International Journal of Science and Research (IJSR)
ISSN: 2319-7064
SJIF (2019): 7.583

Impact of None Pharmaceutical Interventions on COVID-19 in Nigeria, The Bayelsa Experience 2020

Bright E. Shadrack[1], Pabara N. Igwele[2], Tarimobowei Egberipou[3], Edmund R. Egbe[4], Appah W. Williams[5], Jones Stow[26], Adebola Olayinka[7]

[1]Bayelsa Hospitals Management Board, Yenagoa, Bayelsa State
Presenter's email: *esyinebright [at]yahoo.com*

[2, 3, 5, 6]Ministry of Health, Bayelsa State

[4]World Health Organisation, Bayelsa State

[7]Nigeria Field Epidemiology Training Pogram, Asokoro, Abuja

Abstract: ***Background: Since the world encountered the Covid-19 pandemic it has left at least about 1 million people dead with 31, 110, 400 confirmed infections and still counting with no vaccine prequalified for use worldwide. Most disturbing is the pre-symptomatic and oglio-symptomatic transmission of the virus, found in the upper respiratory tract. Best current attempts at controlling SARS-CoV-2 spread are focused on none pharmaceutical interventions that reduce rates of viral transmission. The government of Nigeria on March 29th 2020, announced plans to initiate a national lockdown with various states to modify and implement the process. Methods: The epidemiologic study utilized secondary data collated from inception of Covid-19 Emergency Operations Centre, (EOC) Incident Committee of Bayelsa State and analysed same for demographic qualities of structured age and sex of confirmed and probable cases. The case fatality across age groups and the effect on the lockdown on the epidemiologic curve was assessed. Exclusion criteria, was all incomplete data on the dashboard as at 8th October, 2020. Result: A total of 2193 suspects were tested which represent about 0.1 percent of the total population of the State, 53.5 % were female and 18.3% tested positive of the suspects with 38.7% as female. Case fatality for confirmed and probable cases was 4.4% with age group >59 more at risk of death from covid-19 even though more patients with milder disease were found among age group <40. A total of over 10, 000 deaths were save from over 28, 000 infection. Conclusions: Risk of death from covid-19 is reduced with youth. The epidemiological curve demonstrated that cases and rate of transmission was reduced as the lockdown lasted. The lockdown mitigated and suppressed the spread of Covid-19 across the Local Government Areas of Bayelsa State. The Government ought to be applauded for this initiative, as several lives where save.***

1. Introduction

Since the global declaration of the Covid-19 as a pandemic, the disease caused by the novel Severe Acute Respiratory Syndrome Coronavirus 2(SARS-CoV-2) by the Director of World Health Oganisation (WHO) on January 30th, 2020. Although, it was first reported in Wuhan Province in China as "a cluster of pneaumonia like disease" sometime in December 2019 [1, 2&3]. The rapid spread of Covid-19 by airborne, droplets infections and formites by infected humans have continued to threaten and overwhelm healthcare systems in almost all countries of the world [4]. The world over, the pandemic has left at least about 1 million people dead with 31, 110, 400 confirm infections and still counting till date as no vaccine has been prequalified for use worldwide. The United State of America remains the worst hit with about199, 513 dead from 6, 812, 332 cases with at least 2, 590, 671 people declared recovered. Followed by Brazil with 136, 895 deaths from 4, 544, 629 cases, India with 87, 882 deaths from 5, 487, 580 cases, Mexico with 73, 493 deaths from 697, 663 cases, and United Kingdom with 41, 759 deaths from 394, 257 cases and China excluding Hong Kong and Macau with 4, 634 deaths from 85, 291 cases and 80, 484 recoveries as at 21st September, 2020 [5]. Africa has a total of 33, 953 deaths from 1, 410, 385 cases while Nigeria had 1, 100 deaths from 57, 437 cases and 48, 674 discharged [6].The global pace of COVID-19 research is providing rapid and critical advances although, there are still many unknowns regarding the disease, but there are also important lessons to be gleaned from other pandemics the world had experienced. [3 & 7]. In response to Covid-19, countries have had to impose a range of public health strategies that involved none pharmaceutical interventions which fall into two broad categories:

1) "Mitigation" which aims to achieve herd immunity by allowing the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) virus to spread through the population while mitigating disease burden.
2) "Suppression" aimed to drastically reduce SARS-CoV-2 transmission rates and halt endogenous transmission in the target population.

The first strategy aims to suppress transmission in the target population since control measures reduce viral transmission to such a degree that sustained endogenous transmission is no longer possible. With sustained control measures in place for a sufficient period of time, the virus will be eliminated in the focal population. The second approach aims to manage or mitigate the negative health impacts [8]. Since suppression aims to ultimately halt local transmission, mitigation tends to reduce the growth rate of the epidemic to ensure disease burden does not overwhelm healthcare systems [9]. By reducing (rather than halting) transmission, this strategy allows the susceptible pool to diminish, with the population potentially able to achieve herd immunity

(whereby sustained local transmission is impossible, even without social distancing) [10]. In practice, both approaches require the rollout of the same types of control measures such as social distancing and self-isolation, although the necessary intensities and durations vary. COVID-19 as an on-going and rapidly expanding global pandemic has caused substantial mortality and healthcare systems strained in multiple countries [9] with the older individuals and those with underlying conditions most at risk [11], although, infections have been found across all age groups [12&13]. Most disturbing is the detection of the virus in the upper respiratory tract which suggests a potential for pre-symptomatic and oglio-symptomatic transmission [14, 15&16]. Due to the absence of a vaccine, current attempts at controlling SARS-CoV-2 spread are focused on social measures that reduce rates of viral transmission which involves, social distancing (a generalized reduction of contact rates between individuals in the population) and self-isolation by symptomatic individuals [17]. The spread of SARS-CoV-2 have received much attention in comparison to those of the previous SARS-CoV, and Middle East respiratory syndrome (MERS) [1, 2&3]. COVID-19 has a protean manifestation, and the cryptic transmission of SARS-CoV-2 is characterized by multiple chains of transmission, unlike the SARS-CoV and MERS-CoV viruses that have been reported to occur mainly through nosocomial transmission [3&19].

In response to Covid-19, several countries have had to impose various range of public health strategies that involved none pharmaceutical interventions that fall into the two broad categories of mitigation and suppression. The government of Nigeria on March 29th 2020, through her president, President Mohammed Buhari, had announced the plans to initiate a national lockdown with various states to modify and implement the process as its best for them due to their distinct peculiarities. Even though Lagos State Government had already initiated a state lockdown in response to the increasing number of confirmed cases as at 23 March as it was the State with the index case of the disease in the country [20&30]. We observed as a whole the range of different none pharmaceutical interventions implemented by the Government of Nigeria during the period of the National and States Lockdown which included, Social Distance, ban on all religious activities, Isolation which included, personal and institutional isolation of infected or sick persons, compulsory use of facemask in public places, Promotion and Provision of Hand Hygiene Practices across all communities, Education on Sneezing and Coughing Etiquette, Destruction of Crowded Shanties and Makeshift buildings in Markets and other unathourized Places, Enforcement of Safe and Controlled Burials and Total Lockdown of States, which involved no interstate travels, partial shutting down of corporate business activities, total closure of schools at all levels, regulated market visitation and total shutdown of all drinking bars and eateries as applied [20, 21&22].

2. Methods

We used secondary data collated from the inception of the Covid-19 incident committee of Bayelsa State and analysed same for demographic qualities of structured age and sex on transmission of covid-19 confirmed and probable cases as well as case fatality across age groups during the period under study. Which is from the inception of the index case to the 8thof October, 2020 in the outbreak of Covid-19 in Bayelsa State, South-south Nigeria. Also, we assessed the prospects of the success achieved by the implementation of a these none pharmaceutical strategic interventions as a whole that was put in place to check the spread of Covid-19 by the Government of Nigeria in collaboration with that of Bayelsa State during the period of the lockdown that lasted from March up to about 8thof October, 2020 [20, 23]. We compared the effects of the lockdown on the epidemiologic curve of the disease and assessed the impact it had on the spread of the disease across the entire local Government Areas. By the 2016 data of the National Bureau of Statistics, Bayelsa State had a population of 2, 277, 961with female being 51.3% of the population and >59 years 5.3%.Yenagoa, the State Capital have about 20.7% of the total population. The study design was a quasy-experimental that looked at the effect of the lockdown activities as a whole and the impact in the mitigation and suppression of the Covid-19 in the state and across the Local Government Areas. The secondary data was collated from the Covid-19 incident committee dashboard from inception of the index case to the 8th October, 2020. All age groups were included that were confirmed and probable for the age range of<25 years to >59 years of age that were documented with complete information. Ethical clearance was obtained from the Ministry of Health Ethical committee and approval was given. The appropriate data set was stored and analysed on the researchers password operated laptop and another secondary storage device which was a 512 gigabite flash drive. The data was also sent to the researchers email for safe keeping in the cyber space. An external readable DVD was also used to store the data for safe keeping and protection in the researcher's departmental library. This study did not include data of patients on the DHIS platform and other incomplete data on the EOC incident committee dashboard. The use of only nine age groups for the stratification of participants age was also a limitation as much information may have been hidden in the >59 years group.

3. Result

Table 1: Description of Samples Collected and Tested for Sex

Total Sample Tested	2193
Male	1238
Female	955
Total Number of Confirmed Cases	401
Male	246
Female	155
Total Active Cases	7
Total Number of Recovered Cases (95.8%)	384
Total Number of Death Cases (4.2 %)	17

Table 2: Description of Cases Aggregated by Age-group and outcome

Age Group	Confirmed	Probable	Alive	Dead	% C. F
<25	44		44		
25-29	50		49		
30-34	67		66		
35-39	69		68		
40-44	45		45	1	2.2
45-49	43	1	42	2	4.8
50-54	29		27	2	7.4
55-59	17	1	16	2	12.5
>59	34	1	25	10	40
	398	**3**		**17**	

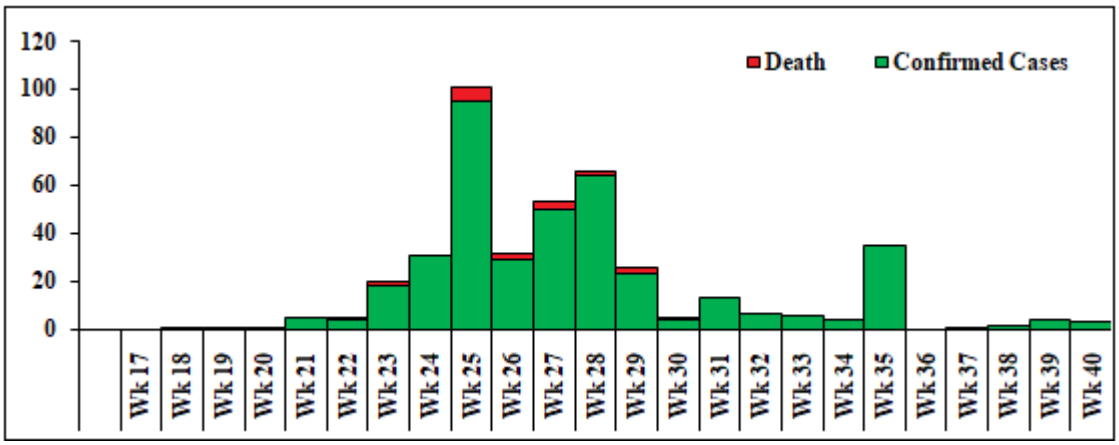
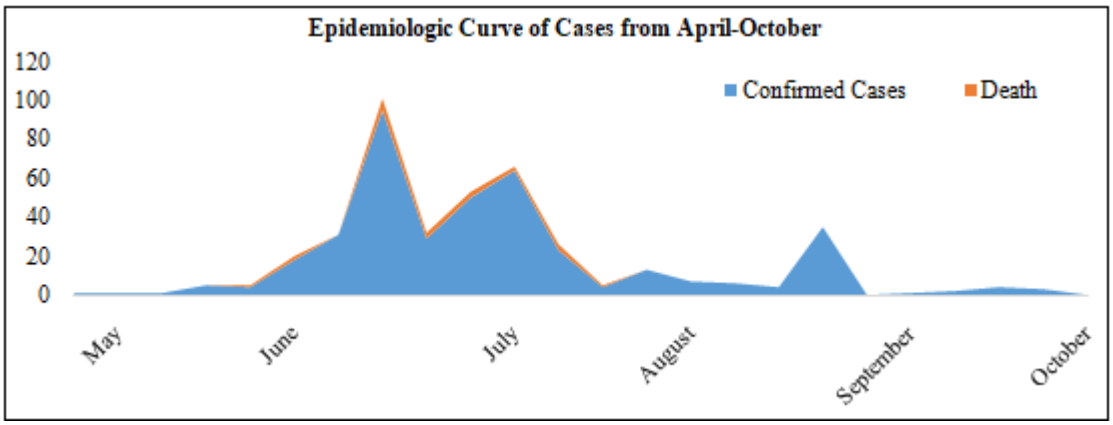


Figure 1: Epidemiology Curve of Confirmed Cases and Deaths from wk17 to wk40



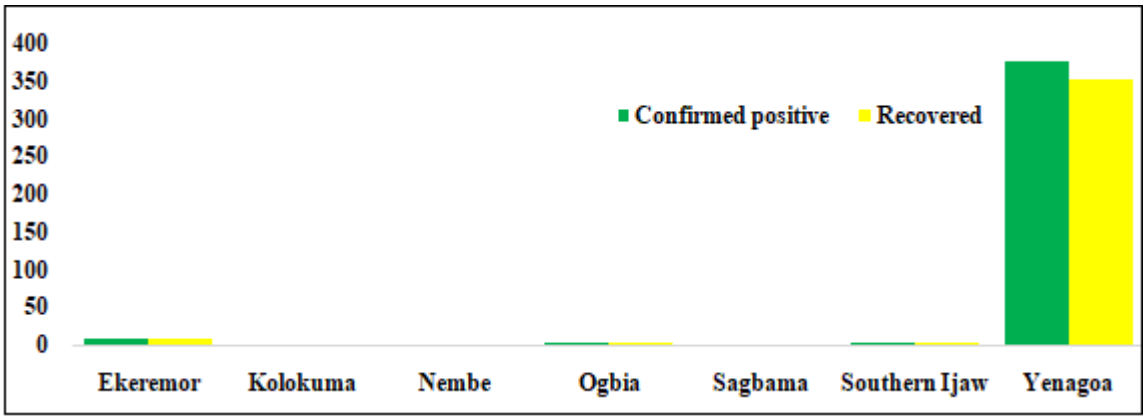


Figure 2: Distribution of Confirmed Positive Cases that Recovered by LGA

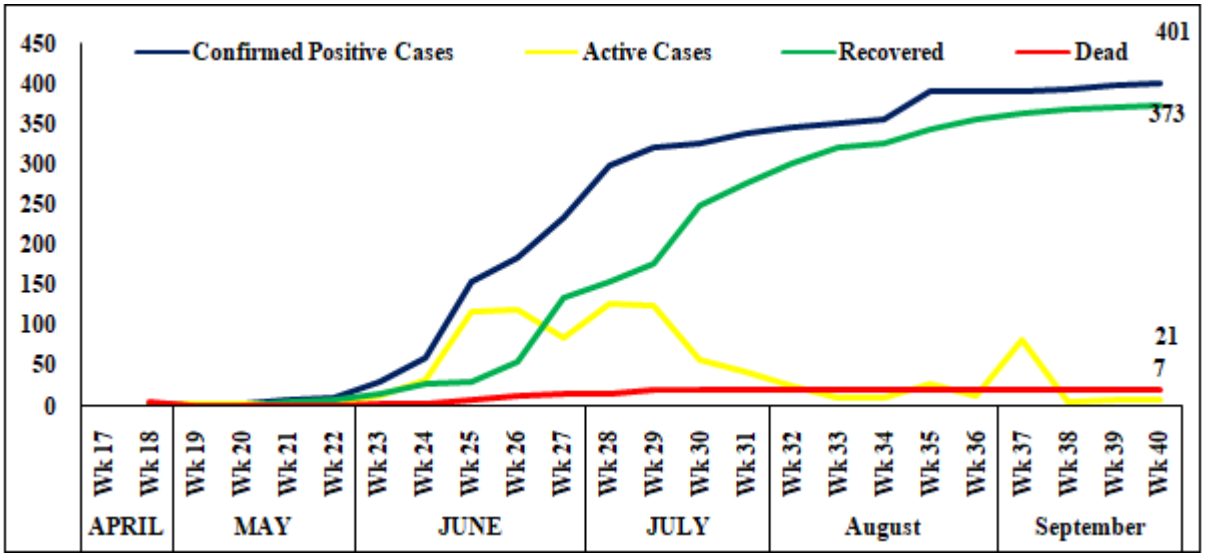


Figure 3: Trend Analysis of casesfrom Epi-Week 17 to 40

4. Discussion

A total of 2193 suspects were tested during the period under review which represent about 0.1 percent of the total state population and 53.5% were female with amongst the total suspects, with 18.3% found to be positive from the total suspects of which 38.7 percent were female. Case fatality for the confirmed and probable cases was 4.4 percent with age group >59 more at risk of death from covid-19 even though more patients with milder disease were found among age group <40. This shows that risk of death from covid-19 is reduced with youth. The Nigerian governments had imposed the lockdown from the 29th of March, 2020 until it was eased-up in phases from June to about September when the cases had plummeted drastically nationwide with the aim of achieving herd immunity through natural infection control as a means of ending the long-term threat of COVID-19. This can be seen clearly from the epidemiological curve which demonstrated that the cases and rate of transmission of covid-19 was impacted as the lockdown continued in June to about September in which the case had started to reduce [16, 24&30]. From the curve, it was obvious that as at the point of initiation of the process there was already community transmission in Bayelsa State with the highest incidence of the disease in June week 21with decline in July and staggered peak in august with decline again in September and finally with no case by October which clearly shows that there was multiple sources of infections as it also demonstrates how highly infectious the SARS-CoV-2 virus can be [26, 29&32]. Death started in week 22 and ended at week 30 with the highest peak at week 25 in June [31, 33&35]. It was clear that the greatest number of cases were from Yenagoa Local Government Area, which is the state capital as most of the patients were unable to travel to the more remote hinterlands due to the lockdown. This indicating that the disease was introduced into the society by an infected persons that may have contracted it from one of our neighbouring states based on the surveillance report travel history of the index case and others [36, 37&39].With the enforcement of social distance and imposition of curfew as well as other measures it was difficult for majority of the infected patients to spread the disease far and wide across the hinterlands [38&39].This work affirms that although, there was wide spread citizen condemnation of these interventions put in place by the Government of Bayelsa State, it was found to have achieved its main objectives of stopping the further spread of Covid-19 in the State. As it achieved herd immunity while simultaneously mitigates the impact of COVID-19 on hospital burden which shows that there is no case in any of the isolation centres in the state as at the date of the commencement of this study. When using the case fatality to estimate the number of deaths prevented by this intervention is estimated to be about 10, 000 deaths from over 228, 000 infections that would have occurred. Finally, we opine that our study only showed the positive impacts of none pharmaceutical interventions of the prolonged National lockdown as enforced and how it had affected the spread of Covid-19 in the study area without looking at effects of the individual components.

5. Conclusion

The lockdown had a positive impact on the indices of cases that were seen from the inception to when it was finally halted in phases which showed that the government met their objectives of halting the spread and breaking the chain of transmission of Covid-19 across the entire Local Government Areas of the State. The Government ought to be applauded for this initiative as several lives where save in the overall process of ensuring the lockdown implementation. Although, there was also the negative impact on the socio-economic activities of the citizens which could have been mitigated with proper planning and prompt delivery of palliatives to deserving citizens.

6. Recommendation

Subsequently, any comprehensive public health policy may needs to take into account the concomitant and wide range negative socio-economic consequences that such control measures may have had on the ordinary citizens and business owners in order to reduce the hash economic realities that are often the results of such long term halt of economic activities. The prolonged none pharmaceutical method of control as practiced during the lockdown was effective at halting the spread of the disease and should be

practiced in case of another spike in increase of infection is encountered in future. Technical process should be adopted at the planning and distribution of palliatives to improve the process and make it more transparent in order to increase citizen's trust and compliance. More awareness and demand creation for testing for Covid-19 should be created in order to screen more members of the society for the virus across the State. Vaccines should be prequalified for use by communities in order to mitigate the effect of the disease within the society

References

[1] Hsiang S, Allen D, Annan-Phan S et al. The effect of large-scale anti-contagion policies on the COVID-19 pandemic. Nature doi.org/10.1038/s41586-020-2404-8 (2020) (Epub ahead of print).
[2] Maguire G. Better preventing and mitigating the effects of Covid-19. Future Sci. OA 6(1), FSO586 (2020).
[3] Deng X, Gu W, Federman S et al. Genomic surveillance reveal multiple introduction of SARS-CoV-2 into Northern California. Science doi:10.1126/science.abb9263 (2020) (Epub ahead of print).
[4] Tobias S. Bretta, B, 1 and PejmanRohania, B. C. Transmission dynamics reveal the impracticality ofCOVID-19 herd immunity strategies. aOdum School of Ecology, University of Georgia, Athens, GA, 30602; bCenter for the Ecology of Infectious Diseases, University of Georgia, Athens, GA, 30602; and cDepartment of Infectious Diseases, University of Georgia, Athens, GA, 30602 Edited by Alan Hastings, University of California, Davis, CA, and approved August 27, 2020 (received for review April 26, 2020)
[5] WorldCovid Global Figures: http://today.rtl.lu/news/world covid-19 global figures
[6] Nigeria Centre for Disease Control, Daily Covid-19 Reports Across States : http://covid-19.ncdc.gov.ng
[7] GuoY .R, CaoQ. D, Hong Z. S. et al. The origin, transmission and clinical therapies on coronavirus disease 2019 (COVID-19) outbreak – an update on the status. Mil. Med. Res. doi:10.1186/s40779-020-00240-0 (2020) (Epub ahead of print).
[8] Anderson R. M., Heesterbeek H., Klinkenberg D., Hollingsworth T. D., How will country-based mitigation measures influence the course of the COVID-19 epidemic?. Lancet 395, 931–934 (2020)
[9] Bedford J. et al., COVID-19: Towards controlling of a pandemic. Lancet 395, 1015– 1018 (2020)
[10] Keeling M. J., Rohani P., Modeling Infectious Diseases in Humans and Animals (Princeton University Press, 2008).
[11] Guan W. J. et al., Clinical characteristics of coronavirus disease 2019 in China. N. Engl. J. Med. 382 1708–1720 (2020).
[12] Liu W. et al., Detection of COVID-19 in children in early January 2020 inWuhan, China. N. Engl. J. Med. 382, 1370–1371 (2020).
[13] Bi Q. et al., Epidemiology and transmission of COVID-19 in Shenzhen China: Analysis of 391 cases and 1, 286 of their close contacts. medRxiv:10.1101/2020.03.03.20028423 (27 March 2020).
[14] Zou L. et al., SARS-CoV-2 viral load in upper respiratory specimens of infected patients. N. Engl. J. Med. 382, 1177–1179 (2020).
[15] Wei W. E. et al., Presymptomatic transmission of SARS-CoV-2—Singapore, January 23– March 16, 2020. MMWR (Morb. Mortal. Wkly. Rep.) 69, 411–415 (2020).
[16] Wolfel R. et al., Virological assessment of hospitalized patients with COVID-2019. Nature 581, 465–469 (2020).
[17] Anderson R.M., Heesterbeek H., Klinkenberg D., Hollingsworth T.D., How will country-based mitigation measures influence the course of the COVID-19 epidemic?. Lancet 395, 931–934 (2020).
[18] Keeling M.J. and Rohani P., Modeling Infectious Diseases in Humans and Animals (Princeton University Press, 2008
[19] World Health Organization. Coronavirus disease (COVID-19). Surveillance strategies for COVID-19 human infection. Situation Report 161, 1–16 (2020).
[20] This Day Newspaper: http//www-thisdaylive-com.cdn.ampproject.org/v/s/w/ Nigeria Lockdown Announcement.
[21] Hollingsworth T.D., Klinkenberg D., Heesterbeek H., Anderson R.M., Mitigation strategies for pandemic influenza A: Balancing conflicting policy objectives. PLoSComput. Biol. 7, e1001076 (2011).
[22] Office for National Statistics, Coronavirus (COVID-19) infection survey pilot: 28 May 2020. https://www.ons.gov.uk/peoplepopulationandcommunity/healthandsocialcare/conditionsanddiseases/bulletins/coronaviruscovid19infectionsurveypilot/28may2020. Accessed 3 June 2020.
[23] Docherty A.B. et al., Features of 16, 749 hospitalised UK patients with COVID- 19 using the ISARIC WHO clinical characterisation protocol. medRxiv:10.1101/2020.04.23.20076042 (28 April 2020).
[24] Rossi F, Tortora C, Argenziano M, Di Paola A, Punzo F. Cannabinoid receptor type 2: a possible target in SAR-CoV-2 (CoV-19) infection? Int. J.Mol. Sci. 21(11), E3809. doi:10.3390/ijms21113809 (2020) (Epub ahead of print).
[25] Stringhini S. et al., Seroprevalence of anti-SARS-CoV-2 IgG antibodies in Geneva, Switzerland (SEROCoV-POP): A population-based study. Lancet 396, P313–P319 (2020).
[26] Sanche S. et al., High contagiousness and rapid spread of severe acute respiratory syndrome coronavirus 2. Emerg. Infect. Dis. 26, 1470–1477 (2020).
[27] Horton R., Offline: COVID-19—A reckoning. Lancet 395, 935 (2020). 29. S. M. Kissler, C. Tedijanto, E. Goldstein, Y. H. Grad, M. Lipsitch, Projecting the transmis- sion dynamics of SARS-CoV-2 through the postpandemic period. Science 368, 860–868 (2020).
[28] Antia A. et al., Heterogeneity and longevity of antibody memory to viruses and vaccines. PLoS Biol. 16, e2006601 (2018).
[29] de Cell `es M.D., Magpantay F.M., King A.A., Rohani P., The impact of past vaccination coverage and immunity on pertussis resurgence. Sci. Transl. Med. 10, eaaj1748 (2018).

[30] Mossong J. et al., Social contacts and mixing patterns relevant to the spread of infectious diseases. PLoS Med. 5, e74 (2008).
[31] RioloM.A.andRohani P., Combating pertussis resurgence: One booster vaccination schedule does not fit all. Proc. Natl. Acad. Sci. U.S.A. 112, E472–E477 (2015).
[32] Li Q. et al., Early transmission dynamics in Wuhan, China, of novel coronavirus– infected pneumonia. N. Engl. J. Med. 382, 1199–1207 (2020).
[33] Zhang J. et al., Evolving epidemiology and transmission dynamics of coronavirus dis- ease 2019 outside Hubei province, China: A descriptive and modelling study. Lancet Infect. Dis. 20, 793–802 (2020).
[34] Linton N.M. et al., Incubation period and other epidemiological characteristics of 2019 novel coronavirus infections with right truncation: A statistical analysis of publicly available case data. J. Clin. Med. 9, 538 (2020).
[35] Lauer S.A.et al., The incubation period of coronavirus disease 2019 (COVID-19) from publicly reported confirmed cases: Estimation and application. Ann. Intern. Med. 172, 577–582 (2020).
[36] Lloyd A.L., Realistic distributions of infectious periods in epidemic models: Changing patterns of persistence and dynamics. Theor. Popul. Biol. 60, 59–71 (2001).
[37] Wearing H., Rohani P., Keeling M, Appropriate models for the management of infectious diseases. PLoS Med. 2, e174 (2005).
[38] Van den DriesscheP.andWatmough J., Reproduction numbers and sub-threshold endemic equilibria for compartmental models of disease transmission. Math. Biosci. 180, 29–48 (2002).
[39] Brett T., Data for: Transmission dynamics reveal the impracticality of COVID-19 herd immunity strategies (Version 2.0.0). Zenodo. http://doi.org/10.5281/zenodo.4000983. Deposited 25 August 2020.