted it internationally) to shine the light upon Asian-American

¹¹ "The Immigrant Gang Plague | Hispanic Gang ... - City Journal."

<https://www.city-journal.org/html/immigrant-gang-plague-12801.html>. Accessed 20 Apr. 2020.

¹² "Chinese Exclusion Act | Definition, History, & Facts | Britannica."

<https://www.britannica.com/topic/Chinese-Exclusion-Act>. Accessed 20 Apr. 2020.

¹³ "The Opium War and the Humiliation of China - The New York" 2 Jul. 2018,

<https://www.nytimes.com/2018/07/02/books/review/stephen-r-platt-imperial-twilight.html>.

Accessed 20 Apr. 2020.

¹⁴ "Solidarity Matters: Black History Month Through An Asian" 21 Feb. 2020,

<https://aapip.org/our-stories/solidarity-matters-black-history-month-through-an-asian-american-lens>.

Accessed 20 Apr. 2020.

success stories¹⁵, at one point even creating an all-Asian-American basketball team and parading them around the world¹⁶. These attempts to 'woo' the Chinese people away from Soviet communist, though unsuccessful, evolved in America into the 'model minority' myth we hold today. Strengthened by the 1956 congressional decision to remove racial restrictions on American immigration policies and transition to a 'merit-based' system (giving preference to academically trained and wealthy immigrants in order to aid the US economy), allowing plenty of educated Chinese and other-Asian immigrants into the United States. Asian immigrants quickly found a place in the growing American middle-class and cemented themselves as an integral part of US culture.

The 2019 coronavirus, and the anti-Asian-American racism that has arisen throughout this pandemic is not a new wound, but the reopening of old, generations-long bigotry firmly cemented in American culture. "They look different from us", it's the same mindset that drove the American government to imprison Japanese Americans during the Second World War and tear down Philipino diasporas in the 1904 San Francisco Bubonic Plague outbreak. The coronavirus and anti-Asian sentiment in America is nothing new, simply the resurfacing of a centuries long struggle faced by members of the Asian American community everyday back into the national spotlight.

6.3 Regional Politics

6.3.1 China

There is overwhelming evidence that the COVID-19 pandemic holds its roots in the Huanan wet-market (the Chinese term for market selling fresh food) in the city of Wuhan, China¹⁷. Most likely coming from the widely traded Chinese Pangolin, sold in some wet-markets around China for its use in traditional medicines, the virus has spread out from the regional capital to the rest of China and then to the rest of the world. However, in recent days (as of 30 March 2020), China has only had new cases of coronavirus among those who had come inbound into the country from abroad. The nation, through a series of responsible protective measures, testing, and mass isolations has curbed the number of new cases to nearly zero. Wuhan, the city in which this pandemic originally started, is even considering lifting the protective measures put in place during the worst of the country's pandemic. It should be noted, however, that there is still fear of false information coming out of the state-controlled media as China wishes to revamp

¹⁵ "How America Created the "Model Minority" Myth | truTV.com."

<https://www.trutv.com/shows/adam-ruins-everything/clips/how-america-created-the-model-minority-myth>. Accessed 21 Apr. 2020.

¹⁶ "The real reasons the U.S. became less racist toward Asian" 1 Dec. 2016, https://www.oregonlive.com/opinion/2016/12/the_real_reasons_the_us_became.html. Accessed 21 Apr. 2020.

¹⁷ "Animals and Coronavirus Disease 2019 (COVID-19) | CDC." <https://www.cdc.gov/coronavirus/2019-ncov/prepare/animals.html>. Accessed 30 Mar. 2020.

their economy¹⁸ and relations to the outside world. Currently, five Chinese nationals who were known to have blown the whistle on the COVID-19 virus in early 2020 have died or have disappeared¹⁹. Western researchers have also called on Beijing to release their true coronavirus data, stating that “[the information produced by Beijing] never happens with real data”²⁰. Even residents of the ground-zero city Wuhan have called out the Chinese government, saying the regimes numbers in aspects to the reported death toll don’t add up to what they are seeing everyday²¹. The question of China’s true data and pandemic experience are an ongoing question, with new evidence and accounts pouring in everyday, seemingly contradicting the evidence of the day’s prior constantly.

While this global pandemic has revealed some of the major flaws in our own nation's medical infrastructure, it has re-exposed a glaring issue in the wildlife policies of China. China, the infamous importer of endangered animal products ranging anywhere from rhino horn to shark fin, also has a massive domestically-grown exotic-animal industry. This industry, sprouting from the People’s Government’s 1978 decision to hand the production of food over from the government to the growing privatized economy (these measures used in order to curb the spread of famine in the country), has since grown from small-farmers catching wildlife in order to make a living, into a one hundred billion yuan industry (14.1 billion USD)²². These animal products, often sold in wet markets like that of Wuhan, provide a perfect breeding ground for infectious diseases such as coronavirus by increasing the probability for host organisms to come into contact with each other and humans. There is evidence to suggest that the 2019 coronavirus originated in bats, then moved into the endangered pangolin, and then made its way into a human being. Through ingestion or through defecation (often times animal cages are stacked on top of one another, allowing for urine, feces, blood, puss, and semen to make contact with a wide range of animals), or through any other mode of transfer, the wet markets of China and the wildlife industry of China increase the likelihood of infectious diseases like the coronavirus to make its way into humankind. This isn’t even the first time we’ve witnessed these policies becoming problematic to the global community: the 2004 SARS outbreak was traced to

¹⁸ "Inside China's high-stakes campaign to smear the United" 12 Mar. 2020, <https://www.foxnews.com/us/china-smear-united-states-coronavirus-wuhan>. Accessed 30 Mar. 2020.

¹⁹ "Chinese whistleblowers who spoke about coronavirus have" 20 Feb. 2020, <https://www.businessinsider.com/china-coronavirus-whistleblowers-speak-out-vanish-2020-2>. Accessed 22 Apr. 2020.

²⁰ "China's Coronavirus Figures Don't Add Up. 'This ... - Barron's." 15 Feb. 2020, <https://www.barrons.com/articles/chinas-economic-data-have-always-raised-questions-its-coronavirus-numbers-do-too-51581622840>. Accessed 22 Apr. 2020.

²¹ "Wuhan residents dispute officials' COVID-19 death toll" 30 Mar. 2020, <https://www.businessinsider.com/wuhan-residents-say-chinese-government-coronavirus-death-toll-is-low-2020-3>. Accessed 22 Apr. 2020.

²² "What is a wet market? Here's why China is reopening ... - Vox." 15 Apr. 2020, <https://www.vox.com/future-perfect/2020/4/15/21219222/coronavirus-china-ban-wet-markets-reopening>. Accessed 22 Apr. 2020.

the trade of civet cats in a wet-market in the city of Heyuan, China²³. The People's Government initially shut down the wildlife trade and banned the selling of civet cats, but just months after reversed their decision and reopened the wildlife trade, allowing organisms like civet cats, pangolins, and bats to be sold and consumed in their plethora of wet markets. It should be noted, however, that it is not the Chinese people who are invested in these exotic animal products, but a small minority of wealthy individuals who prescribe to these dangerous products in many ways as a status-symbol. The time has come for the Chinese government to amend these policies.

6.3.2 A Divided United States

By a far margin, the United States of America is the most powerful country on the face of the globe. With an annual GDP of nearly twenty trillion dollars and nearly seven hundred billion of that spent on defense alone, if there should be a nation coping well with the COVID-19 pandemic, it should be the United States. However, as it is in the early afternoon of March 30, 2020, the epicenter of the disease is in America, with nearly half of those cases coming from New York City alone. In just a few weeks, the US has grown from having zero confirmed cases to over 140,000 and nearly 2,500 attributed deaths²⁴, swamping the American medical infrastructure and exposing dire systemic issues in the process.

Since its first confirmed cases of coronavirus in late January 2020²⁵, the U.S has been desperate in its attempts to limit the spread of the virus. However, as of 30 March, the United States has a staggering 163,000 confirmed cases, begging the question, what went wrong? The answer is complex and not entirely one with a clear answer, however, the discourse currently ravaging America's response to their pandemic is in no way being helped by the American President, Donald Trump. While there is a division (generally across party lines) on whether or not his action in response to the threat of COVID-19 has been up-to-par, what it has in no way been is consistent.

In the election of Donald Trump, the vast majority of Americans, from those who voted for him to those who staunchly opposed him, knew his leadership would be in no way similar to that of his predecessors. Trump's entire pitch to the American voter positioned him as the outside candidate, the instigator, and the speaker of the "forgotten rural white man/woman". While his advisers and his administration's medical leaders call for self-isolation and the utilization of mass-testing, President Trump has actively ignored and often contradicted his medical generals

²³ "WHO sees more evidence of civet role in SARS | CIDRAP."

<https://www.cidrap.umn.edu/news-perspective/2004/01/who-sees-more-evidence-civet-role-sars>. Accessed 22 Apr. 2020.

²⁴ "Cases in U.S. | CDC."

<https://www.cdc.gov/coronavirus/2019-ncov/cases-updates/cases-in-us.html>. Accessed 30 Mar. 2020.

²⁵ "Cases in U.S. | CDC." <https://www.cdc.gov/coronavirus/2019-ncov/cases-updates/cases-in-us.html>. Accessed 1 Apr. 2020.

and health-care officials, on April 17th realising a plethora of tweets in support of anti-lockdown groups such as “liberate Michigan”. While an American President should operate with maturity and resolve, the American President has made none of his country’s coronavirus problems better, and, arguably, is worsening the issue at hand.

6.4 Power in the future

6.4.1 America

In the back of every democratically elected leader’s mind the thought of reelection is always a constant one. Especially here in America, in the midst of the most globally influential [re]election, one’s positive approval among his (as of April 22, by any logical poll, it is going to be a he) constituents is something to devote effort to in the utmost regard. Should we let the economy fall in order to benefit the public safety of the nation, should we allow some to die in order to save more, should we follow what our health officials have told us to do or should we live free and die?

The New York Governor Andrew Cuomo has gained considerable traction with his calm, rational leadership, putting him into the national spotlight in the midst of the coronavirus outbreak. Similar to the way Rudy Giuliani grew to be a nationally recognized leader and hero in the aftermath of the September 11th attacks in 2001, the coronavirus has again put onto display the calm and effective leadership of New York State and City.

In this important election year, where the current field of contenders for the American presidency (Joe Biden and Donald Trump) are becoming increasingly more decisive, especially as members of both parties begin to question the crisis leadership abilities of both candidates, the question may be open for the DNC, Mr. Cuomo’s party, to put forward a new candidate for the November election.

6.4.2 Iran

Through a series of unpopular reforms and foreign policy, the Islamic controlled government of Iran has alienated itself from the constituents they are said to represent, whether that is through their difficult relationship with the United States - an action closing them off to nearly every benefit offered by the western world - or establishing theocratic law throughout the nation. Many Iranians are discontent with their government, believing their system is rigged in favor of only the powerful groups and entities of the nation²⁶. In recent days, as Iran’s coronavirus case numbers soar, and death toll with it, the federal government is holding onto less support than ever. Iran, having been cut off from many areas of the developed world through a series of American sanctions, has sent out a plea to the western world. In some cases turning to the use of mass-graves, the nation is in desperate need of medical supplies and aid. Their entreaty is

²⁶ Current Situation in Iran”

<https://www.thoughtco.com/current-situation-in-iran-2353079> Accessed 1 april. 2020

actually winning support from allies like Russia, China, and leaders of the United Nations, who think the American President should suspend the harsh sanctions on Iran for as long as they are fighting the coronavirus. However, the American government has all but ignored the advice from the health experts and has taken no action since. Saudi Arabia even, Iran's long-time regional enemy has even put aside theocratic differences and sent a plane full of medical supplies and PPE to the nation's capital Tehran.

Even with the sympathy support gained by their government for them, the Iranian people are still anything but approving of their nation's leadership. Polls generally find that only around 15 percent of the Iranian populous support their government, a number which has shot further down with their inability to help their constituents during this pandemic²⁷. At the end of all of this, the numbers may fall far enough for the question of a new regime to be taken seriously.

6.4.3 France

France, at its core, is a nation unaccepting of the grave wealth-inequality that plagues both its borders and the rest of the world. Having held many revolutions fighting this issue since its first in the late 18th century, France is a nation never at rest if it means a better life for its people.

Today, however, France is at the heart of the coronavirus pandemic, with over four hundred people dying in the nation every day²⁸, and nearly sixty thousand confirmed cases²⁹. In response to the pandemic, the nation's president, Emmanuel Macron, has taken drastic action in order to curb the spread of the disease, placing a mandatory quarantine upon nearly the entire nation and announcing immediate bonuses to healthcare providers in order to compensate those actively fighting the pandemic. Also sending in the national military, in an operation known as "resilience" in order to ensure sanctuary and protection³⁰. The French President is doing everything he can in order to curb the outbreak of this coronavirus.

These extreme measures, however, have not stopped a continuation of the protests movements that put the nation on shut down just a few months prior to this health pandemic. The most famous of which, the yellow jackets, are still marching in the streets³¹, demanding justice for the poor in a world controlled by the rich.

²⁷ "Iran Poll Shows Only 15 Percent In Tehran Satisfied With"

<https://en.radiofarda.com/a/iran-poll-shows-only-15-percent-in-tehran-satisfied-with-government/30338976.html>. Accessed 1 Apr. 2020.

²⁸ "France reports record one-day death toll - Today's Coronavirus"

<https://www.weforum.org/agenda/2020/03/31-march-2020-coronavirus-updates/>. Accessed 31 Mar. 2020.

²⁹ "France - Worldometer." <https://www.worldometers.info/coronavirus/country/france/>. Accessed 1 Apr. 2020.

³⁰ "Macron calls for national unity in war against coronavirus"

<https://www.politico.eu/article/emmanuel-macron-calls-for-national-unity-in-war-against-coronavirus/> Accessed 1 April. 2020

³¹ "/pol/ - Politically Incorrect » Thread #248977163 - 4plebs." 19 Mar. 2020, <http://archive.4plebs.org/pol/thread/248977163/>. Accessed 31 Mar. 2020.

Chapter 07. Economy of COVID

Introduction and Contributions by George Desjarlais (Lead Editor), Penelope Fernandez, Malik Ford, and Cemiya Torres

7.1 Introduction

The COVID-19 crisis has had a major effect on international trading outside of America as well as on imports coming into America. The large demand for toilet paper and other household products that are being purchased in mass quantities are a familiar example of the market impact. Due to these changes in the global economy, the reliability of major business supply chains and sell prices at local stores and cyber venues has become a topic of interest as well as importance. Many ships carrying cargo that is supposed to be imported to America are unable to dock at harbors because countries have shut down their borders due to health regulations implemented by the CDC. It has been reported that over 80 countries have issued similar travel restrictions. There has been a significant loss of revenue due to changes in the transportation of manufactured goods. Companies are in need of new permits and governments have imposed new tariffs that have affected the supply routes.

Such changes in world trade demonstrate how the highly contagious COVID-19 virus are impacting the global economy. According to Natlawreview.com, "China's imposed a travel ban and other restrictions that shuttered manufacturing facilities in an effort to contain the virus, which in turn affected American companies operating in the country or reliant on components shipped from China". According to WTO.org or the World Trade Organization, "production and consumption are scaled back". In other words, trade is being affected by loss of the production of goods.

The impact of COVID-19 on our food supply has been equally regrettable, as described in subchapter 7.3, and its impact on transportation is discussed in subchapter 7.5. But perhaps the greatest catastrophe has been in the medical field, subchapter 7.4. While doctors and nurses work desperately to keep a massive number of virus patients alive in hospitals, emergency rooms, intensive care units, ambulances, and makeshift clinics, they are dealing with a shortage of critical medical equipment. The main supplier of face masks for example, is China. Due to America closing down its borders and interrupted trade, the US is unable to get the same number of medical masks to its medical professionals as before, and they need more of them now than ever. The lack of medical masks and other PPE (personal protective equipment), critical for a

healthcare worker's safety, has allowed the virus to further spread. To complicate matters, everyday Americans need to wear masks when in public, putting additional strain on the supply chain. "Take masks, for example. Masks help prevent the transmission of COVID-19, which is spread through respiratory droplets produced by sneezes and coughs." The mandate to wear masks has caused a major shortage in the USA. The type of mask in lowest supply is the N95 respirator, which has the highest filtration of disease-causing airborne particles. This mask should be used strictly by those working in the medical field rather than by civilians due to the extremely close contact that healthcare workers have with virus-infected patients. It has been confirmed by the CDC that COVID-19 can be carried on a mask for up to a week after landing on the surface of the mask, which is why it is important that masks be disposed after use, making the supply further strained. Until now, there is no treatment for COVID-19 and doctors are relying on methods and medicines that simply manage symptoms such as fever or inability to breathe, to manage underlying illness like diabetes or respiratory diseases that make outcomes of the virus more lethal. It is a very challenging learning curve and it is emotionally brutal for doctors, nurses and other healthcare workers, who do not know whether their patients are going to live or die. Hospitals are overcrowded with COVID-19 patients with no known cure, and to make matters worse they are running low on much-needed supplies. Subchapter 7.4 takes a closer look at the shortage of supplies that hospitals around the country are facing.

What remains to be seen is how these tremendous economic burdens will be addressed at the national level.

7.2 COVID19 and Trade

7.2.1 Effects of COVID19 on trade by John Quentin Seery

Pandemics are large-scale outbreaks of infectious disease that can greatly affect morbidity and mortality over a wide geographic area. But they can also cause significant political, social, and economic disruption. Trade is particularly important because it depends on all of these factors to function, and trade during the COVID-19 crisis has certainly taken a hit. The current trends pose challenges for both science and management of disease.

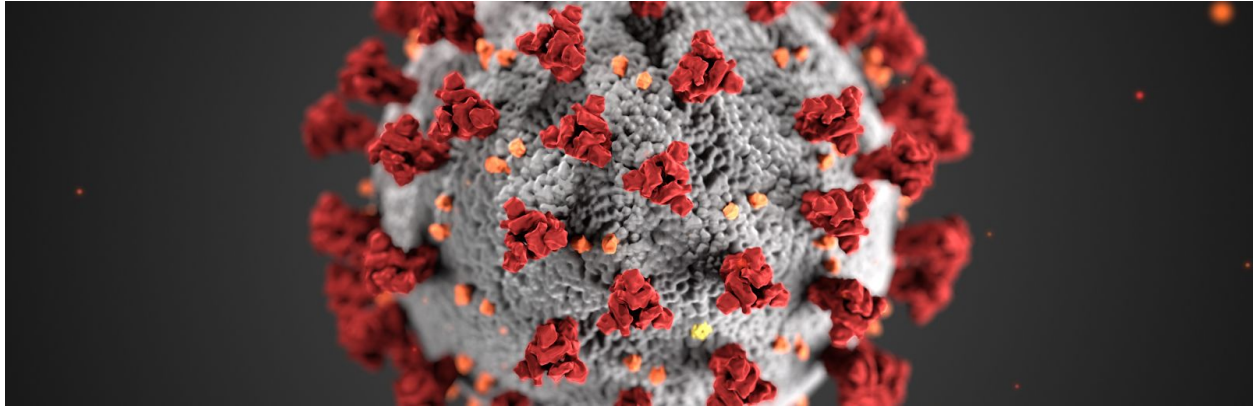


Figure.1: A Coronavirus Molecule

COVID-19 and all the uncertainty around this novel virus has caused a great deal of panic among quarantining populations, and with it, a reduction of economic activity and tax revenue. The impact on trade makes smaller and mid-sized markets particularly vulnerable, effecting not just the industries, but their workers. Based on infrastructure and economic development models, it projected that trade will see a mixture of massive layoffs, hiring sprees, and everything in between. Fortunately for industry and its employees, social distancing and lockdown orders do not preclude the need to eat and shop for certain essential items, and for many businesses that means they can continue operating. Governmental leaders and policies must consider any intervention that could help workers and the economy get through this uncertain time.



Figure.2: A woman shops while wary of touching any surface that may be infected

with COVID-19.

To sum it up, while the coronavirus is indeed an enormous health risk, the economy must continue to function so people can get the various goods they need. Sheltering in place, working and schooling from home are important to flatten the curve and slow the spread of contamination, but a complete economic shutdown could prove to be worse than the virus itself.

References:

1. <https://www.brookings.edu/blog/the-avenue/2020/03/19/covid-19-is-hurting-many-industries-and-workers-but-could-it-help-trade-and-logistics/>

7.2.1 Effects of COVID19 on trade by Prophet Davison

During times like this we can observe first hand the affects a widespread virus can have on not only the population but the economy and trade as well. In order to get more information about what we should do today we have to look towards the past and old pandemics' influence on trade.

Some key examples would be the bubonic plague and the spanish flu. The bubonic plague similar to covid affected many countries around the world although mainly in Europe, but Europe being one of the main powers at the time their economy took a big hit. Unsurprisingly trade routes were also a main way in which the virus spread, spread from host to host over the Indian ocean trade networks and many others. It's known that the plague started in Asia and in 1346 was passed to the mongols which were nomadic from then on it continued spreading making its way to constantinople. There was definitely a direct correlation between trade routes and the spread of the plague. With major European cities hit the economy took a major hit with serfdom (the state of being a serf or feudal laborer) decreasing and the price of things such as labour and goods going up. Compared to now is the 1918 influenza while Covid 19 is not as deadly as this one was and is more widespread we can draw some parallels to how its affecting the economy and the government. For example during this pandemic medical staff had been so overwhelmed in select cities that bodies were found lying in the street. While this is not happening currently our hospitals are still very much overwhelmed and that goes hand in hand with the economy. Insurance is one of the main ways hospitals make money, but with overwhelming amounts of patients and some who can't afford to pay medical fees there is a question of how the government will help. In the US stock markets are at their lowest and many small businesses have closed, but in both cases of the bubonic plague and the spanish flu, and the 1918 influenza after the pandemic was slowed the economy began to recover. It first focuses on our hospitals and first responders so that we can slow this pandemic before we can began assessing and fixing the damage done to the economy.

References:

Bubonic Plague (article). (n.d.). Retrieved from <https://www.khanacademy.org/humanities/world-history/medieval-times/disease-and-demography/a/disease-and-demography>

Conis, E. (2020, March 9). Before COVID-19, How Epidemics Affected the Economy. Retrieved from <https://time.com/5799582/epidemics-economies-history/>

Figure 2f from: Irimia R, Gottschling M (2016) Taxonomic revision of *Rocheportia* Sw. (Ehretiaceae, Boraginales). Biodiversity Data Journal 4: e7720. <https://doi.org/10.3897/BDJ.4.e7720>

(n.d.). doi: 10.3897/bdj.4.e7720.figure2f

7.3 Effects of COVID19 on the Food Supply by Penelope Fernandez

The impact of COVID-19 on the food supply has been nothing short of terrible. Worried shoppers have been bum rushing supermarkets and delis in order to get supplies that they think that they will need for the long term. The hysteria has caused a lot of people to stockpile toilet paper and other supplies, which has caused many markets to have half empty shelves. Subsequent shoppers are then not able to find the products they need. Such “panic shopping” and hoarding of products has a larger consequence on international trade routes, and on supply and demand. “For years, companies have worked hard to keep inventories low, timing shipments to balance supply and demand using knife-edge accuracy.” This means that because of the shortage of so much food and house essentials, they’ve had to double the supply to meet the demand of panicked shoppers. The food system relies on international trade which has been stopped, exposing the lack of inventory in the US, and causing people to have to rely on self-sufficiency. A solution to this is having better and larger inventories in times of crisis in order to accomodate the stockpiling that inevitably occurs. We can expect that COVID-19 will not be the last pandemic to strike the world, learning from our mistakes now to spare another crisis in the future would go a long way to protect the safety of people around the world.

References:

<https://phys.org/news/2020-03-covid-perils-food.html>

7.4 Effects of COVID19 on Medical Supplies by Malik Ford

One of the major crises of the COVID-19 outbreak is the shortage of medical supplies America is facing. A national survey of hospital infection control professionals reported that many medical facilities are nearing the end of their PPE (personal protective equipment) supplies. As of 27 March, nearly a third of facilities were almost out of face masks, 13% had no more plastic face shields, and about 25% were completely or nearly out of gowns (Thompson 2020). One in five facilities has no available respirators, which can mean life or death for those with severe symptoms (Thompson 2020). This has led to many unconventional ways of getting medical supplies to the places that need them most. Veterinarians, for example, have donated approximately 250 ventilators that are typically used on animals (Bryant 2020). Home Depot issued a 'stop-sale' order on N-95 masks, for the purposes of donating whatever supply they had to healthcare workers. Even the military is sending doctors, nurses, and medical supplies to New York in order to help lighten the load (Collins 2020).

This outbreak has truly shown how poorly the USA's health infrastructure fares in the face of a wide-scale outbreak. The country was simply not prepared for this problem. Manufacturers of medical supplies are working very hard to produce as much as they can, but they are only able to make so many at a time. The country can't just build more machines to manufacture these supplies overnight. These issues ought to be treated the same way the nation treats national defense. It doesn't build military aircrafts days or moments before entering a war, they are built well in advance. Critical medical supplies shouldn't be treated any differently. Stockpiling medical supplies to have on hand during a disaster could mean saving thousands of lives, yet the nation was unprepared. The lesson learned (or maybe not learned in spite of this catastrophe) is that the country should focus more on being prepared for situations like the current one.

References:

7.5 Effects of COVID19 on Transportation by Penelope Fernandez

COVID-19 has had effects on transportation as well. Many trains in New York City are

running faster due to low passenger usage, and there are more trains in use to allow for social distancing, but they are also a potential source of infection to the essential workers who rely on them to get to their jobs due to the high level of surface contact. Uber and Lyft drivers have taken extreme precautions to make sure that they don't get the virus by limiting contact with passengers, for example putting up see-through barriers to prevent passengers from touching, sneezing on, or breathing within the same area as the driver. Drivers are often suspicious if a passenger has a cough, even if they are not infected with the virus. Many Lyft and Uber drivers have lost income due to low ridership, and may not be eligible to claim unemployment insurance.

References:

<https://marketscale.com/industries/transportation/the-ripple-effects-of-covid-19-on-the-transportation-industry-roads-rails-rides/>

Chapter 08. Public Health & Safety and COVID

8.1 Introduction

Due to the high infection rate and lack of knowledge or treatment of COVID-19, the novel coronavirus poses a huge public risk. It spreads rapidly and is able to contaminate many within a short amount of time. This is very dangerous especially to those that are at higher risk due to underlying medical conditions or old age, and still need to venture out into the public seeking food and other supplies, exposing them to infection. But in the age of COVID-19, there are other threats at hand that need to be considered in the conversation on public health and safety. Take for example crime rates. Due to infection and illness, the number of police on duty has significantly decreased. Without sufficient police patrolling communities, crime continues to increase. As a result, according to recent news outlets, there has been an escalation of criminal activity, especially in poverty stricken areas. The lack of officers creates more tension within neighborhoods under the current climate of fear and panic. The police department isn't the only sector suffering a withdrawal of its workforce. Other emergency professionals such as firefighters are also low in number. Without sufficient efforts to prevent the spread of the virus, or to properly maintain buildings and other public structures, residents are endangered with hazardous surroundings. When local emergencies don't get the attention they need, simple problems evolve into complex situations due to the multiple factors at hand. Everyday employees such as grocery store cashiers have become essential workers due to a pandemic that jeopardizes entire populations. Chapter Eight looks at the various impacts of COVID-19 on public health and safety.

8.2 Effects on crime by Susan Look

Throughout this pandemic, all around the United States the news has seen a drop in crime rates. This can be attributed to stay-at-home and shelter-in-place orders. People's lives have shifted from being out and about, to being locked in at home, reducing the opportunity to carry out crimes. Crime is dependent on three things, "opportunity, motivation, and the absence of a capable guardian" said McCleary. Because of this virus, more people are staying home so fewer easy targets are walking around. People's houses are not targets for burglary as much, now that people are always in the house. Businesses all around the United States are much safer because they are closed.

McCleary has predicted a drop in burglaries, street crimes, auto thefts, larceny, and aggravated assault. On the flip side, it's been predicted that the United States could head into recession due to the economy shutting down. If money problems become too intense, there could be a spike in crime such as theft, as people become desperate, to make ends meet.

In New York City, the number of severe felonies has dropped to 16.6% from March 16 to March 22 compared to the same period in 2019. In Chicago, homicides have dropped to 29% during the week that the stay-at-home order went into effect. Online scamming is said to increase due to shopping centers being closed. Another concern that experts have, is an increase in domestic violence as alcohol use rises. Finally, communities could see a rise in crime as non-violent offenders are released from incarceration due to the high risk of contracting the virus that are seen in prisons' tight living quarters. As it becomes quickly evident, there are many factors related to COVID-19 that could have either a positive or detrimental effect on crime.

References:

Willets, M. (2020, March 25). How will the coronavirus affect crime rates? It's complicated, experts say. Retrieved from <https://www.thestate.com/news/coronavirus/article241494801.html>

Crime Hasn't Spiked During COVID-19 Outbreak – Yet. (n.d.). Retrieved from <https://www.usnews.com/news/national-news/articles/2020-03-30/coronavirus-quarantines-spark-drop-in-crime-for-now>

8.3 Effects on fire department services by Lisette Mejia

The coronavirus pandemic is straining resources around the country, and firefighters are feeling the impact as much as any other first responder. Firefighters are critical

personnel in any town or city, responding not only to fire situations but building code hazards, ambulance calls, and other 911 emergencies. But right now, they're finding themselves in a dangerous situation. While many workers in other industries have the possibility of working from home, firefighters live and work at the fire departments where their ladder trucks are housed in order to respond immediately to a crisis, and those spaces are notoriously small and tight. These conditions allow for rapid spread of the virus, should one of them become infected. While the need for firefighters to respond to emergencies remains high, training and preparedness sessions have been postponed. According to the New York Times, "several preseason meetings where fire teams get together to share information and prepare for the upcoming fire season have been canceled." This creates the possibility of poorer outcomes in managing fire emergencies. While the world responds to COVID-19, fire emergencies don't just go away to allow localities to focus on the virus. It is important that they continue to make conditions safe for the very people who may one day save our lives.

Pierre-Louis, K. (2n.d., March 20). How the Coronavirus Crisis May Hinder Efforts to Fight Wildfires . Retrieved from: <https://www.google.com/amp/s/www.nytimes.com/2020/03/20/climate/coronavirus-firefighters-wildfires.amp.html>

8.4 Effects of COVID19 on other Locally Related Emergencies

As the World stands still, businesses, museums, theaters are closed; meetings, conferences and sports events are postponed; social gatherings, jobs and schooling is happening remotely. Nonetheless, people keep getting sick. The United States has documented over 600,000 deaths already which is one third of the total casualties in the world. Meanwhile, patients with other illnesses continue to require daily treatment (John Hopkins University). Amid this outbreak, patients with underlying illness have been in more danger than ever because of their compromised immune systems and with constant contact with outsiders. Many elected surgeries have been postponed, but this does not mean medical assistance stops if someone were to have an emergency crisis such as heart attack. The precautions and medical response remain the same and the person would receive immediate care.

8.5 Effects of COVID19 on Public Transportation and Healthcare Workers

The coronavirus is spread when someone is exposed to respiratory particles of those who are already infected, for example through sneezing, coughing or even simply talking. If these particles enter the respiratory system of a healthy person through touching their eyes, nose or mouth, they can develop the illness caused by the virus. This poses a great risk to not only health care workers but also people who use and

work in public transportation. These kinds of workers are known as essential workers. Essential occupations can vary from pharmacists, security services, mass transit, food and agricultural workers, news media, people who work in hospitals, and workers who support national security. Health workers recognize that the risk of exposure to the virus doesn't outweigh their indispensability during a pandemic, when they are needed most. But some health workers aren't even getting the right protective gear and equipment they need to ensure their own safety and prevent the spread of the virus. Their highly pathogenic workplace setting demands that they be given proper masks and gloves or else they simply cannot do their work. This forces the workers into a dilemma of needing to choose between their health or job.

8.5 Special Case Study: Sacrifices made by Medics and other Health Care Workers in Wuhan, China, by Emily Shi

Thousands of people have contracted COVID-19 and many have died from the illness. But in Wuhan, China, many healthcare workers are working hard to give their patients the best treatments possible. These medics work around the clock, day and night to try to save as many lives as they can. Even though these healthcare workers risk their lives to save their patients, they provide them with the utmost care.

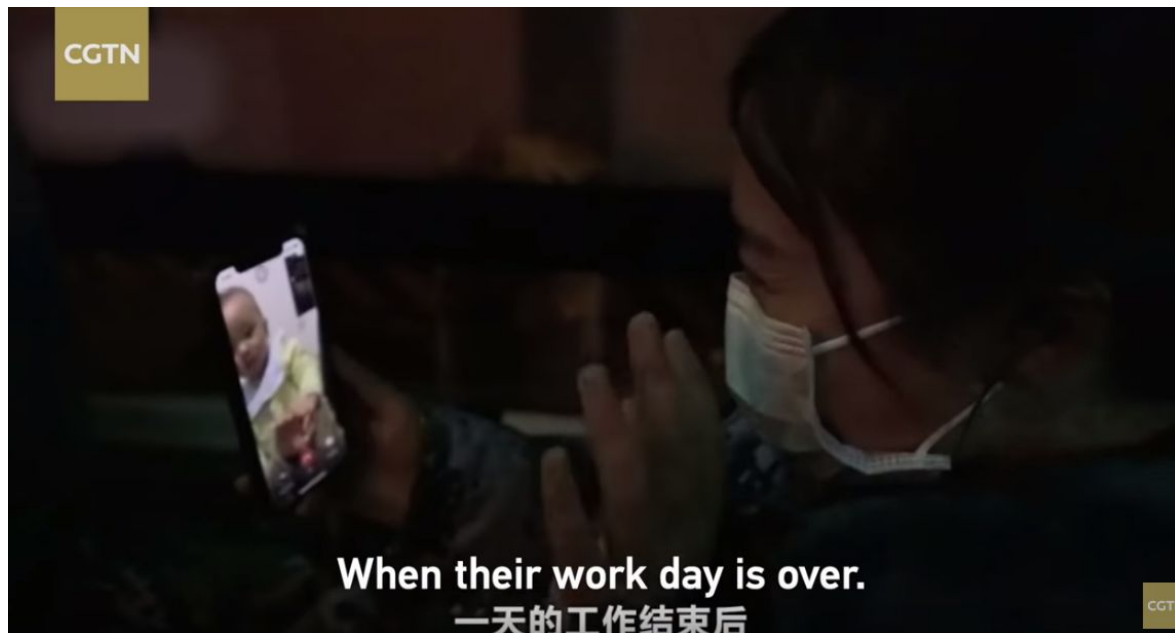


Photo from CGTN interview

Medics working in Wuhan and neighboring provinces come from all over China to help COVID-19 patients. Many medics leave behind their families and seldom get time off to spend it with their loved ones. Zhang Jixian is a doctor who works at the Integrated Chinese and Western Medicine Hospital of Hubei, and was one of the first doctors to notify Hubei and the nation about the COVID-19 outbreak. In an interview with "China

Daily,” Zhang Jixian was very emotional when the subject of families was brought up. She solemnly said in the video “Don’t bring up the subject of families, talking about families makes me so sad. Because I don’t have time for them. Sometimes I’m so busy I forget about them, when I remember, I feel that it is indeed my fault. As a daughter, how can I be negligent of caring for my parents.” She was caring for her patients and she did not have time to think about her family. Numerous encountered the same problem. They’re oftentimes faced with needing to choose between going to Wuhan and assisting COVID-19 patients, or being filial and taking care of their own families. Many medics have a hard time convincing their families why these patients are more important than their own families but when people become a doctor or a nurse, an oath is taken to take care of sick patients. Zhang Jixian also said “it’s true that one must choose between loyalty and filial devotion,” showing how difficult it is for both medics and their families. Many doctors and nurses from all over China were drafted to work in hospitals in Wuhan and other neighboring provinces to take care of COVID-19 patients and so they are further away from family and can only contact them via digital devices. These medics also work long shifts because there is a shortage of medics, so contacting family members is challenging when these doctors are exhausted from work.



Photo from CGTN Interview

With the overabundance of COVID-19 patients, the number of doctors and nurses is not enough, many of them are forced to work long shifts before taking breaks. Having to wear protective suits, masks, and goggles daily for an extended period of time can result in blisters and rashes, and can leave them very fatigued. In an interview with CGTN, Sun Qing, an ICU nurse from the Military Medical Team worked so hard she was hypoglycemic (low blood sugar). She said “ I guess it should be hypoglycemia. I had some chocolate, and I’m feeling better now. Like my heartbeat is coming back”

these nurses work so hard to care for their patients that they get hypoglycemic and yet after eating some chocolate, Sun Qing went directly back to work. Once Sun Qing and her colleagues got off from work, they noticed that by wearing gloves for so long every day, the color of their hand is different than the color of the rest of their arm. In the interview one worker said “after wearing a mask for such a long time, they don't even know what we look like-complaining about the protective clothings-the marks on their faces and the tired body”. Even forgetting what they look like in normal clothes and without masks shows how long they must have their protective gear on. In another interview with China Daily, Fan Xuepeng asked the cameraman “how do you feel wearing a protective suit? is it suffocating? is it hot?” The cameraman responded “ yes, it's suffocating and hot” Fan Xuepeng said the cameraman hasn't done much but nurses need to stay inside the suits for 6 to 8 hours and work, it's very uncomfortable for them. Doctors and nurses have to wear protective gear to protect themselves, but wearing them all day long every day can leave blisters and rashes. In an interview with CGTN, Lyu Wen a nurse in Wuhan Union Hospital said “there are so many blisters on my face, they hurt. I have to use this gauze or I can't wear face masks and goggles.” Nurse Lyu and her colleagues work 6-hour shifts, the whole time wearing these protective gear. No matter if these blisters form, Nurse Lyu uses gauze to prevent them from popping and continues to work. While wearing these suits, they cannot eat, drink or use the bathroom. Zhang Fang, another nurse at Wuhan Union Hospital says that the hospital also bought adult diapers for them to use. Working under these conditions is challenging and yet they persevere and proceed to treat their patients with the utmost care. These doctors and nurses are the true heroes in Wuhan, China, taking care of COVID-19 patients to the best of their ability.



Photo from CGTN Interview

Ambulance drivers who risk their lives to get patients to a hospital are also hardworking and very valuable. When people call hospitals about someone contracting the virus, they are the first responders. They drive to the area with their protective gear on and get the infected person onto the ambulance. They drive to the nearest hospital, but if the hospital does not have enough machines to check if the person for COVID-19 or to treat them, they drive to other hospitals that do. (CT scans are used to see if a person has pneumonia and thermometers are used to check for fevers.) Once a person is confirmed to have COVID-19, they are accepted into the hospital where they would get treated. A lot of people still contract the virus and so the ambulance drivers usually have a long shift. Liu Shen is an ambulance driver, in an interview with China Daily, he said “the earliest ride starts at 8 or 9 a.m., considering we usually start our shift at 9. Sometimes we’d take 3 or 4 trips in one night, driving on the road the whole time with no time to rest.” Starting his shift early, and staying up late driving around to pick up the patients is a lot of work and he usually sleeps whenever he can until another call comes in.



Photo from CGTN Interview

With COVID-19 still spreading in Wuhan, China, many doctors, nurses, and ambulance drivers work hard to help their patients get better. These medics in Wuhan play an extremely important role in caring and curing their fellow Chinese citizens who are infected with COVID-19. Ambulance drivers spend their time delivering patients to hospitals and preventing other citizens from contracting the virus. Doctors and nurses work long hours to care and cure their patients even in uncomfortable situations. Many doctors, nurses and ambulance drivers in Wuhan have made many sacrifices to help those infected with COVID-19 and we wish they get recognized for the beautiful work they have done to help Wuhan, China.

References:

DW documentary. (2020, March 17). Coronavirus in China | DW documentary [video]. YouTube: <https://www.youtube.com/watch?v=3K3fy5eKeuM&list=PLN8VbMhsgV3qws4m3YUjt3-INSYeuKXhG&index=2&t=0s>

CGTN. (2020, February 22). On the Scene | Wuhan Vlog: One day with the military nurses in the ICU at Huoshenshan [video]. YouTube: <https://www.youtube.com/watch?v=PMj3UAcITu4&list=PLN8VbMhsgV3qws4m3YUjt3-INSYeuKXhG&index=3>

China Daily. (2020, March 10). Battle in the Quarantine ward in Wuhan. More patients recovered. [video]. YouTube: https://www.youtube.com/watch?v=6xSbGv3m_Ok&list=PLN8VbMhsgV3qws4m3YUjt3-INSYeuKXhG&index=4

China Daily. (2020, February 20). Zhao jixian, Who sounded the alarm of a #Virus outbreak. Watch the video to know her story [video]. YouTube: https://www.youtube.com/watch?v=IQH4zHX0_aA&list=PLN8VbMhsgV3qws4m3YUjt3-INSYeuKXhG&index=5

China Daily. (2020, February 16). Ambulance driver in #Wuhan: As a party member, we should take the lead in battling the epidemic [video]. YouTube: https://www.youtube.com/watch?v=1_3Z8dj3LNc&list=PLN8VbMhsgV3qws4m3YUjt3-INSYeuKXhG&index=6

China Daily. (2020, March 2). Six hours in Wuhan: Fighting Death on the Front line [video]. YouTube: <https://www.youtube.com/watch?v=tRfWyhRsh-A&list=PLN8VbMhsgV3qws4m3YUjt3-INSYeuKXhG&index=8>

South China Morning Post. (2020, March 13). Rare look at medical staff in China's central city of Wuhan on front lines of the coronavirus fight [video]. YouTube: <https://www.youtube.com/watch?v=os4yemZA6Qc&list=PLN8VbMhsgV3qws4m3YUjt3-INSYeuKXhG&index=9>

Chapter 09. Past and future of pandemics

Introduction by Kate Mumford & Dayanara Sanchez (Co-Lead Editors), Contributions by Prophet Davison, Aiyana Avery, Karla Cortes, & Max Feldman.

9.1 Introduction

Throughout the course of history there have been many pandemics that have devastated the human population, and whose after-effects have thrown society off balance during the road to recovery. Pandemics affect society in various ways and at all levels, which can be seen in the way empires have carried out their conquest attempts, and how trade and globalization was responsible for the spread of illness. Diseases such as the Spanish Flu and the Black Death provide case examples of historical pandemics. Like Prophet Davison explains in the chapter on trade and pandemics, “There was definitely a direct correlation between trade routes and the spread of the plague.” Many empires and large civilizations fell because they weren’t able to withstand the effects of these epidemics on its people and its societies And, as Kate Mumford writes in the chapter titled “Effect of globalization on pandemics”, “the world cannot go back to what it was before globalization, so both the good and bad effects of connectedness must be considered when it comes to pandemics.” Without the massive spread of disease that happened even centuries ago, the world would be a very different place than it is today.

Pandemics and widespread disease will continue to be a threat even after the COVID-19 outbreak is over. In the future, societies will continue to have to deal with this threat, but after learning from the circumstances surrounding the current pandemic, it’s likely that the way that the global community prepares and responds will be different. This will be due mainly to the advancement of technology. It’s quite likely that technology advancements will continue to boom in the same way that they have been for the past decade. This technology will come in the form of biological breakthroughs, in both beneficial and nefarious forms. Like Max Feldman describes in the chapter on Rogue Scientists, “biological warfare and CRISPR combined have the potential to create biological weapons that are extremely resistant and fatal and in the wrong hands can be used for malicious reasons that may have detrimental effects”. In addition, technological breakthroughs will happen in online platforms, which will allow future generations to be able to become more virtually connected in times of isolation, as Karla Cortes writes in “Virtual Connectivity and Pandemics”: “With all the new resources to stay connected, physical isolation equals virtual connection.” All in all, the COVID-19 global pandemic is not the world’s first massive outbreak, and will not be the last, but one thing is for sure: the way in which society acts during pandemics has changed and will continue to evolve.

9.2 Trade and Pandemics

During times like the present in which the world finds itself, society can observe the effects a widespread virus can have on not only the human population, but the economy and trade. In order to get more information about what we should do today we can look at past pandemics' and their influence on trade. Some key examples would be the Bubonic Plague and the Spanish Flu.

The Bubonic Plague, similar to COVID-19, affected many countries around the world, although it was centered mainly in Europe. Europe was one of the main powers at the time, and their economy took a big hit. Unsurprisingly, trade routes were a main way in which the virus spread, moving from host to host over the Indian ocean trade networks, as well as many others. The plague started in Asia in 1346 and was passed to the Mongols, who were nomadic. From there it continued spreading, making its way to Constantinople. There was a direct correlation between trade routes and the spread of the plague (William J. Bernstein, 2008). When the disease made its way to major European cities, the number of people in serfdom (the state of being a serf or feudal laborer) decreased and the price of things such as labor and goods went up.

The Spanish Flu started in the early 1900s. COVID-19 has proven to be not as deadly and more widespread than the Spanish Flu, but we can draw some parallels to how it's affected the economy and the government. (Elena, 2020). For example, during the Spanish Flu, medical staff were so overwhelmed in select cities that bodies were found lying in the street (Thomas Garrett 2007).

While this is not happening currently, at least in the United States, hospitals are still very much overwhelmed, as is the economy. Insurance is one of the main ways hospitals make money, but with overwhelming amounts of patients and some who can't afford to pay medical fees, the government is forced to step in with assistance. U.S. stock markets are at their lowest and many small businesses have closed. A similar economic catastrophe was seen in the Bubonic Plague and the Spanish Flu. In the aftermath however, the economy began to recover. To learn from the pandemics that came before, society should first focus on our hospitals and first responders so that the pandemic can be slowed, then begin assessing and fixing the damage done to the economy.

9.3 Role of Pathogens in Conquest Attempts

There are several examples throughout history in which pathogens were used as a form of weaponry in conquest attempts and land grab tactics. In 1346 Mongols catapulted the bodies of plague victims over the city walls of Caff, Crimea, to bring the city down. Upon impact, the cadavers would splash bodily fluids, infecting the people in the surrounding areas (Broughton, n.d.) These bodies would then be feasted upon by rats which would help in spreading the disease further throughout the conquered empire. When a rat digests an infected body, its feces, once dry, breaks up into microscopic aerosol

particles, making it easier for people to inhale and become infected with the new pathogen (PestWorld, 2014). These rodents also would be able to spread disease through interaction with other insects that later make contact with human beings. "Diseases carried by rodents can also be spread to humans indirectly, through fleas, ticks, or mites that have fed on an infected rodent" (PestWorld,2014). These takeover tactics were used by the Mongols to make the people of Cappadocia vulnerable and in the end, brought them down to their knees and concluded in negotiations between Cappadocia and the Mongols. To make matters worse, as the conquered peoples started showing symptoms of illness, panic grew, resulting in mass fleeing, and as a result the plague was carried to new cities along the way, such as Constantinople (Kalu,2018).

9.4 Empires and pandemics

Over the centuries, the world has seen the rise and fall of countless empires. An empire can be defined as a state which has control over other states and seeks to expand its power (Davidson, 2011). Historical empires have fought battles with many different armies over time. However, there is another enemy that many empires have had to confront, often more deadly than battalions or gunfire: disease. Diseases that affect an immense portion of the population over a large geographic area is known as a pandemic (Merriam-Webster, 2020). Some pandemics include the Antonine Plague in 165-180 CE during the Roman Empire, and the Plague of Justinian in 541-542 CE during the Byzantine Empire. They both changed the way that the empires functioned and had enormous effects on the course of history.

The Roman Empire lasted from 27 BC to 476 AD, and in 165 CE the empire was co-ruled by Marcus Aurelius and Lucius Verus. Prior to this, Lucius Verus had led armies in a fight against the Parthians, in the middle-east. When he and his army traveled via the Mediterranean on their return to Rome, he and his armies brought back an extremely deadly disease, and spread it along the way. The military lived in very tight quarters, and the empire was constantly warring against their neighbors, so the disease spread quickly and vastly. It is believed that the Antonine Plague killed between 10 and 15 percent of the empire or 60-70 million people. This disease affected all aspects of the massive Roman Empire. For example, the Germanic tribes that the empire was battling crossed into the Roman territory for the first time in centuries. This was the start of the Roman army's demise. When the military needed the money most, the economy began to collapse because so many people were dying of illness, resulting in a massive loss in tax income. Furthermore, the weakness caused by the disease made it a lot easier for barbarians from neighboring communities to invade. The pandemic was not just poorly managed by the government, but it was one of the factors that led to the ultimate weakening of the Roman Empire. Due to the connectedness of the empire and the nature of the military, the disease spread in huge ways and caused the empire to lose much power.

Another major pandemic that ravaged an empire was the Plague of Justinian, in 541-542 CE. After the fall of the Roman Empire, the Byzantine Empire emerged out of

what was the Eastern portion of the Roman Empire. This plague was actually the Bubonic Plague, but this event occurred centuries before the 14th-century outbreak of the Black Death (Sowards, 2016). The disease most likely started in India or China, and through trade, it spread into North Africa and the Mediterranean area (The Pacifist, 2020). This plague's carriers were the black rat and fleas, which got into ships and traveled with merchants and trade. At the time, the emperor of the Byzantine Empire was Justinian, and his goals included bringing the empire back to glory- he fought many wars in efforts to conquer Italy, Northern Africa, and other barbarian tribes. These attempts at conquest caused a spread of infected rats and dispersed the disease further throughout the empire. The disease was so poorly managed by the emperor that bodies littered the streets, and were disposed of in all sorts of ways, such as mass burial pits and bodies being dumped into the ocean. It was so widespread that even the emperor himself had it at one point. The military was immensely weakened, and defenses on all sides fell. The government itself began to collapse under the pressure of the disease. Twenty-five percent of the empire's population died, with approximately 5,000 dying in the capital city every day (Horgan, 2015). It is considered to be the pandemic with the 4th largest death toll, after the Black Death, Smallpox, and the Spanish Flu (LePan, 2020). These historical examples are important illustrations of how plaques affect empires.

9.5 Effects of Globalization on Pandemic

Globalization can be described as “the growing interdependence of the world's economies, cultures, and populations, brought about by cross-border trade in goods and services, technology, and flows of investment, people, and information” (Kolb, 2018). Globalization has been responsible for the spread of goods, political ideologies, religion, culture, and much more. Since the development and use of the Silk Road in 130 BC (History.com, 2017), connections between the continents have been made, and interconnectedness has grown. As discussed in the previous chapters, many historical diseases such as the Black Death, the Spanish Flu, and the Antonine Plague have ravaged across countries and even continents. In each of these situations, connectedness has played a huge role in the spread of the disease, and without this spread, the effects of the disease on the world as a whole would be immensely different. Pandemics have contributed greatly to the spread of disease, both in the past and with the present pandemic. However, globalization has also allowed for more spread of knowledge and training and a larger worldwide network to research solutions to disease. The world cannot go back to what it was before globalization, so both the good and bad effects of connectedness must be considered when it comes to pandemics.

Due to the combination of heightened population growth and technological advancements that allow for very fast travel, the way that disease spreads has changed immensely. The ability to book a flight and go to a country on the other side of the Earth within a matter of hours is a huge reason that disease spreads so quickly today. Cruise ships are another popular means of globe trotting, and are in fact responsible for some

of the earliest spread of COVID-19 (Amos, 2020). Besides modern forms of travel, a shift in political ideology has also been a catalyst for disease spread. “The global spread of capitalism and the free market is the main driving force behind the current era of globalization”(Knobler, 2006). As goods are being spread around the world with such ease (enabled by capitalism in many countries), disease is spread with it. The West Nile virus’s introduction into the USA, the swine flu in 2009, and COVID-19 are just a few examples of pandemics that have spread mainly due to globalization and interconnectedness. The global change from localised food consumption to long distance shipments of food has also been a reason for greater spread of disease. Wealthy nations have an especially high demand for seasonal foods year round, causing much of their foods to be imported. This can spread foodborne diseases such as E. Coli and salmonella (The National Academies, 2020).

However, the upside of globalization in times of a pandemic is a greater body of research that can be used to work for a solution. In addition, globalization allows doctors and health officials from around the world to help countries in need by training them in pandemic response and recovery, and supplying them with resources (Knobler, 2006). For example, in the Ebola epidemic, the United States worked with many countries in Africa such as Guinea, Liberia, and Sierra Leone to help contain and manage the illness, which wouldn’t have been possible without globalization (USAID, 2019).

9.6 Virtual Connectivity and Pandemics

Embracing virtual connectivity has become the new normal. While there is no actual definition of what constitutes “normal,” what can be stated as true is that many people across the world have had to adapt to new ways of living under the current circumstances of COVID-19. Being apart from the outside world may be tormenting to many, but it’s something most people around the world have been forced to embrace. As we withdraw from the real world to lower our risk of being contaminated and spreading the coronavirus, we are becoming more prosocial. With all the new resources to stay connected, physical isolation equals virtual connection. There are many drawbacks and disadvantages in technology, but this is an environment where it can benefit us. We ought to take this time to improve our digital skills and use the tools that will help us stay connected.

Today, virtual communication is supported by a variety of apps and services. Text messaging, voice calls, video conferencing and social media are available. Not only have these programs changed personal lives, but they have allowed workers to continue their jobs remotely. Google hangouts and Zoom are being widely used by those working from home and for schooling. Tech companies are constantly improving the quality of their apps, as the pandemic has motivated companies to advance their products to fully satisfy their customers. Gmail accounts make virtual connection possible for many users. Using Gmail, one can sign up and access most online sites, making connection to others easier. Virtual communication has become the most predominant aspect of social life for individuals, and has evolved together with the

current pandemic and the social distancing restrictions which have been implemented to slow the spread of infection. The web became publicly available by the year 1991, which brought on a new world that would shape the way the future advanced. The Internet allows access to vast amounts of ideas, history, and information. Without access to the internet and the virtual world, the COVID-19 pandemic would have been incredibly difficult to manage and be dealt with properly.

Before touch screens and the ability to stay in touch with one another easily through digital devices, carving messages or information into stone, or the use of smoke signals is how people communicated. It then advanced to people writing letters to communicate distantly with friends and relatives, at least until the telegraph's invention in the 19th century by Samuel Morse, otherwise known as "Morse Code." The Telegraph marked the first significant advancement in communication technology. With a useful invention like the telegraph, people were able to communicate over long distances faster than before, which provided a stepping stone to future advances in the technological world.

9.7 Rogue Scientists, CRISPR, Bioengineering and Biological Warfare

Biological warfare has been a method used in conflict for thousands of years, with the aim of causing as much damage as possible to one's enemies. Biological warfare is defined as the use of toxins of biological origin or microorganisms as weapons during times of war. The use of biological warfare can be traced back to 600 BC when Solon used the herb hellebore to poison his enemies during the siege of Krissa (Riedel, 2004) and likely before then as well. More recent incidents of biological warfare include when Japan infected its enemies with diseases like anthrax during WWII or when the British gave Native Americans smallpox blankets when they arrived in North America (Riedel, 2004).

CRISPR is a family of genetic sequences that act as defense mechanisms from prokaryotic organisms such as bacteria and archaea (Vidyasagar, 2018). CRISPR gene editing was adapted from this family of DNA sequences and allows scientists to alter genetic sequences and modify the gene function for certain genes (Vidyasagar, 2018). CRISPR can be utilized by scientists for either malicious or beneficial causes. With the power of CRISPR, rogue scientists have the power to create biological weapons such as synthetic diseases which could possibly kill countless numbers of people.

Biological warfare and CRISPR combined have the potential to create biological toxins that are extremely resistant and fatal to their victims. In the wrong hands, it can be used for malicious reasons that have catastrophic effects. The creation of biological weapons requires highly trained and knowledgeable scientists in order for them to work effectively, which begs the question, why are scientists creating these biological weapons if they were educated with the objective of advancing humanity in a positive way? The most likely answer is that either the enemies have these weapons already and scientists want their nation to be prepared, or so that they can protect themselves

(Guillemin, 2006). Utilizing CRISPR, scientists have the ability to bioengineer new biological weapons that are advanced to the point where it's extremely hard to prevent or cure the resulting illness. CRISPR and bioengineering in the wrong hands can lead to the decimation of entire civilizations and as a result should be under strict regulation.

References:

Amos, O. (2020, April 20). Coronavirus journey: The 'last cruise ship on Earth' finally comes home. Retrieved from <https://www.bbc.com/news/world-52350262History.com>

Bryant, M. (2016, March 3). 20 years ago today, the World Wide Web was born - TNW Insider. Retrieved from

<https://thenextweb.com/insider/2011/08/06/20-years-ago-today-the-world-wide-web-opened-to-the-public/>

Bubonic Plague (article). (n.d.). Retrieved from <https://www.khanacademy.org/humanities/world-history/medieval-times/disease-and-demography/a/disease-and-demography>

Catapulted Death: Can a Flying Corpse Distribute the Plague? (n.d.). Retrieved from <http://www.montana.edu/historybug/yersiniaessays/broughton.html>

Conis, E. (2020, March 9). Before COVID-19, How Epidemics Affected the Economy. Retrieved from <https://time.com/5799582/epidemics-economies-history/>

Davidson, P. (2020, April 6). Empire. Retrieved from <https://www.ancient.eu/empire/>

Editors. (2017, November 3). Silk Road. Retrieved from <https://www.history.com/topics/ancient-middle-east/silk-road>

Figure 2f from Irimia R, Gottschling M (2016) Taxonomic revision of Rochefortia Sw. (Ehretiaceae, Boraginales). Biodiversity Data Journal 4: e7720. <https://doi.org/10.3897/BDJ.4.e7720>. (n.d.). DOI: 10.3897/bdj.4.e7720.figure2f

Frischknecht, F. (2003, June). The history of biological warfare. Human experimentation, modern nightmares and lone madmen in the twentieth century. Retrieved from <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1326439/>

Frost, C. A. (n.d.). What Is Virtual Communication Technology? Retrieved from <https://www.techwalla.com/articles/what-is-virtual-communication-technology>

Guillemin, J. (2006, July). Scientists and the history of biological weapons. A brief historical overview of the development of biological weapons in the twentieth century. Retrieved from <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1490304/>

Horgan, J. (2020, April 5). Antonine Plague. Retrieved from https://www.ancient.eu/Antonine_Plague/

Horgan, J. (2020, April 5). Justinian's Plague (541-542 CE). Retrieved from <https://www.ancient.eu/article/782/justinians-plague-541-542-ce/>

Imagcwp. (2012, May 1). Communication Technology from the Past, the Present, and the Future! –HollyCurtis Paper1-3. Retrieved from <https://imagcwp.wordpress.com/2012/05/01/communication-technology-from-the-past-the-present-and-the-future-hollycurtis-paper1-3/>

Kalu, M. C. (2019, July 9). Birth of the Black Plague: The Mongol Siege on Caffa. Retrieved from <https://www.warhistoryonline.com/instant-articles/mongol-siege-caffa-black-plague.html>

Knobler, S., Mahmoud, A., & Lemon, S. (1970, January 1). Summary and Assessment. Retrieved from <https://www.ncbi.nlm.nih.gov/books/NBK56579/>

Kolb, M. (2020, January 29). What Is Globalization? Retrieved from <https://www.piiie.com/microsites/globalization/what-is-globalization>

LePan, N. (2020, April 7). Visualizing the History of Pandemics. Retrieved from <https://www.visualcapitalist.com/history-of-pandemics-deadliest/>

Merriam Webster. (n.d.). Pandemic vs. Epidemic: What is the Difference? Retrieved from <https://www.merriam-webster.com/words-at-play/epidemic-vs-pandemic-difference>

Riedel, S. (2004, October). Biological warfare and bioterrorism: a historical review. Retrieved from <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1200679/>

Rubin, G. (2020, March 23). Coping with COVID-19: Ideas for Staying Connected in this Time of Social Distancing. Retrieved from <https://gretchenrubin.com/2020/03/coping-with-covid-19-staying-connected>

Sowards, W. (2016, May 10). What was the Plague of Justinian? Retrieved from <https://www.passporthealthusa.com/2016/05/what-was-the-plague-of-justinian/>

The National Academies. (2020). The National Academies presents: What You Need to Know About Infectious Disease. Retrieved from <http://needtoknow.nas.edu/id/challenges/globalization/>

The Pacifist. (2020, January 13). The Plague of Justinian. Retrieved from <https://www.youtube.com/watch?v=pJ35NulUNIY>

USAID. (2019, September 5). Ebola: The Recovery. Retrieved from <https://www.usaid.gov/ebola>

Vidyasagar, A. (2018, April 21). What Is CRISPR? Retrieved from <https://www.livescience.com/58790-crispr-explained.html>

What Diseases Do Mice & Rodents Carry? Rodent Diseases. (n.d.). Retrieved from <https://www.pestworld.org/news-hub/pest-health-hub/health-hazards-posed-by-rodents/>

It is no measure of health to be well adapted to a profoundly sick society.

-Jiddu Krishnamurti.