

Assessment of the Impact of Coronavirus (COVID-19) Pandemic on Educational System in Nigeria: Implication for Stakeholders

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Abstract

The spread of coronavirus pandemic (COVID-19) is a trending issue that has become a global threat to the development of all countries in the world. The disease has affected all sectors of the economy, including sports, education, etcetera. This study examined the impact of the Corona Virus on the educational system in Nigeria and its implication for stakeholders. The spread of the pandemic was analyzed using the reports emanated from reliable sources. The pandemic's effects include the closure of schools at all levels, delay in completion of an academic degree, risky decision making, rise in public and private partnership, online teaching, and students' learning outcomes. The implication for stakeholders includes the government's need to provide an up-to-date report on the pandemic's spread to protect institutions' inhabitants. School authorities should provide teaching through online platforms (Zoom, Skype, Whatsapp, Googlemeet, Email, etcetera). There should be synergy between school management and parents to ensure that students receive the teaching provided online. Also, parents should assist their children by providing them the necessary gadgets needed for learning online. Moreover, the students should be taught precautionary measures that will enable them to stay safe for the post-coronavirus era.

Keywords: COVID-19, education system, stakeholders, Nigeria

Introduction

The coronavirus pandemic is the primary concern of all countries worldwide, whether developed or developing. The Coronavirus has brought the countries down to their knees because of the severe damages that it has caused. The first case of someone suffering from the Coronavirus can be traced back to November 17, 2019, based on media reports on Chinese government data. The report shows that Chinese authorities had identified some people who contracted the virus last year and subsequently came under medical investigation. Weeks after the identified people's

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medical surveillance, China announced the new virus, later named a Coronavirus (“First COVID-19,” [2020](#); Toquero, [2020](#)). Expressly, it was stated that a 55-year-old from Hubei province in Wuhan’s city could have been the first person to contract the virus. The Coronavirus, which is now a pandemic, as of April 2, 2020, has infected 900,306 persons and killed 45,693. The disease currently has a presence in over 200 countries. World Health Organization characterized the spread as pandemic and reported significant eruptions in China, Italy, Spain, Iran, the United States, and the United Kingdom. COVID19 is caused by a virus that infects people, spread substantially, and affects human beings and many species of animals such as camels, cattle, cats, and bats (Fetzer et al., [2020](#); World Health Organization, [2020](#)).

Nigeria was one of the first countries to recognize the risk and start planning the response for COVID-19. In a massive effort of national coordination, a multi-sectoral National Coronavirus Preparedness Group was established by Nigeria CDC on January 7, 2020, one week after China first reported the cases and three weeks before WHO declared its disease an international concern. The country has also established diagnostic capacity for COVID-19 in three laboratories within the country in one month. Nigeria CDC has established a national team that meets daily to assess the risk coronavirus posed to the nation and review its response to it. As of April 2, 2020, the country has 184 confirmed cases and two deaths, with 20 patients discharged from the hospital (Nigeria Control Disease Centre, [2020](#)).

With the fast spread of the virus across the world’s length and breadth, it has affected virtually all facets of development, including health, education, sports, aviation, culture, agriculture, security, oil and gas, commerce, to mention a few. As a result of the virus, educators and students are currently feeling the astonishing ripple effect as schools at all levels are shut down until further notice amid the public health emergency. The initial development has made countries worldwide ensure that education is continuously given to their people, especially for disadvantaged children and youth who tend to be the hardest hit by school closures. A consensus had developed that the temporary school closures as a result of health and other crises and the scale and speed of the present educational interruption are unequalled and, if persistent, could threaten the right to education (Abidah et al., [2020](#); Evans, [2020](#); Jandrić, [2020](#); Kidman & Chang, [2020](#); Paintsil, [2020](#); Mahmut, [2020](#)).

Considering the importance of education and Nigerian commitment to the Education for All, Sustainable Development Goals initiatives, and national development objectives as encapsulated in the national policy on education, it can

be said that such commitment is seriously under threat due to the outbreak of Coronavirus. Given the previous, this study examined pandemic coronavirus's effect on the educational system in Nigeria and its implication for stakeholders.

Nature of Coronavirus

Coronavirus belongs to a large family of viruses that may cause illness in humans or animals. The virus is widely known to cause respiratory contagions ranging from the common cold to more stark diseases such as Severe Acute Respiratory Syndrome (SARS) and Middle East Respiratory Syndrome (MERS). World Health Organization announced "*COVID-19*" as the name of this virus on February 11, 2020, in tandem with the guidelines that were previously developed with the World Organization for Animal Health and the Food and Agriculture Organization of the United Nations (Chen et al., [2020](#); Guanet al., [2020](#); Kapasia et al.,[2020](#); Schwartz et al., [2020](#)).

The International Committee on Taxonomy of Viruses (ICTV) pronounced "*severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2)*" as the name of the new virus on February 11, 2020. This name was adopted because it is hereditarily related to the Coronavirus responsible for the outbreak of SARS in 2003. While related, the two viruses are different. From the perspective of risk communications, using the name SARS can have inadvertent consequences in creating needless fear for some populations, especially in Asia, which was worst affected by the outbreak of SARS in 2003. Therefore, WHO has started referring to the virus as "*the virus responsible for COVID-19*" when communicating with the public. The disease usually spreads through respiratory droplets ejected by someone who is sneezing or coughing or both. The risk of catching the virus from someone with zero symptoms is not uncalled for; many people remain asymptomatic while they are carriers of the virus and may cause infection to others with low immunity. Therefore, COVID-19 was declared a lethal pandemic, and severe measures were taken to control its spread (Ahmed et al.,[2020](#); Shah et al., [2020](#)).

COVID-19 is defined as a lower respiratory tract infection, meaning that most of the symptoms are mainly felt in the lungs and chest, which is quite different from colds that bring on a high respiratory tract infection, producing sinus congestion runny nose. These symptoms seem to be mostly absent for people with COVID-19, though they are not unheard. Specifically, the most comprehensive breakdown of the disease symptoms emanates from a recent World Health Organization analysis of more than 50,000 confirmed cases in China (Chen et al., [2020](#); Oranburg,

[2020](#); Viner et al.,[2020](#)). The outcome of the analysis presents the most common symptoms as well as the percentage of people who had them:

Table 1

WHO Analysis of the Common Symptoms and Percentage of COVID-19 Confirmed Cases in China

Symptoms	Percentage	Symptoms	Percentage
Fever	88%	Shortness of breath	19%
Dry cough	68%	Coughing up blood	1%
Fatigue	38%	Swollen eyes	1%
Sore throat	14%	Nausea or vomiting	5%
Coughing up sputum or thick phlegm from the Lungs	33%	Stuffy nose	5%
Headache	14%	Diarrhea	4%
Chills	11%		

Source: WebMD Health News ([2020](#))

The Spread of Coronavirus from a Global Perspective

Table 2

Global Situation Report 70 on Coronavirus by Regions as of March 31, 2020

SN	Region	Confirmed Cases	Death
1	Western Pacific Region	104868	3671
2	European Region	423946	26694
3	South-East Asia Region	4215	166
4	Eastern Mediterranean Region	50349	2954
5	Region of the Americas	163014	2836
6	African Region	3786	77
	Total	750890	36405

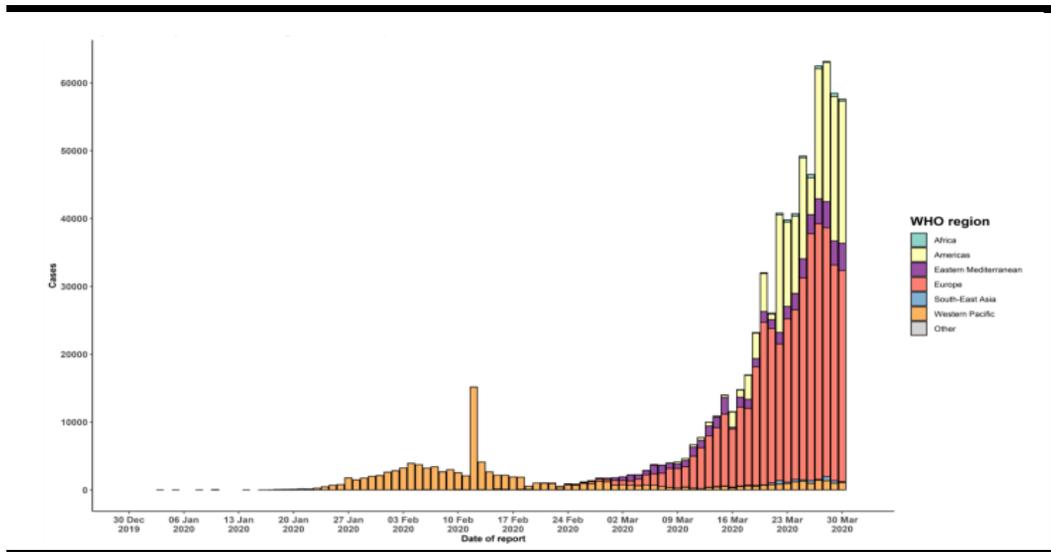
Source: World Health Organization ([2020](#))

Since the beginning of the outbreak of Coronavirus in Wuhan, China, in late December 2019, one of the most vital strategies at the repression stage has been to identify all contacts, ensure their strict isolation and adhere strictly with follow up regarding any symptoms of the diseases (Chen et al., [2020](#); Rangiwai&Simati-Kumar, [2020](#)). Recent studies in China have shown that increased surveillance, self-isolation, and contact trace reduce the risk of contagion of Coronavirus;

moreover, the risk of further spreading the virus by the infected patient in the community is restricted. Table 2 and Figure 1 explains the spread of the virus from a global perspective.

Figure 1

Epidemic Curve of Confirmed COVID-19 Cases by March 31, 2020



Source: World Health Organization ([2020](#))

Assessing the Spread of Coronavirus in Nigeria

The Coronavirus sneaked to Nigeria on February 28, 2020, when the Federal Ministry of Health of Nigeria alerted the World Health Organization (WHO) of an established case of COVID-19 in Lagos, Nigeria. The patient was a 44-year-old male engineer, an Italian, who journeyed from Milan, Italy to Lagos, Nigeria, on February 24, 2020. The Italian came for a mission at a factory located in the Ewekoro area of Ogun State. Upon entrance to Lagos, he was conveyed by the factory's vehicle to a hotel where he remained for one night before moving on the next day to the factory's site in Ogun State. Specifically, on February 25, 2020, he allegedly developed a headache during the evening hours. Subsequently, he presented to the factory's hospital on February 27, 2020, with signs of headache and fever, which had not gone since the beginning on the evening of February 25 despite self-medication. Due to Coronavirus's suspicion, he was later referred to an infectious diseases hospital in Lagos, where a sample was collected and sent to

the laboratory for testing. The outcome of the test released by the Lagos University Teaching Hospital on February 27, 2020, was positive for COVID-19 infection. As of April 1, 2020, Nigeria had 151 confirmed cases and two deaths in total (University of Lagos, [2020](#)). The summary of Coronavirus spread in Nigeria is presented below in Tables 4 and 5.

Table 4

Case Summary of Coronavirus in Nigeria as of April 1, 2020

Total Confirmed Cases	151
Discharged	9
Death	2

Source: Nigeria Centre for Disease Control ([2020](#))

Table 5

State-wise Confirmed Cases in Nigeria

State	Numbers	State	Numbers
Abuja (FCT)	28	Abia	0
Adamawa	0	AkwaiBom	0
Anambra	0	Bauchi	2
Bayelsa	0	Benue	1
Borno	0	Cross River	0
Delta	0	Ebonyi	0
Enugu	2	Edo	4
Ekiti	2	Gombe	0
Imo		Jigawa	0
Kaduna	3	Kano	0
Katsina	0	Kebbi	0
Kogi	0	Kwara	0
Lagos	82	Nasarawa	0
Niger	0	Ogun	4
Ondo	0	Osun	14
Oyo	8	Plateau	0
Rivers	1	Sokoto	0
Taraba	0	Yobe	0
Zamfara	0		

Source: Nigeria Centre for Disease Control ([2020](#))

Furthermore, two latest developments have occurred since the occurrence of the Coronavirus in Nigeria. First, a liaison among researchers and scientists from various institutions in Nigeria, African Centre for Genomics of Contagious Diseases of Redeemer University, Human and Zoology Virology in Lagos State Teaching Hospital, and Nigerian Institute of Medical Research was developed. The institutional collaboration resulted in successful genome sequencing of the COVID-19 strain, which confirmed the virus's presence in Nigeria, similar to Italy and Wuhan, China. The first coordinated attempt of the sequencing of a virus in Africa was achieved by the Lagos State Ministry of Health and Nigeria Centre for Diseases Control. World Health Organization affirmed the results; hence, it could be regarded as the first academic achievement of Nigerian scientists that helped outline the Coronavirus strategy. The second development was contact tracing and monitoring regarding the COVID-19 index in line with global best practices to test for the pandemic virus's possible presence in diagnosed persons.

Effects of Coronavirus on Educational System in Nigeria

As the world in general and Nigeria in particular hitherto face the global health crisis, serious concern began to emerge from the nation's already fragile educational industry due to the outbreak of the COVID-19 pandemic threatening the sector in the areas:

Closure of Schools. The pandemic Corona Virus has affected the educational system in Nigeria, which led to the extensive spread closure of schools at all levels (Pre Primary Schools, Primary Schools, Secondary Schools, and tertiary institutions in the country). The announcement and implementation of a nationwide shutdown of the educational institutions at all levels due to the pandemic coronavirus took effect from March 20, 2020 ("COVID-19," [2020](#)). Following that, the children at Community primary schools were chanting "Coronavirus, we no go gree" that we will not submit to a pandemic that had affected over 120 million learners. UNESCO ([2020](#)) confirmed that preliminary evidence revealed that COVID-19 patients had been adults, and children were less susceptible to catch the virus, but they could be potential carriers. Therefore, school closure was considered an effective way to slow the spread of the illness. Gloria ([2020](#)) affirmed that over 421 million students were affected in 39 countries due to coronavirus outbreaks globally due to school closure endangering their timely completion of the academic year.

The previous outbreak of infectious diseases has prompted more comprehensive school closure within and outside the country with varying degrees of effectiveness. However, the challenge of mass education was created, which was

to be met by the teachers. Considering the Nigerian population's low literacy rate, how well people understand in the simplest form what a virus means? Were the teachers initially trained on how to disseminate such decisive and deceptive information in an understandable way to evade panic and mass hysteria?

Delay in Academic Program. The pandemic COVID-19 has undoubtedly affected the continuation of academic programs in educational institutions, as many schools were about to start their examinations. In contrast, those that have already started the exams were compelled by necessity. The slow pace of change in academic institutions globally in general and Nigeria, in particular, is lamentable, with centuries outdated, lecture-based approaches to teaching, entrenched institutional biases, and obsolete classrooms. However, COVID-19 has become a mechanism for educational institutions globally to explore an innovative way out relatively quickly, and Nigeria was no exception.

Lower Educational Quality. The closure of educational institutions nationwide in Nigeria was the time to look for sustainable means of providing standardized education and well-trained individuals, organizations, and policies to continue quality teaching and learning in the educational industry. It is too early to judge how reactions to COVID-19 will affect the education system; researchers hint that it could have a long-lasting effect on the trajectory of teaching and learning innovation and digitalization (Gloria & Diana, [2020](#)). Most schools in the nations are finding a stopgap way out to continue teaching, but the quality of learning is much dependent on digital access and its quality. Unless access costs reduce, and the quality of access increases, the gaps in education quality shall widen; thus, socio-economic standards will worsen. Until now, no state policy has appeared to avoid this loss.

Online Teaching. So far, many educational institutions in Nigeria have shifted to online teaching (Ejiohou, [2020](#)). The developed countries like UK and Italy, though much adversely affected by the pandemic, have taken this opportunity to turnaround their educational systems; for instance, Italy has made efficient use of technology for teaching life skills online. Countries like Nigeria need global help and guidance, especially for strengthening internet networks. Some private school systems in Nigeria have initiated augmentation of standard asynchronous online learning tools such as reading material via Goggle Classroom with synchronous face to face video instruction to meet the challenge. Despite sounding quite promising, it is an issue faced by the rich and the poor alike. The school closure has significantly affected the students, especially students belonging to low-income strata who lack access to internet facilities and other technologies. Furthermore, the

erratic power supply hinder the useful function of learning devices such as smartphones, laptops, and desktop computers. Tied to this is the low quality of high-cost internet data services of the network providers in Nigeria. A more severe threat is increased post-pandemic dropout from schools after discontinuation; an increase in abject poverty due to loss of work may get it further complicated. Many families can neither afford nor are skillful in the use of classified gadgets for online learning. Apart from these infrastructural deficits, teaching with technology needs a well-trained human capital, which Nigeria lacks, like many other developing countries of the world.

Students' Learning Outcomes. COVID-19 negatively affects students' academic outcomes in that students were deprived of learning opportunities for growth and development. The disadvantages are disproportionate for less privileged learners who tend to have fewer educational opportunities beyond school. Students' dropout rate tends to rise due to pandemic coronavirus as schools are hubs of social activity and human interaction. Students who miss such interaction, which is essential to learning, may experience academic retardation. Phelps & Sperry (2020) affirmed that the pandemic outbreak had necessitated parents, including those with limited academic background and resources, to facilitate their children's learning domestically, most especially at the primary and secondary level. These risk control decisions have led millions of students driven into homeschooling. However, Gloria (2020) accentuated that COVID-19 has become a catalyst for educational institutions globally to search for innovative situations in a relatively short time.

Risky Behaviors. An adage says that "an idle hand is a devil workshop." Following Coronavirus's outbreak in the country, academic institutions right from the primary to tertiary were shutdown indefinitely. The situation puts a strain on parents and guardians to provide care and manage distance learning while children are out of school. In the absence of alternative options, leaving children alone when schools were shutdown could lead to risky behavior and increase the influence of peer pressure and substance abuse. Out of the school, girls presently stand the risk of being impregnated and lured into marriage due to cultural norms.

Rise in Public-Private Partnership. In just the past few weeks, learning syndicates and coalitions have started taking shape with different stakeholders, including governments, education professionals, technology providers, and telecom network operators coming together to make use of digital platforms as a temporary solution to the crisis. In an emerging country like Nigeria, where the government had principally provided education, this could become widespread and increase

education costs at all levels. Azar (2020) emphasized that educational innovation is receiving attention beyond the typical government-funded as more comprehensive collaboration has been established between the town and the gown to reach common educational goals.

Post-COVID19 Scenario

Many scientists believe that a herd-immunity may prevent the 2nd wave of COVID19 in Africa(Bhatti, 2020). FontanetandCauchemez (2020) have explained that herd immunity is a key concept for epidemic control. It states that only a proportion of a population needs to be immune (through overcoming natural infection or through vaccination) to an infectious agent for it to stop generating large outbreaks. A key question in the current COVID-19 pandemic is how and when herd immunity can be achieved and at what cost. However, the herd immunity is attained after 2-3 attack of the pandemic (Miller et al., 2009).

It is also debated that segments of a population may gain herd immunity, but it may not be uniform across the population. Hence the chances of an outbreak are potent (Rubin, 2020). Moreover, it is reported that naturally acquired antibodies to COVID-19 get weakened and disappear in 4-6 weeks (Doshi, 2020; Mandavilli, 2020). It is a myth that COVID19 can recur or not as reinfection was reported only in a few cases. Children younger than ten were rendered immune to the pandemic (Goldstein et al., 2020); therefore, a hue and cry were raised against school closing. Later it was found that young children may not get infected from the virus, but they could be potential carriers.

Another myth about vaccines has also been broken. Although many countries, including Nigeria, claim that they have reached the final stages of preparing the vaccine, Peiris and Leung (2020) have denied the possibility to reach a pre-COVID19 ‘normalcy.’ van Doremalen et al. (2020) have warned that experiments with primates have shown a reduction in symptoms and reduced a load of virus in the lower respiratory tract, but the animals do not get virus-free. This situation is alarming, and many people believe that educational Institutions should remain closed, lowering the chance of contamination across the wider population.

Conclusion

The rapid spread of COVID 19 has demonstrated the importance of building resilience to confront various threats emanated from the pandemic disease to insecurity and changes resulted from technological advancement. The pandemic equally serves as an avenue to remind relevant stakeholders in the nation’s educational industry of the students’ fundamental skills in this unpredictable world,

such as informed decision making, creativity in problem-solving, and adaptability to the dynamic nature of the system. Strict measures should be taken to ensure that these skills accord all students' needed priority in Nigeria.

It is concluded that COVID 19 resurgence threat is still not over. The countries that took an early step suffered less loss. It is time to remain globally connected and learn what is happening around and act accordingly. It is sorrowful that precious academic time has been lost to many students worldwide, and consequently, the number of out-of-school children may rise again. Many students would not complete a tier of education, such as primary, elementary, and secondary. Nigeria already hits the bottom low for literacy rate and educational attainment. Therefore, it would be an excellent preventive measure to keep students away from school to protect them physically. However, the government must look forward to alternate measures to ensure that the country does not suffer from educational setbacks.

The Corona pandemic (COVID 19) is not over and continues to pose health, social, and educational challenges. Well-coordinated efforts at all levels, family, school, district, province, and state level, are needed. Young people may not be at much risk attending schools or colleges, but teachers, staff, and surrounding communities would be at a greater risk. Therefore, unless the protocol is followed seriously, the opening of the educational institutions would remain threatening. People who may come across students during their travel to and back from school, particularly the weak and the old, would be at higher risk of exposure to illness and death.

Educational Institutions should follow standardized data-driven protocol to maximize students, staff, families, and communities' safety as advocated globally. Corresponding with the recent hike in COVID 19 cases, Walker al. (2020) proposed that effective mitigation strategies need to be implemented while continuing with the prevention protocols. Besides, robust testing must be continued, followed by rapid isolation and quarantine to safeguard everyone from this vicious pandemic.

Effect of Coronavirus on Educational System in Nigeria: Implication for Stakeholders

The pandemic's effect has been felt-worldwide; hence, no country can avoid WHO guidelines to protect the general population. It is crucial for educational institutions to create awareness about the pandemic and instruct the students, teachers, and staff to follow the SOPs to stay safe. Some of the guidelines are noted below:

1. The school authority should, as a matter of urgency, provide prompt and reliable updates on COVID-19 and initiate all measures required to protect the institution's inhabitants.
2. Seminars, conferences, and workshops on good respiratory hygiene, covering of mouth and nose with a tissue or handkerchief while coughing or sneezing, and maintain a safe distance of at least 2 meters' distance from each other should be organized for the administrative, academic, and non-academic staff of the schools.
3. The school authority, in partnership with the Ministry of Health, should ensure the regular supply of water, soap, and sanitizers in the educational institutions; moreover, a regular drill for handwashing with soap and sanitizer for at least 20 seconds should be opted by every institution as a preventive measure.
4. The school management's culture and the principle of best respiratory hygiene practices should be promoted and urge students to comply with them to curtail and prevent disease spread strictly.
5. The use of distance learning programs, open educational applications, and platforms that schools and teachers can use to reach learners remotely to limit education disruption should be prioritized.

As a way of preparing for the post-coronavirus era in the Nigerian education system, the following recommendations were made to keep both educators and students safe:

1. Both students and teachers should be encouraged to practice respiratory hygiene at home at all levels of education. When coughing and sneezing, they should cover the mouth and nose with flexed elbow or tissue and discard the tissue immediately into a closed bin and clean their hands with alcohol-based hand rub or with soap and water.
2. They should cover their mouth and nose when coughing and sneezing to prevent the spread of viruses and germs because if they sneeze or cough into their hands, they may contaminate objects or people they touch.
3. Practice of social distancing is vital for students and teachers during the pandemic period. Specifically, they need to maintain at least 1 meter (3 feet) distance between themselves and other people, particularly for those who are coughing, sneezing, and have a fever.
4. They should avoid touching the eyes, nose, and mouth because hands touch many surfaces contaminated with the virus.

5. There is a need for the general practice of hygiene measures when visiting places like live animal markets, animal product markets, or wet markets. They should avoid contact with other animals in the market (e.g., bates, dogs, snakes, rodents, birds, stray). If they contact such, they need to ensure regular hand washing with sanitizer after touching animal products animals.
6. Finally, they need to avoid the consumption of raw or undercooked animal products. They need to handle raw meat, animal organs, or milk with care to avoid cross-contamination with unprepared foods.

References

- Abidah, A., Hidayatullaah, H. N., Simamora, R. M., Fehabutar, D., & Mutakinati, L. (2020). The impact of COVID-19 to Indonesian education and its relation to the philosophy of “merdekabelajar”. *Studies in Philosophy of Science and Education*, 1(1), 38–49.
- Ahmed, H., Allaf, M., & Elghazaly, H. (2020). COVID-19 and medical education. *The Lancet Infectious Diseases*, 20(7), 777–778. [https://doi.org/10.1016/S1473-3099\(20\)30226-7](https://doi.org/10.1016/S1473-3099(20)30226-7)
- Azar, Z. (2020). Impact of the 2019-20 coronavirus pandemic on education. <https://en.wikipedia.org/wic/>
- Bhatti, M. W. (2020, July 22). Is Pakistan heading towards Covid-19’ herd immunity’? *The NEWS Daily*. <https://www.thenews.com.pk/print/690329-is-pakistan-heading-towards-covid-19-herd-immunity>
- Chen, H., Xu, W., Paris, C., Reeson, A., & Li, X. (2020). Social distance and SARS memory: impact on the public awareness of 2019 novel coronavirus (COVID-19) outbreak. *medRxiv - The Preprint Server for Health Sciences*. <https://doi.org/10.1101/2020.03.11.20033688>
- COVID-19: Federal government orders closure of unity schools.(2020, March 19). *The Guardian*. <https://guardian.ng/news/covid-19-fg-orders-closure-of-unity-schools/>
- Doshi, P. (2020). Covid-19: Do many people have pre-existing immunity? *BMJ*, 370, m3563. <https://doi.org/10.1136/bmj.m3563>
- Ejiohou, T. (2020). *COVID-19 amidst shutdown of schools*. <https://www.yiago.org/>
- Evans, O. (2020). Socio-economic impacts of novel Coronavirus: The policy solutions. *BizEcons Quarterly*, 7, 3–12.

- Fetzer, T., Hensel, L., Hermle, J., & Roth, C. (2020, March 21). *Coronavirus perceptions and economic anxiety*. VOX EU. <https://voxeu.org/article/coronavirus-perceptions-and-economic-anxiety>
- First COVID-19 case happened in November, China records show. (2020). *The Guardian*. <https://www.theguardian.com/world/2020/mar/13/first-COVID-19-case-happened-in-november-china-government-records-show-report>
- Fontanet, A., & Cauchemez, S. (2020). COVID-19 herd immunity: Where are we? *Nature Reviews Immunology*, 20(10), 583–584.
- Gloria, T. (2020). *The path forward amid COVID-19*. TD Magazine. <https://www.td.org/user/content/GloriaTam>
- Gloria, T., & Diana, E. (2020). *3 ways the coronavirus pandemic could reshape education*. World Economic Forum. <https://www.weforum.org/agenda/2020/03/3-ways-coronavirus-is-reshaping-education-and-what-changes-might-be-here-to-stay/>
- Goldstein, E., Lipsitch, M. & Cevik, M. (2020). On the effect of age on the transmission of SARS-CoV-2 in households, schools and the community. *medRxiv - The Preprint Server for Health Sciences*. <https://doi.org/10.1101/2020.07.19.20157362>
- Guan, W.-J., Ni, Z.-Y., Hu, Y., Liang, W.-H., Ou, C.-Q., He, J.-X., Liu, L., Shan, H., Lei, C.-L., Hui, D. S. C., Du, B., Li, L.-J., Zeng, G., Yuen, K.-Y., Chen, R.-C., Tang, C.-L., Wang, T., Chen, P.-Y., Xiang, J., Li, S.-Y., ... Zhong, N.-S. (2020). Clinical characteristics of 2019 novel coronavirus infection in China. *New England Journal of Medicine*, 382, 1708–1720. <https://doi.org/10.1056/NEJMoa2002032>
- Jandrić, P. (2020). Postdigital research in the time of COVID-19 (2020). *Postdigital Science and Education*, 2, 233–238. <https://doi.org/10.1007/s42438-020-00113-8>
- Kapasia, N., Paul, P., Roy, A., Saha, J., Zaveri, A., Mallick, R., Barman, B., Das, P., Chouhan, P. (2020). Impact of lockdown on learning status of undergraduate and postgraduate students during COVID-19 pandemic in West Bengal, India. *Children and Youth Services Review*, 116, 105194. <https://doi.org/10.1016/j.childyouth.2020.105194>
- Kidman, G., & Chang, C. H. (2020). What does “crisis” education look like? *International Research in Geographical and Environmental Education*, 29(4), 279–282. <https://doi.org/10.1080/10382046.2020.1831204>

- Mahmut, Ö. Z. E. R. (2020). Educational policy actions by the ministry of national education in the times of COVID-19 pandemic in Turkey. *KastamonuEğitimDergisi*, 28(3), 1124–1129.
- Mandavilli, A. (2020, June 18). You may have antibodies after coronavirus infection: But not for long. *New York Times*. <https://www.nytimes.com/2020/06/18/health/coronavirus-antibodies.html>
- Miller, M. A., Viboud, C., Balinska, M., & Simonsen, S. (2009). The signature features of influenza pandemics - implications for policy. *New England Journal of Medicine*, 360, 2595–2598.
- Nigeria Centre for Disease Control. (2020). *Situation report on Coronavirus*. <https://COVID19.ncdc.gov.ng/1/4/2020>
- Ninkong, N. (2020). *COVID-19: Government order closure of all school*. <https://m.guardian.ng/news/could-19-government>
- Oranburg, S. (2020). *Distance education in the time of Coronavirus: Quick and easy strategies for professors* (Duquesne University School of Law Research Paper No. 2020-02). Pittsburgh, PA: Duquesne University-School of Law.
- Paintsil, E. (2020). COVID-19 threatens health systems in sub-Saharan Africa: The eye of the crocodile. *The Journal of Clinical Investigation*, 6(1), 30–48.
- Peiris, M., & Leung, G. M. (2020). What can we expect from first-generation COVID-19 vaccines? *The Lancet*. Advance online publication. [https://dx.doi.org/10.1016%2FS0140-6736\(20\)31976-0](https://dx.doi.org/10.1016%2FS0140-6736(20)31976-0)
- Phelps, C., & Sperry, L. L. (2020). Children and the COVID-19 pandemic. *Psychological Trauma: Theory, Research, Practice, and Policy*, 12(S1), S73.
- Rangiwai, B., & Simati-Kumar, B. (2020). A plan for online teaching and learning for the Master of Applied Indigenous Knowledge (MAIK) programme in Māngere: Responding to COVID-19. *TeKaharoa: The eJournal on Indigenous Pacific Issues*, 15(1), 1–14. <https://www.tekaharoa.com/index.php/tekaharoa/article/view/290>
- Rubin, R. (2020). Difficult to determine herd immunity threshold for COVID-19. *Journal of American Medical Association*, 324(8), 732–732.
- Schwartz, A. M., Wilson, J. M., Boden, S. D., Moore, T. J. Jr., Bradbury, T. L. Jr., & Fletcher, N. D. (2020). Managing resident workforce and education during the COVID-19 pandemic: Evolving strategies and lessons learned. *JBJS Open Access*, 5(2), e0045.

- Shah, A., Kashyap, R., Tosh, P., Sampathkumar, P., & O'Horo, J. C. (2020). Guide to understanding the 2019 novel coronavirus. *Mayo Clinic Proceedings*, 95(4), 646–652. <https://doi.org/10.1016/j.mayocp.2020.02.003>
- Toquero, C. M. (2020). Challenges and opportunities for higher education amid the COVID-19 pandemic: The Philippine context. *Pedagogical Research*, 5(4), 1–5. <https://eric.ed.gov/?id=EJ1263557>
- UNESCO. (2020). *COVID 19 educational distribution and response*. <https://www.cdc.gov/coronavirus/2019-ncov>
- University of Lagos. (2020). *Update on COVID-19 in Nigeria*. <https://unilagedu.ng/p=6161>
- van Doremalen, N., Lambe, T., Spencer, A., Belij-Rammerstorfer, S., Purushotham, J. N., Port, J. R., Ulaszewska, M., Feldmann, F., Allen, E. R., Sharpe, H., Schulz, J., Holbrook, M., Okumura, A., Meade-White, K., Pérez-Pérez, L., Bissett, C., Gilbride, C., Williamson, B. N., Rosenke, R., Long, D., ... Munster, V. J. (2020). ChAdOx1 nCoV-19 vaccination prevents SARS-CoV-2 pneumonia in rhesus macaques. *bioRxiv*. Advanced online publication. <https://dx.doi.org/10.1101%2F2020.05.13.093195>
- Viner, R. M., Russell, S. J., Croker, H., Packer, J., Ward, J., Stansfield, C., Mytton, O., Bonell, C., & Booy, R. (2020). School closure and management practices during coronavirus outbreaks including COVID-19: A rapid systematic review. *The Lancet - Child & Adolescent Health*, 4(5), 397–404. [https://doi.org/10.1016/S2352-4642\(20\)30095-X](https://doi.org/10.1016/S2352-4642(20)30095-X)
- Walke, H. T., Honein, M. A., & Redfield, R. R. (2020). Preventing and responding to COVID-19 on college campuses. *JAMA*, 324(17), 1727–1728. <https://doi.org/10.1001/jama.2020.20027>
- WebMD Health News (2020). *Symptoms of coronavirus disease*. <https://www.webmd.com/lung/covid-19-symptoms#1>
- World Health Organization (WHO). (2020). *Coronavirus disease 2019 (COVID-19): Situation report 75*. <https://www.who.int/emergencies/diseases/novel-coronavirus-2019/situation-reports/1/4/2020>