

# A BITTER PILL TO SWALLOW: THE INEVITABILITY OF GLOBAL PANDEMICS AND WHY WE MUST TAKE ACTION NOW FOR THE FUTURE†

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When everyday life began to drastically change, many, including myself, were utterly blindsided. As we all know, COVID-19, the disease caused by SARS coronavirus (SARS-CoV-2), sent shockwaves across the globe and brought about the strange new normal of face coverings and social distancing. Society came crashing down to a halt as travel became restricted, sports games were delayed, and families were separated. To someone of the past, all of this would likely sound like fiction — or would it? That depends on how far one looks back into history.

In the year of our lord 1348 there occurred in the city and contado of Florence a great pestilence, and such was its fury and violence that in whatever household it took hold, whosoever took care of the sick, all the carers died of the same illness, and almost nobody survived beyond the fourth day, neither doctors nor medicine proving of any avail, and there appeared to be no remedy, either because those illnesses were not yet recognised, or because doctors had never previously had cause to study them properly. Such was the fear that nobody knew what to do: when it caught hold in a household, it often happened that not a single person escaped death.

These are the words of Baldassarre Bonaiuti, a chronicler of Florence, as he recounted life during the Black Death.<sup>1</sup> It is estimated that 25 million people of Europe, almost 40% of the continent's population, succumbed to this plague just between the years of 1347 and 1352.<sup>2</sup> In the early 20th century, there was the 1918 influenza pandemic that ravaged the globe following the end of the First World War. Here, it is believed that approximately 500 million people contracted the virus, about 33% of the world's population, which resulted in over 50 million

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† This is an honorable mention essay for an interprofessional writing competition held by the *Syracuse Law Review*. To accommodate various professional fields, the citations are a blend of APA and Bluebook style formats. Sources and details have not been independently verified by *Syracuse Law Review* and *Syracuse Law Review* did not complete a peer review of the study or of the conclusions drawn by the authors.

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1. Marchionne di Coppo di Stefano Buonaiuti. (n.d.). Retrieved from [https://www.brown.edu/Departments/Italian\\_Studies/dweb/plague/perspectives/marchionne.php](https://www.brown.edu/Departments/Italian_Studies/dweb/plague/perspectives/marchionne.php).

2. THE BLACK DEATH: THE PLAGUE, 1331–1770. (n.d.). Retrieved from <http://hosted.lib.uiowa.edu/histmed/plague/>.

deaths.<sup>3</sup> Even more recently, the HIV/AIDS global epidemic has caused over 32 million deaths since its beginning in the early 1980s.<sup>4</sup> The list goes on, with several less notorious disease outbreaks occurring in just the last twenty years: Severe Acute Respiratory Syndrome (SARS), H1N1 Influenza or “Swine Flu,” Ebola, and Zika.<sup>5</sup> So, since the history of mankind is so intertwined with repeated, sudden eruptions of disease, why did COVID-19 come as such a surprise?

For most, historical events like the plague or the 1918 influenza pandemic seem to be in the distant past, and the more recent disease outbreaks have seemingly not caused enough chaos to grab the world’s attention. But for many leading health organizations like the World Health Organization (WHO) and the Centers for Disease Control and Prevention (CDC), the current pandemic was far from unexpected, and more importantly, they believe it will not be the last of its kind.<sup>6</sup> Even famous entrepreneur and philanthropist Bill Gates emphasized this great risk in his ominous 2015 warning, saying that “if anything kills over 10 million people in the next few decades, it’s most likely to be a highly infectious virus, rather than a war . . . we’re not ready for the next epidemic.”<sup>7</sup> To understand why pandemics may be an inevitability, however, we must look back at both the common themes that characterize recent pandemics and the evolution of human behavior itself.

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3. History of 1918 Flu Pandemic. (2018, March 21). Retrieved from <https://www.cdc.gov/flu/pandemic-resources/1918-commemoration/1918-pandemic-history.htm>.

4. Global HIV & AIDS statistics - 2020 fact sheet. (n.d.). Retrieved from <https://www.unaids.org/en/resources/fact-sheet>; A Timeline of HIV and AIDS. (2021, January 26). Retrieved from <https://www.hiv.gov/hiv-basics/overview/history/hiv-and-aids-timeline>.

5. Huremović D. (2019). Brief History of Pandemics (Pandemics Throughout History). *Psychiatry of Pandemics: A Mental Health Response to Infection Outbreak*, 7–35. [https://doi.org/10.1007/978-3-030-15346-5\\_2](https://doi.org/10.1007/978-3-030-15346-5_2).

6. The best time to prevent the next pandemic is now: Countries join voices for better emergency preparedness. (n.d.). Retrieved from <https://www.who.int/news/item/01-10-2020-the-best-time-to-prevent-the-next-pandemic-is-now-countries-join-voices-for-better-emergency-preparedness>; Why It Matters: The Pandemic Threat. (2020, August 21). Retrieved from [https://www.cdc.gov/globalhealth/healthprotection/fieldupdates/winter-2017/why-it-matters.html#:~:text=Many challenges exist worldwide that, through global travel and trade; World must be ready for the next pandemic, UN says on first International Day of Epidemic Preparedness. UN News. \(n.d.\). Retrieved from https://news.un.org/en/story/2020/12/1080922](https://www.cdc.gov/globalhealth/healthprotection/fieldupdates/winter-2017/why-it-matters.html#:~:text=Many challenges exist worldwide that, through global travel and trade; World must be ready for the next pandemic, UN says on first International Day of Epidemic Preparedness. UN News. (n.d.). Retrieved from https://news.un.org/en/story/2020/12/1080922); Hunter, P. (2007). *Inevitable or avoidable? EMBO Reports*, 8(6), 531–534. doi:10.1038/sj.embor.7400987.

7. Gates, B. (2015, March). *The next outbreak? We’re not ready* [Video]. TED Conferences. [https://www.ted.com/talks/bill\\_gates\\_the\\_next\\_outbreak\\_we\\_re\\_not\\_ready?utm\\_campaign=tedsread&utm\\_medium=referral&utm\\_source=tedcomshare](https://www.ted.com/talks/bill_gates_the_next_outbreak_we_re_not_ready?utm_campaign=tedsread&utm_medium=referral&utm_source=tedcomshare).

When examining recent past pandemics, several similarities among them become apparent, and it is likely that these shared qualities or characteristics are fundamental for their ability to spread so effectively. For instance, pandemics of the last century were often respiratory viruses, particularly either influenza or coronaviruses, that appeared during the winter months in the Northern Hemisphere.<sup>8</sup> Another key detail is that these viruses spawn from non-human sources and become *zoonotic*,<sup>9</sup> which translates to the ability to be transmitted from animals to humans.<sup>9</sup> This critical element leads to the possibility of *animal reservoirs*, where the virus may be maintained in a particular animal population and perhaps undergo events of genetic change.<sup>10</sup> Influenza demonstrates this quality in that it possesses several animal reservoirs, such as wild birds and swine (e.g. avian influenza and swine influenza, respectively).<sup>11</sup> While human infections of influenza from these animal reservoirs are rare, they carry the potential to spark pandemics because humans lack immunity to these novel strains.<sup>12</sup> Coronaviruses are also zoonotic, as SARS-CoV was likely transmitted from civet cats and Middle East Respiratory Syndrome coronavirus (MERS-CoV) was likely transmitted from dromedary camels.<sup>13</sup> Although the exact origin of SARS-CoV-2 remains unknown, this virus is also zoonotic and likely originated from a species of bat.<sup>14</sup> Furthermore, while SARS-CoV-2 has been demonstrated to infect numerous species of animals, such as cats, dogs, and even wild mink, there is still not enough evidence to support the establishment of an

8. Mujica, G., Sternberg, Z., Solis, J., Wand, T., Carrasco, P., Henao-Martínez, A. F., & Franco-Paredes, C. (2020). Defusing COVID-19: Lessons Learned from a Century of Pandemics. *Tropical Medicine and Infectious Disease*, 5(4), 182. doi:10.3390/tropicalmed5040182; Khan, M., Adil, S. F., Alkhatlan, H. Z., Tahir, M. N., Saif, S., Khan, M., & Khan, S. T. (2020). COVID-19: A Global Challenge with Old History, Epidemiology and Progress So Far. *Molecules*, 26(1), 39. doi:10.3390/molecules26010039

9. Mujica et al., *supra note* 8, at 182.

10. Mujica et al., *supra note* 8, at 182; Influenza - Chapter 4 - 2020 Yellow Book. (n.d.). Retrieved from <https://wwwnc.cdc.gov/travel/yellowbook/2020/travel-related-infectious-diseases/influenza#:~:text=The primary reservoir for influenza, sea lions, and bats>.

11. Influenza - Chapter 4 - 2020 Yellow Book. (n.d.). Retrieved from <https://wwwnc.cdc.gov/travel/yellowbook/2020/travel-related-infectious-diseases/influenza#:~:text=The primary reservoir for influenza, sea lions, and bats>.

12. *Id.*; Zoonotic influenza. (n.d.). Retrieved from <https://www.who.int/news-room/spotlight/influenza-are-we-ready/zoonotic-influenza>.

13. Coronavirus. (n.d.). Retrieved from <https://www.afro.who.int/publications/coronavirus>.

14. COVID-19 and Animals. (n.d.). Retrieved from <https://www.cdc.gov/coronavirus/2019-ncov/daily-life-coping/animals.html#:~:text=We do not know the,causes COVID-19>.

animal reservoir for SARS-CoV-2.<sup>15</sup> If a reservoir is established, however, mutated variants of SARS-CoV-2 could be recurrently introduced into humans in the future.<sup>16</sup>

Though, the capability of viruses to become zoonotic depends on several factors. Since viruses exhibit certain *tropism*, or host selectivity, mutations that enable the opportunity to infect cells of an alternative host species is of course required; this unfortunately is out of human control.<sup>17</sup> Nevertheless, once a virus gains the ability to transmit itself to a new host species, the current host must still come into contact with the prospective new host species for cross-host transmission to take place. Thus, limiting contact between the current host and the new potential host prevents zoonotic events from occurring.<sup>18</sup>

Conversely, this interaction *can* be affected by the behavior of humans. Increased contact between certain host species and humans, for example through wildlife trade, the domestication of animals, hunting, agricultural expansion, and overall human population expansion, is vital for the successful transmission of zoonotic diseases.<sup>19</sup> Large livestock farms, due to the high demand of meat for consumption, further creates favorable conditions for animal-to-human transmission.<sup>20</sup> In general, loss of habitats and mass animal migrations due to ongoing climate change and deforestation contribute to more species coming into contact with one another, further increasing the risk of both cross-host events and pandemics.<sup>21</sup> Live-animal markets in densely populated areas also display a considerable risk due to the greatly increased contact between humans and wild animals.<sup>22</sup> Although the origin of any given pandemic

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15. Mary Van Beusekom | News Writer | CIDRAP News | Sep 18, 2. (2020, September 18). COVID-19 likely spreading from people to animals-and vice versa. Retrieved from <https://www.cidrap.umn.edu/news-perspective/2020/09/covid-19-likely-spreading-people-animals-and-vice-versa>; What Happens If COVID-19 Infects Wild Animals? (2021, January 25). Retrieved from <https://now.tufts.edu/articles/what-happens-if-covid-19-infects-wild-animals>.

16. What Happens If COVID-19 Infects Wild Animals?, *supra note* 15.

17. Parrish, C. R., Holmes, E. C., Morens, D. M., Park, E., Burke, D. S., Calisher, C. H., . . . Daszak, P. (2008). Cross-Species Virus Transmission and the Emergence of New Epidemic Diseases. *Microbiology and Molecular Biology Reviews*, 72(3), 457–470. doi:10.1128/mmbr.00004-08

18. *Id.*

19. *Id.*

20. Coronavirus and Climate Change. (2020, July 06). Retrieved from <https://www.hsph.harvard.edu/c-change/subtopics/coronavirus-and-climate-change/>

21. *Id.*

22. Morens, D. M., Daszak, P., Markel, H., & Taubenberger, J. K. (2020). Pandemic COVID-19 Joins History's Pandemic Legion. *MBio*, 11(3). doi:10.1128/mbio.00812-20

is exceedingly difficult to determine, these types of markets were likely the source of several disease outbreaks including SARS and COVID-19.<sup>23</sup>

Perhaps the most significant factor contributing to the rise of pandemics is the intense globalization that has been seen in recent decades.<sup>24</sup> Just as the Black Plague spread along trade routes throughout Asia and Europe, the ability for disease outbreaks to expand and spread depends on human movement. Yet, while it took several years for the plague to spread across the world, it could theoretically take only *thirty-six hours* for a disease to travel from a remote village to any major world city.<sup>25</sup> To exemplify this point, it is thought that HIV first existed between 1880 and 1920, but its global reach did not occur until humans became more geographically expansive later in the twentieth century.<sup>22</sup> There is now more human movement than ever before due to the development of a world economy, technological advancements in transportation, tourism, migrant populations, and refugees, among others.<sup>26</sup>

Additionally, widespread rapid urbanization caused by globalization not only increases human population density, an ideal condition for human-to-human transmission of disease, but also propagates substantial health inequalities for those of a lower socioeconomic status. In conjunction with overcrowding, lack of proper housing, sanitation, and access to medical resources is common in regions of rapid, unplanned urbanization.<sup>27</sup> Over 50% of the world's population is concentrated in urban environments compared to only 5% two centuries ago, and this number is likely to rise to over two-thirds of the world's population by 2050.<sup>28</sup> Globalization therefore allows rapid transmission of disease-

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23. *Id.*

24. Morens et al., *supra* note 22; Saker, L. (2004). *Globalization and infectious diseases: A review of the linkages*. Geneva: Special Programme for Research and Training in Tropical Diseases (TDR).

25. CDC's Global Response to COVID-19. (2020, February 19). Retrieved from <https://www.cdc.gov/globalhealth/stories/covid-global-response.html>.

26. Saker, *supra* note 24; Knobler, S., Mahmoud, A. A., & Lemon, S. M. (2006). *The impact of globalization on infectious disease emergence and control exploring the consequences and opportunities: Workshop summary*. Washington, DC: National Academies Press.

27. Knobler et al., *supra* note 26.

28. *Id.*; 26.68% of the world population projected to live in urban areas by 2050, says UN | UN DESA Department of Economic and Social Affairs. (n.d.). Retrieved from <https://www.un.org/development/desa/en/news/population/2018-revision-of-world-urbanization-prospects.html>.

causing agents worldwide, and what used to be a localized, contained outbreak can now transform into a global pandemic within days.<sup>29</sup>

For COVID-19, a collection of pneumonia cases in Wuhan, China was reported on December 31, 2019. By January 31st, 2020 the first case of COVID-19 was seen outside of China in Thailand, and on March 11th, 2020, the WHO declared COVID-19 a pandemic with over 118,000 confirmed cases.<sup>30</sup> All of this occurred within the span of a few months. The continuous evolution of human behavior, especially in relation to the environment, drastically increases the risk of future pandemics, but if these trends have been noted and were well-known among experts, were we prepared for COVID-19?

In 2019, the World Health Organization (WHO) warned that the next influenza pandemic was indeed inevitable.<sup>31</sup> In fact, there have been three pandemics of influenza (including the aforementioned H1N1 “Swine Flu”) since the great 1918 influenza pandemic, and the WHO actually created new guidelines on how to address global pandemics following the 1997 Avian Influenza A outbreak of Hong Kong.<sup>32</sup> These guidelines were composed of two parts, risk assessment and risk management, but only a handful of countries dedicated the resources required for adequate risk assessment, and in general, WHO recommendations to prevent future pandemics have been overlooked by the global community.<sup>33</sup> Investments in research funding for both viral pandemic prevention and antiviral treatments have also been scarce due to the lack of public attention and government involvement.<sup>34</sup> Most notably though, is that on January 30th, 2020, the WHO declared a “*public health emergency of international concern*” or “*PHEIC*,” the organization’s highest alarm which indicates the possibility of an imminent pandemic. Yet, this warning was ignored by most and only a few countries stepped in to increase testing and social distancing.<sup>35</sup>

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29. Knobler et al., *supra* note 26.

30. Archived: WHO Timeline - COVID-19. (n.d.). Retrieved from <https://www.who.int/news/item/27-04-2020-who-timeline---covid-19>; WHO Director-General's opening remarks at the media briefing on COVID-19 - 11 March 2020. (n.d.). Retrieved from <https://www.who.int/director-general/speeches/detail/who-director-general-s-opening-remarks-at-the-media-briefing-on-covid-19---11-march-2020>.

31. Vogel, L. (2019). World must prepare for inevitable flu pandemic, says WHO. *Canadian Medical Association Journal*, 191(14). doi:10.1503/cmaj.109-5735.

32. Khan et al, *supra* note 8, at 39.

33. *Id.*

34. *Id.*

35. Maxmen, A. (2021). Why did the world’s pandemic warning system fail when COVID hit? *Nature*, 589(7843), 499–500. doi:10.1038/d41586-021-00162-4.

This was conceivably the world's greatest failure in curbing the spread of COVID-19 and likely had disastrous consequences. Several technical challenges were presented as well, such as the widespread backlash against mask-use and social distancing rules.<sup>36</sup> Social stigmas, in which there are negative associations between a group of people and a certain disease, were also evident during the COVID-19 pandemic and even contributed to the circulation of negative stereotypes and discrimination against certain ethnic groups. These social stigmas may encourage those infected to hide their disease and avoid proper medical care.<sup>37</sup> Clearly, the world was not ready to confront the unique challenges posed by COVID-19 and ultimately needs to become better prepared to face future disease outbreaks.

Benjamin Franklin famously once said, “an ounce of prevention is worth a pound of cure.” Too often has the world collectively dismissed previous pandemics and failed to prepare for future ones. This lack of observed preparedness was utterly exposed by COVID-19, and though it is exceptionally difficult to predict when the next pandemic will occur, we do know that future outbreaks are inevitable. Consequently, it is absolutely imperative that the world learns from this pandemic, both from its successes and failures, to effectively manage what is to come next. For instance, during the plague, it was clear that disease could be prevented if contact with infected individuals or objects was avoided. Authorities of some cities prevented foreign travelers from entry and even formed makeshift camps to separate the healthy from the infected.<sup>38</sup> Furthermore, in the wake of the plague, the concept of *quarantine* was first noted in 1377 and the first permanent plague-only hospital was formed in 1423.<sup>31</sup> During the 1918 influenza pandemic, schools and churches were closed, public gatherings were postponed, and social distancing was encouraged.<sup>39</sup> In the United States, the use of masks in public was also enforced and met with intense controversy.<sup>40</sup> Yet these practices of *nonpharmaceutical interventions* (NPIs), all of which mirror those being used today, were often uncoordinated and employed too late to be

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36. Khan et al, *supra note* 8, at 39.

37. *Id.*

38. Tognotti, E. (2013). Lessons from the History of Quarantine, from Plague to Influenza A. *Emerging Infectious Diseases*, 19(2), 254–259. doi:10.3201/eid1902.120312

39. *Id.*

40. Scerri, M., & Grech, V. (2020). To wear or not to wear? Adherence to face mask use during the COVID-19 and Spanish influenza pandemics. *Early Human Development*, 105253. doi:10.1016/j.earlhumdev.2020.105253

effective.<sup>41</sup> Nonetheless, the importance of early NPIs in mitigating the spread of disease was exemplified, as the implementation of early NPIs was significantly related with lower peaks of mortality across United States cities.<sup>42</sup> So now that vaccines for COVID-19 are being globally distributed and the end may be in sight, how do we learn from *this* pandemic and what can we do to prepare for the future?

For the scientific community, a greater understanding of coronaviruses is required and investigations into animal reservoirs and potential zoonoses must continue. This will lead to invaluable information regarding viral pathogenicity and possible clues for designing novel antiviral therapeutics for future outbreaks.<sup>43</sup> Active world surveillance is also imperative in curbing future pandemics, but improved methods of detecting a virus quickly enough for the world to effectively react are still needed.<sup>44</sup> Greater efforts to reduce wildlife trade, deforestation, and climate change may also be required to decrease the frequency of cross-host viral transmission.<sup>45</sup> Likewise, advances in livestock safety, safer practices of wild animal consumption, and global education regarding the behaviors that increase disease transmission are other improvements that can be made.<sup>46</sup> Though fortifying the world's healthcare systems by employing a sufficiently sized workforce, maintaining adequate stockpiles of personal protective equipment (PPE), and encouraging citizens to follow public health guidelines is possibly the most essential of these for pandemic preparation.<sup>47</sup>

All in all, preparing for the next pandemic will require cooperation among the global community, as lack of communication and trust between nations negatively affects scientific investigation and prevention efforts.<sup>48</sup> Similarly, both the general public and government authorities must not forget about the importance of pandemic preparedness as they have often done in the past once outbreaks became controlled; this selective amnesia only leads to confusion and panic once the false sense

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41. Tognotti, *supra* note 38.

42. Hatchett, R. J., Mecher, C. E., & Lipsitch, M. (2007). Public health interventions and epidemic intensity during the 1918 influenza pandemic. *Proceedings of the National Academy of Sciences*, 104(18), 7582–7587. doi:10.1073/pnas.0610941104

43. Khan et al, *supra* note 8, at 39.

44. Dodds, W. (2019). Disease Now and Potential Future Pandemics. *The Worlds Worst Problems*, 31–44. doi:10.1007/978-3-030-30410-2\_4

45. Coronavirus and Climate Change, *supra* note 20.

46. Dodds, *supra* note 44.

47. Khan et al, *supra* note 8, at 39.

48. *Id.*



2021]

**A Bitter Pill to Swallow**

91

of security again vanishes.<sup>49</sup> The cyclical pattern *must* stop here. The world needs to keep investing into infectious disease research and public health to make an impact on future generations. Fortunately, as horrendous as this pandemic has been, we have fared well compared to the outbreaks of our predecessors. Still, what lies on the horizon remains a mystery, and as globalization and climate change continue to increase the frequency of epidemics across the globe, the worst may be yet to come. This is the bitter pill that humanity must swallow to ensure the future safety and security of mankind. There is still time to use this as an opportunity to both minimize the forces that fuel pandemics and prepare. Certainly, we must learn to work together against this common threat while we still have the chance.

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49. The best time to prevent the next pandemic is now: Countries join voices for better emergency preparedness. (n.d.). Retrieved from <https://www.who.int/news/item/01-10-2020-the-best-time-to-prevent-the-next-pandemic-is-now-countries-join-voices-for-better-emergency-preparedness>.