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## Unique Perspectives on the Spread of COVID-19

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# Unique Perspectives on the Spread of COVID-19

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News articles and research studies highlighting the changing knowledge about COVID-19 have cast a mundane, yet ever constant glare on our lives. The broad scope of the virus has brought together professionals from diverse research backgrounds, thus providing us unique perspectives into the nature of this pandemic. In this article, we will be highlighting interesting COVID-19 research efforts in three unique fields: geoscience, mechanical engineering, and political science.

Dr. Charlie Zhang, a professor of geography and geoscience at the University of Louisville, conducted research on the relationship between socioeconomic trends and the spread and impact of COVID-19 as of June 2020. Using data provided by Johns Hopkins University, Dr. Zhang analyzed infection rates and COVID-19 deaths across counties in the United States. He sought to identify how socioeconomic factors contributed to disparities observed across counties.



Photo 1. Photo Portrait of Dr. Charlie Zhang.

The results of the study indicate that while metropolitan areas have larger populations leading to high concentrations of COVID-19

infections and deaths, several non-metropolitan areas face surprisingly similar incidence and mortality rates. In fact, Dr. Zhang mentioned that “the Midwest states like North Dakota and South Dakota have the highest infection rates nationwide.” In our interview, Dr. Zhang explained that these surprisingly high morbidities in these rural communities are likely due to large elderly populations, high levels of preexisting health conditions, high levels of poverty, and inaccessibility to healthcare facilities, services, and insurance.

Cultural climates further contribute to these disparities. Non-metropolitan areas’ social structures are built around community engagement, creating resistance to social distancing. Resistance to social distancing is compounded by the perception that rural communities are invulnerable to the pandemic, creating a false sense of justified exemption from safety guidelines. Social distancing is also more challenging in these communities due to the lack of jobs with remote accessibility. Furthermore, several rural government leaders neglect to emphasize the importance of social distancing or the severity of and risks associated with the pandemic. Dr. Zhang commented on this during our interview when saying, “Officials and governors in the Midwest barely practice or enforce any kind of social

distancing like wearing a mask or practicing social distancing.” Dr. Zhang’s research debunks the perception that non-metropolitan communities are spared from the impacts of the pandemic and indicates that they are, in fact, more vulnerable in some regards. His findings not only validate the existence of a threat but also identify what disparities have led to a disproportionate amount of these communities being affected. With this information, policies can be enacted that address specific vulnerabilities and more attention can be given to rural communities. Dr. Zhang described his work’s relationship with policy development when he said:

*“We found several variables including people who are below poverty, elderly age groups, and [...] the percentage of people who tested in a state. All these variables show a significant impact on infection and mortality rates. This can inform policy makers to help the most vulnerable demographic groups and communities.”*

Healthcare insecurity, for example, can be addressed by providing greater access to testing resources and mobile

health clinics. These findings also can help rural communities better understand their own susceptibility and consequently promote social distancing. Ultimately, Dr. Zhang's research provides us with a greater understanding of the specific impact of the pandemic on rural communities.

While the socioeconomic perspective described the spread of COVID-19 on a larger scale, research in engineering has highlighted the spread on a cellular level. To elaborate upon this line of research, we interviewed Md Mahamudur Rahman, a PhD candidate at UoFL's Department of Mechanical Engineering. He recently conducted a study describing the potential role of membrane tension on the spread of COVID-19. Mr. Rahman initially became interested in this line of questioning when he observed some animations of a virus diffusing into a cell. This encouraged him to connect with the Neuroscience department to further understand how the virus spreads. Eventually, he published a research article which discusses how membrane tension can be impacted by factors such as temperature, humidity, and the use of masks.



Photo 2. Photo Portrait of Md Mahamudur Rahman

The practicality of masks has been debated since the start of the pandemic. While most people agree that masks can slow the spread of the virus, some still have questioned their efficacy.

Although masks do not guarantee protection against the virus, they do block most of the particles in the air which significantly decreases the chances of infection. Mr. Rahman's research sheds a new perspective on masks, suggesting that they do more than merely block pathogens from entering our body. Mr. Rahman states that by

*“inhaling hot and moist air, we prevent our nasal airway temperature from dropping. The higher temperatures, such as those close to body temperature, stop the favorable virus replication process which is caused by cell membrane fusion.”*

Stopping replication is critical because wearing a mask not only decreases chances of infection, but if you do contract COVID-19, it's less likely to be as severe.

Mr. Rahman further described how temperature and humidity may play a large role in the virus' spread. By plotting the number of COVID-19 cases against indoor climate (indoor temperature and humidity) such as in a hospital waiting room, Mr. Rahman discovered some interesting patterns. According to his data, a less humid environment and a critical wet bulb temperature, which is measured from indoor temperature and humidity, of around 50-58°F appears to correlate to an increased spread of COVID-19.

During colder months, what should we do to prevent the spread of COVID-19? First, wear a mask. Always mask up around others, but Mr. Rahman also recommends occasionally wearing one when you're alone because it can stop virus replication by “keeping your nasal passages hot.” Of course, wearing a mask indoors is critical but when you're outside and far from other people, you actually might want to

avoid masks. In freezing conditions, the wet bulb temperature is already away from the critical range mentioned earlier. Thus, wearing a mask in freezing temperatures may raise your nasal airway temperature to the critical range at which the virus can replicate favorably. With this in mind, always keep your masks on around other people; however, if you're outside and far away from others, consider keeping the mask off. When you are at home, try to avoid keeping the temperature set to the critical wet bulb of 50-58°F. He also suggests that people should “humidify their rooms because that increases the wet bulb temperature which avoids the favorable virus replication conditions.” Mr. Rahman recommends staying in hot and humid environments, such as cooking at a hot stove, relaxing in a warm bath, or sitting near a humidifier that generates warm steam.

Ultimately, our interview with Mr. Rahman furthered our understanding about why masks are vital in controlling the spread of this virus. We were also able to learn about how temperature and humidity contribute to how the virus replicates. We hope people apply this information to their daily lives so that we can all contribute to preventing the spread of COVID-19.

Besides the physical and socioeconomic factors, the mindset of the public significantly contributes to the spread of COVID-19. With mass media available at everyone's fingertips, huge amounts of information are available like never before. However, the sheer volume of information with questionable credibility can pose a threat to the public's knowledge base. Media outlets aiming to ruin political images and a decreased quality of information have led to wide-spread misinformation, distrust, and rise of conspiracy theories within the public.



Photo 3. Photo Portrait of Dr. Adam Enders.

Dr. Adam Enders, a UofL professor and expert on conspiratorial thinking within American politics, has been investigating who is most susceptible to these theories and the implications of the mentality. When describing groups most prone to believing conspiracy theories, he explained:

*“On the one hand, we have conspiracy theories that are designed to malign particular groups which are sometimes racial and ethnic groups. And on the other hand, we have racial, ethnic groups and religious groups and socioeconomic groups that have been the subjects of actual conspiracies and other sorts of poor treatment by institutions we'd like people to believe in and trust.”*

These groups are likely to believe selected information that suits their interests and backs up their beliefs. In the case of the first group that Dr. Enders described, some of these people

do everything “the right way” but still don’t have life turn out the way they want it to. As a result, they seek “causal explanation and some structure from a very messy world that’s filled with coincidences” in the form of conspiracy theories. Those who undermine information presented to the public by health experts regarding COVID-19 tend to distrust many forms of public authority. People have had their lives uprooted by the pandemic—by disturbance of day-to-day pleasantries and/or financial misfortunes—and have turned to exposing the “hidden conspiracy theories” of COVID-19. And how does one “fix” these mentalities? “...what kind of corrective information is there for somebody who doesn't trust anybody, right?” Dr. Enders inquired. When it comes to preventative measures, Dr. Enders suggested that there are several different methods with varying levels of effectiveness. Methods that he suggested include, “try[ing to]...minimize people's exposure to conspiracy theories and misinformation, so ... removing that kind of information from social media platforms like Facebook and Twitter. Maybe ... adding disclaimers saying that the veracity of this information has been disputed or some element of this is in question...” He even brought up the practice of teaching fact-checking in grade school—a practice found in Europe already.

Ultimately, Dr. Enders resolves that “we shouldn't pathologize people that believe these things.” Those who believe in widely different conspiracy theories all have a root reason for doing so—to “satisfy (a) psychological need.” He urges us to “... think about how we label these people and how we conceive of this predisposition to believe these kinds of things.” Only

when we take this information into mind can we find a work-around to improve public compliance when it comes to COVID-19 information.

In conducting these three interviews, we have learned new information about the spread of COVID-19 from various multidisciplinary perspectives. As each of these of these researchers continue their work, we encourage everyone to remain updated with their investigations and reach out to them for any specific questions about their study. We have linked each of their research articles below:

Zhang, C.H. And Schwartz, G.G. (2020), Spatial Disparities in Coronavirus Incidence and Mortality in the United States: An Ecological Analysis as of May 2020. *The Journal of Rural Health*, 36: 433-445. <https://doi.org/10.1111/jrh.12476>

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