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The 5-pronged Attack of the Coronavirus War

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Abstract: The purpose of this paper is to provide a framework regarding coronavirus war. This paper originated in a classroom discussion of an MBA course on World Trade in the Spring Semester of 2020 at NYIT-Vancouver. World trade has been greatly affected by the coronavirus pandemic. The crisis is a war between humans and the virus. It requires a holistic plan to fight the invisible enemy beyond the various medical-pharmaceutical remedies currently adopted regionally worldwide. As a war against a common enemy, the problem can be viewed as a VUCA problem in management methodology. The traveling map in terms of a 5-pronged attack by the enemy should be better understood to plan a strategy of fighting this war. It is argued that closing borders are not a good holistic strategy. In addition to having a negative impact on trade, it does not solve a pandemic spread. The focus is on mitigations, but the mitigations based on the closing of borders (or regions) will not solve an exponential spread, which is the crux of the matter with a worldwide pandemic.

Keywords: *Coronavirus, mitigations, virus, immune system*

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I. INTRODUCTION

The coronavirus war is being fought on many fronts. Unquestionably, the battle is in the ICU rooms, and resources and mitigations for that battle should be given the highest priority. Yet, humans can win a battle but lose the war. As information unfolds, either the war is nugatory, or a smarter type of social distancing needs to be adopted. Surveillance and epidemiology provide additional knowledge resulting in a lifestyle change. Ultimately, fighting an exponential spread has to rely on human intelligence to build an immune system and the resilience necessary to win the war.

The crux of surveillance is contact tracing, which involves a requirement for statistics rigor and the costs of compiling and structuring appropriate data sets. Existing studies largely rely on samples based on a physical geographical testing domain, e.g., a location, a hospital, a cruise ship, airplane cabins, etc. [1, 2]. The spread of the virus in a confined space, e.g., inside the ICU when a virus has already multiplied inside a human body, could be more acute and lethal than those encountered at random in communal public spaces. However, it could be the management of what is outside the system that is the Achilles heel.

Epidemiology models of coronavirus can be many. However, studying the problem after the facts cannot provide effective guidance on preventive measures for a pandemic. It is imperative to develop better guidance during the early phase of a contagious virus before an outbreak. More stringent guidelines for traveling should have been developed before the world's countries shut their doors to "foreigners" as the only pragmatic way to deal with the spread. Unfortunately, a virus does not carry a passport. Policies based on passport or ethnicity may not reduce the spread rate. As undetected leaks, however, small, the number, to begin with, would spread exponentially. When an exponential spread occurs, the number will necessarily be large. A country may successfully contain a community spread, but when the border is reopened, travelers could bring the virus back in [3].

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Traveling is an integral part of economic activities, not just for cross-border traffic but also for most people's daily activities. With many people utilizing public transportation, this expediates a virus spread, even if the virus begins only with one person. This is a community within a community problem. For example, while New Mexico has a low infection rate while sandwiched between two high infection states, Arizona and Texas, the Navajo community in New Mexico could suddenly become a hotspot.

At the micro-level, some communities may adopt its country's board base policy of closing the doors, i.e., no visitors in and no residents out, even though inter-community activities need to happen as a matter of necessities, which often bring in huge economic benefits to a community, e.g., tourism. Social distancing indeed can be extremely costly for all types of activities, retails, recreations, neighborhood caring, etc., because mobility and close contacts with one another are essential to sustain any community, large or small. Shutting the doors is the most primitive way of dealing with the problem, but it may not be the smartest way of dealing with social distancing. The real issue is whether we can utilize technology to provide a mobility guideline without giving up too much of one's privacy. But first of all, we need to understand the broad picture of how a virus invades a community without first understanding that we cannot effectively design a strategy. The purpose of this paper is to provide a framework and to generate a discussion.

II. METHODOLOGIES FOR A VUCA PROBLEM

A VUCA problem is defined as one entailing volatility, uncertainty, complexity, and ambiguity for managing problem generally. The volatility of the problem could not be underestimated in light of the "second-wave" phenomenon emerging in many regions of the world. The uncertainty of the problem is that mutations as well as expanded symptoms are going through uncharted territories. The complexity will not be properly understood without years of scientific research that are followed up with investment in R&D. The ambiguity of problem is that one can never be sure about the significance of the origin of this virus.

The notion of VUCA was introduced by the U.S. Army War College to describe an environment exhibiting the four features popularized after 9/11 in the U.S., [4]. Elaboration of this framework has been further explained in business school courses, [5]. Unquestionably, the role of the United States has a role to play in this endeavor, [6]. However, the management problem that we confront cannot and should not be limited to only the health system authority of a country. It is a socio-economic problem that needs to be addressed, involving other sectors of a country as well. A public-private endeavor, therefore, is unavoidable. A top-down approach to addressing a pandemic spread is insufficient, and will demand knowledge and expertise beyond the traditional expertise that the health system of a country alone can provide.

Thus, a multidisciplinary approach is needed in tackling a problem which at the surface may appear to be a mere medical-pharmaceutical challenge. Efforts of this kind have been made holistically and regionally, [7], and more recently, in the area of aquaculture, [8]. The state involvement of a VUCA problem is always experimental, and a play-as-evidence-unfold type of methodology highlights that decisions need to be made at crucial junctures. Yet, one cannot search in the dark for too long, as strategy of fighting a war would always require a blue-print, however imprecise and crude a model may be. No management problem can be tackled without knowing a plan. In the case of a war, the plan must be structured based on some understanding of the enemy, no matter how little we know about them.

A framework to understand the common enemy and to narrate some crucial decisions made by governments will be useful, as each country finds its own way to combat the situation. Formulating a plan to fight this war, however, should not be done in an ad hoc manner based on circumstances. Some type of knowledge integration is essential. The notion of developing a Decision Intelligence (DI) for Situation Analysis to cope with this VUCA problem is a proposal on methodology, arguably belonging to the discipline of managerial economics. A methodology of this type aims for an action-oriented approach, as has been persuasively made in [9], addressing to the recovery situation dealing with Covid-19. The said approach is completely general. The external condition of a situation is a combination of analysis, knee-jerk as well as wise policy reactions to situation, which is important as a learning exercise towards how VUCA should be handled.

A. *The Traffic Lights of a Contagious Virus*

Every virus (million kinds of them) has its journey on earth, it sometimes goes through an incubation period, and at times, are more active and concentrated in certain regions of the world. When traveling on earth, a virus is transmitted from a source to 5 different platforms. The human platforms consist of 3 typesAsymptomatic (no symptoms), Clinical Symptomatic (proven by tests), and Nonclinical Symptomatic (cured by self-healing, or some

traditional methods such as lemon or ginger tea, sinus rinse, etc.). Nonhuman platforms consist of dead objects (different type of surfaces), and animals (furs, feathers, etc.). There may be other platforms, for instance, food, air, water, etc. These are platforms that can either be easily controlled (e.g., not eating certain food), or impossible to control (e.g., in the atmosphere). We are ruling out these latter platforms to make the discussion more manageable.

The spread rate of a virus can be exponential, but through what platform? The spread rate is usually tracked within the health care system of a country in clinical tests by using R-naught, not categorizing them via different platforms. Understanding the journey of a virus via other platforms can track the spread as a traveling map, conceptually at least, via successive stages of infection, pointing to possible needs for collecting additional data beyond the conventional R-naught calculation. R-naught is not an action-oriented approach. It only characterizes the seriousness of a spread. Diving into details about spreads through platforms may point to additional ways of tracking, doing social distancing, surveillance, or extra quarantines.

A diagram below assumes a virus originates from an unknown source. It avoids the question on the origin of the virus. The 5 different platforms to propagate a virus is symbolically described as a fork with 5 prongs. All of the 5 prongs are logical possibilities that can occur at every successive stage of a virus propagation (not drawn to scale). The diagram highlights the spread via humans by using the traffic lights of Red, Yellow, and Green. Humans affected by a contagious virus could be Symptomatic (S) or Asymptomatic (A), both can be indexed by the time stage of a spread. The Red light signifies a situation whereby the virus is caught by a clinical test. The Yellow light represents instances wherein a virus is alerted by individuals themselves, and usually coped with by traditional self-help methods, through which the infected individuals may or may not regain their health. The Yellow light can turn to a Red light in successive stages when self-help is ineffective. In that case, the virus is registered as Red, and will be counted in the system. All Reds are counted within the system, while all Greens and Yellows are counted outside of the system. As people say, "we don't know the denominator."

Let's think through this process more carefully. The most problematic cause is the Green-lighted virus, which are the asymptomatic cases. They are not detectable by the health institution system. The only way to limit its spread is by limiting its traveling, i.e., social distancing for 14 days. If within that 14 days, the light turns Yellow and then Red, the virus is registered into the system. If the Yellow light is on only for a short while, the virus will exist only for a short time but will die or hibernate before the 14-day quarantine is over. Of course, if it is Green light throughout the 14 days, the virus would be already dead or hibernated by the end of the 14 days.

Health systems in the world are spending most of their resources in managing the Red-light virus in the system. For an effective slowing down of the virus spread, we may also want to address the methods of managing the Green and the Yellow lights as well. Some of the more successful cases did rely heavily on public cooperation, e.g., South Korea, [10].

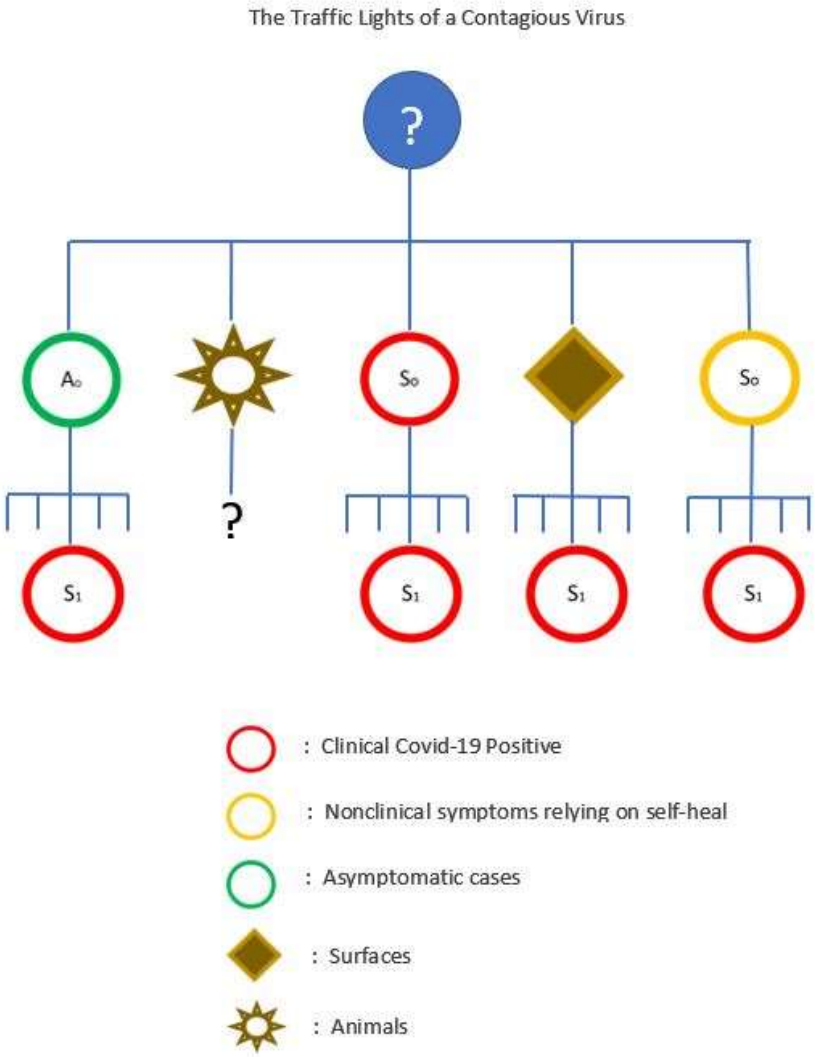

Fig. 1. The traffic light on contiguous virus

1) Notes for the diagram: 1. Note that the Yellow Lights and the Green Lights have been traveling. There can be 2 explanations to that: 1. The cross-country-border health checks have been ineffective. 2. The origin, the BIG QUESTION MARK, has already existed in many parts of the world but only recently discovered by genetic sequencing.

2. Unfortunately, country policies have been designed around the diamond fork of the 5 platforms. All countries say: "this is my country's boundary. I develop a policy based on the geographical areas of that boundary." Most of the migration is geographical based, location based. For community-based surveillance, it is a good idea, but not necessarily for a country policy. Of course, all health systems in the world are addressing to the Red lights ignoring the Yellow and the Green lights. In Canada, adopting policies on the Yellow lights–not allowing Yellow lights to get onto domestic trains and flightsis very recent. Across the globe, there are no global policies in place to address the Green Lights. This is understandable, because stopping the Green Lights alongside with all healthy individuals on earth will stop the whole world from spinning, engaging in trade and commerce, which in turn give us food and comfort. At present, we do not know how many Green lights there are in a population. Perhaps that remains to be the one policy that the World Health Organization (WHO) should quickly develop.

3. Another question that can be raised by the above characterization is: Which of the 5-prongs of the fork is most lethal? Intuitively, it has to be the Red-light virus. Those are the viruses in the emergency waiting rooms, the ICUs. Indeed, this was the question Dr. Sanjay Gupta asked Bill Gates on CNN: Which number is most important to contain now–the reported symptomatic cases (the level) or the spread (rate of increase in small number cases)? In the end, you can win a battle but lose the war.

4. A person- to- person spread can be of 3 types:

I. The Within health system type: Red S to Red S

II. The Self-Healed type: Yellow S to Red S

III. The Asymptomatic type: Green S to Red S

5. The immune system in a human rank in reverse to spread:

A. Strong: The Greens

B. Mild: The Yellows

C. Weak: The Reds

III. DISCUSSION

At present, we do not know how many of the Green and the Yellow lights out there. When a health care system claims success, the system is only declaring a containment of reported rate within their own geographical boundary. However, policies based on geographic boundaries, i.e., the diamond prong of a 5-pronged fork spread is unlikely going to be successful for reasons mentioned earlier. For example, if New York's absolute reported case and its spread is down, will New York open to people from other states going there? Of course, they would. If so, New York will be re-infected again, unless the whole population there has developed immunity with anti-bodies in their systems. In other words, the war with the virus must ultimately be won by the majority of the population being the strong immune Greens, unless the virus self-destructs or can be terminated by a vaccine.

Particular health system in a region can develop its own tracking of the virus, e.g., the replication number, R-naught, defined as the average number of infected people per one contagious person. A health system can claim victory when R- naught < 1, i.e., when the speed of recovery is higher than the speed of contagion, or at least a containment in that even if R-naught > 1, spread rate being larger than recovery rate, the rate of increase in R is slowed down, [11]. However, this constitutes as winning a battle only for a particular boundary platform. Examples of similar type of epidemiological tracking can be found in Wuhan, China as well as in Germany, [12, 13].

If we understand the journey of a virus, we know the virus has a 5 pronged-fork attack mechanism. Geographical and locational policies only address to one prong. For transmission mechanisms outside the jurisdiction of a particular health system, there must be smart contact tracking that can be assisted by technology. Many of such attempts are already being made, e.g., by mobile tracking, [14, 15, 16], by Google maps identifying high density neighborhoods, [17, 18], or some type of self-reporting file sharing software of which reliable statistics can be gathered through low cost implementation driven by social circles and/or individuals' civic duties. The type of data that needs to be tracked is also extremely important. For example, serologic surveillance does not test for whether or not an individual is currently Covid-19 positive, but whether they were ever infected and are now immune Having procedures and systems such as this being developed could be the ultimate game changer, as it would imply there is a growing army of certified health caregivers and professionals working on the frontiers who will not be put at risk acquiring or transmitting the infection.

At the community level, outside the health system, the most severe economic damage caused by the spread of the virus comes from the fear of the Green light platform and the policies of the Diamond platform (i.e., countries' closed border policies). The strategy of closing boundaries and borders is not a sustainable strategy, as it is against the human nature's desire to interact and live with others. The extreme form of social distancing is only a defensive remedy. The White House, perhaps recognizing the ambiguity of border closing, and following the advice of the CDC, announced on April 3 that the wearing of masks in public space is recommended but not mandatory. That, when emphasized strongly, is also a defensive mechanism for preventing the spread of virus via the asymptomatic individuals (Green lights), and not for the protection of the individuals being infected. Reason being, transmission mechanism from person to person is largely believed to be via droplets. Essential businesses such as drug stores and supermarkets are adopting numerous measures such as 2-meter distancing rules and single-lane shopping flow to cope with maintaining some kind of economic activities rather than an all-or-nothing type of lockdown for solutions. These types of guidelines are likely be set using moral persuasions rather than direct regulations, however.

A tangential question could also be asked regarding how much risk an average person is taking in possibly contracting the virus from an asymptomatic Green light, assuming the person is staying out of the high density and highly infected areas, e.g., hospitals. Using the city of Vancouver as an example, which has a population of roughly 2.6 million. The British Columbia CDC website gives a confirmed positive case of 615 (Vancouver Coastal Health) on April 8, 2020. Using US CDC asymptomatic to confirmed case ratio of 25%, the probability of randomly encountering someone that is asymptomatic in the geographical area of Vancouver is 0.000059. Even doubling the asymptomatic case ratio to 50% (some case studies reported as high as 61%), the probability is not higher than 0.00012. This calculation, while not useful for informing the exponential spread characteristics of the

virus, does provide a rough ex-ante probability estimates which may be useful for people traveling and visiting the city. We note that individuals in a community can consists of persons who are from Green lights to Yellow or Red lights, as well as from Yellow lights to Red and Green lights. This method of alerting a community, again, is different from the estimation of *R*-naught, which is based on the health system in any given geographical area administratively defined by the government.

Looking ahead on how economies may gradually return to normal, we note that not all social functions are the same, [19]. These are the type of smart social distancing that would need to be considered together with the micro-dynamics of individuals as economic men, and not merely men as microorganism fighting a germ war with another specie. Humans have common sense; for example, wearing a mask is generally a good hygiene practice, but it also inhibits clear speech and one's hearing ability. The general pattern would require a constant evaluation of risk and a trade-off decision made between risks and economic consequences that may be location specific. Individuals' preferences for risk trade-offs with economic necessities are different, and possibly have much to do also with the culture of the community. A more flexible mitigation tactics are likely to emerge for some communities over a complete lockdown: e.g., in public space where verbal communication is kept to a minimum (e.g., inside a train), you see more people wearing masks or even mandatory; while in public or private spaces where verbal communication is essential (e.g., press briefings requiring Q&A), you see less use of masks. All these are mitigations that can reduce the economic damage, even though it will not help to fight the war against the virus, which ultimately has to rely on advancing the human's immune system and in finding a vaccine to cure it.

IV. CONCLUSION

At the time of concluding this paper, we know that Covid-19 is a killer; but it is beatable, if vaccines are discovered, and if it is caught at the early stage of a spread. The most likely scenario is probably a co-existence with the virus for a while. In other words, we might have to live with the coronavirus, just like many other different viruses in the atmosphere, relying ultimately on human's immune system to deal with it.

The paper analyzes a contagious virus attack as a 5-pronged fork that can occur anywhere and at any level of its transmission journey. It argues that winning the war on coronavirus may require going outside of a conventional health system. The costly and extreme form of social distancing may bring a community more quickly over the apex of a virus spread. But if exponential spread is the intrinsic character of a contagious virus, a health system of a geographical area that was successful in containment via mitigations cannot guarantee that the virus will not be brought back by travelers outside the system, unless the whole community is immunized.

Western societies generally do not accept third party tracking of an individual's mobility, as it infringes on a person's privacy. Contact tracing in an open borderless environment, while extremely important, is also very difficult to implement. Arguably, the cost of losing certain degree of privacy is minor, if a society can quickly regain the huge economic loss caused by social distancing. Individual liberty will not be hugely compromised if the tracking of the virus mobility is encouraged by voluntary self-reporting. Likewise, at an individual level outside of a health care system, an offensive strategy of strengthening one's immune system can bring about greater awareness of proper diet, nutrition, and healthier lifestyle. This, together with easy testing and ultimately, the discovery of a vaccine, a once contagious and deadly virus can be contained and defeated.

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REFERENCES

[1] H. Nishiura, T. Kobayashi, T. Miyama, A. Suzuki, S.-m. Jung, K. Hayashi, R. Kinoshita, Y. Yang, B. Yuan, and A. R. Akhmetzhanov, "Estimation of the asymptomatic ratio of novel coronavirus infections (COVID-19)," *International Journal of Infectious Diseases*, vol. 94, pp. 154–155, 2020. doi: https://doi.org/10.1101/2020.02.03.20020248

[2] K. Mizumoto, K. Kagaya, A. Zarebski, and G. Chowell, "Estimating the asymptomatic proportion of coronavirus disease 2019 (COVID-19) cases on board the diamond princess cruise ship, Yokohama, Japan, 2020," *Eurosurveillance*, vol. 25, no. 10, 2020. doi: https://doi.org/10.2807/1560-7917.ES.2020.25.10.2000180

[3] S. Ahmed and P. Anirvan, "Targeting the immunology of coronavirus disease-19: Synchronization creates symphony," *Rheumatology International*,

vol. 40, no. 8, pp. 1343–1345, 2020. doi: https://doi.org/10.1007/s00296-020-04624-2

[4] P. Kinsinger and K. Walch. (2012) Living and leading in a VUCA world. [Online]. Available: https://bit.ly/3hhw3sZ

[5] N. Bennett and J. Lemoine, "What VUCA really means for you," *Harvard Business Rreview*, vol. 92, no. 1/2, p. 27, 2014.

[6] G. D. Bruton, M. W. Peng, D. Ahlstrom, C. Stan, and K. Xu, "State-owned enterprises around the world as hybrid organizations," *Academy of Management Perspectives*, vol. 29, no. 1, pp. 92–114, 2015. doi: https://doi.org/10.5465/amp.2013.0069

[7] N. Carbonara, N. Costantino, and R. Pellegrino, "A three-layers theoretical framework for analyzing public private partnerships: The Italian case," *Organization, Technology & Management in Construction: An International Journal*, vol. 5, no. Special, pp. 799–810, 2013. doi: https://doi.org/10.5592/otmcj.2013.3.5

[8] L. W. Lai and F. T. Lorne, "State-assisted entrepreneurial ventures: The case of aquacultural development and the seafood industry in Hong Kong," *International Journal of Entrepreneurial Venturing*, vol. 12, no. 4, pp. 439–458, 2020. doi: https://doi.org/10.1504/ijev.2020.10031371

[9] L. Pratt. (2020) AI + Coromavoris + DI: Using technology to restart to business safety. [Online]. Available: https://bit.ly/3qB4sqN

[10] J. Power. (2020) South Korea's coronavirus response is the opposite of China and Italyand it's working. [Online]. Available: https://bit.ly/3AgEQUz

[11] P. Surico and A. Galeotti. (2020) The economics of a pandemic: The case of Covid-19. [Online]. Available: https://bit.ly/3qI0NaP

[12] A. Pan *et al.*, "Association of Public Health Interventions With the Epidemiology of the COVID-19 Outbreak in Wuhan, China," *JAMA*, vol. 323, no. 19, pp. 1915–1923, 2020. doi: https://doi.org/10.1001/jama.2020.6130

[13] R. Woelfel, V. M. Corman, W. Guggemos, M. Seilmaier, S. Zange, M. A. Mueller, D. Niemeyer, P. Vollmar, C. Rothe, and M. Hoelscher, "Clinical presentation and virological assessment of hospitalized cases of coronavirus disease 2019 in a travel-associated transmission cluster," *MedRxiv*, 2020. doi: https://doi.org/10.1101/2020.03.05.20030502

[14] J. Marson, C. Stupp, and D. Hinshaw. (2020) U.S. and Europe turn to phone-tracking strategies to slow spread of coronavirus. [Online]. Available: https://on.wsj.com/3jGL1M7

[15] Z. Doffman. (2020) Coronavirus phone tracking now impacts us alland this is just the start. [Online]. Available: https://bit.ly/3qzgscq

[16] A. Jones. (2020) The race to trace the spread of COVID-19 in Canada using disease trackers. [Online]. Available: https://bit.ly/2UfR2Et

[17] R. Copeland. (2020) Google offers user location data to health officials tackling coronavirus. [Online]. Available: https://on.wsj.com/3dqWdZi

[18] N. Griffiths. (2020) COVID-19: Google knows how well were social distancing in B.C.

[19] H. Rashid, I. Ridda, C. King, M. Begun, H. Tekin, J. G. Wood, and R. Booy, "Evidence compendium and advice on social distancing and other related measures for response to an influenza pandemic," *Paediatric Respiratory Reviews*, vol. 16, no. 2, pp. 119–126, 2015. doi: https://doi.org/10.1016/j.prrv.2014.01.003