

Chapter Fifteen

COVID-19 AND AFRICAN ENVIRONMENTAL/HERBAL BASED REMEDIES

Jude I. Onebunne, PhD

Department of Philosophy

Nnamdi Azikiwe University, Awka

juno,anyi@gmail.com

&

Success Okechukwu

Nnadiabube Research Institute

Ngozika Estate Phase 2, Awka

&

Benjamin C. Okoye

Universita Pontificia Salesiana,

Roma

Executive Summary

The emergence of COVID-19 pandemic has brought unprecedented changes to all nations of the world. The outbreak of the epidemic rises on daily basis globally but in Africa, there remains till date low reports of COVID-19 pandemic. Many researchers emerged to discover why there low turnout of COVID-19 victims' cases in Africa. This led to different philosophies and theories of ecology. Using the method of critical analysis, the researcher discovers that there is great contribution of African ecology (environment) to the high survival of COVID-19. On the other hand, the search for a possible cure and a vaccine for the novel coronavirus disease led to experiments on chlorophyll, aspirin and different African ecological medicinal plants as possible cure to covid-19 in Africa.

Keywords: Africa, ecophilosophy, ecosophy, COVID- 19, ecology

Introduction

The COVID-19 pandemic is an unanticipated phenomenon that has exposed human fragility in an interconnected and interdependent world. In December 2019 a novel corona virus (COVID-19) was detected in Wuhan, China and has since spread around the world (Kanu 2020a). COVID-19 is an illness caused by a novel corona virus called severe acute respiratory syndrome corona virus 2 (SARS-CoV-2; formerly called 2019-nCoV) which was first identified amid an outbreak of respiratory illness cases and uncontrollable death cases. According to Africa CDC (2020), the disease spreads from person to person through infected air droplets that are projected during sneezing or coughing. It can also be transmitted when humans have contacts with hands and surfaces that contain the virus and touch their eyes, nose, or mouth with the contaminated hands. To fight COVID-19, the Government has prohibited people from the crowding around, social distance, wearing masks and always washing their hands (Keni R etal;2020).

As of 18th April, 2020, 10:00am CEST; WHO reported more than 2.1 million confirmed cases of COVID-19, including 142,229 deaths in 213 countries, areas or territories. The most affected countries with more than 30,000 confirmed cases of SARS-CoV-2 are the United States of America, Spain, Italy, Germany, France, the United Kingdom, China, Iran, Turkey, Belgium, the Russian Federation, Canada and Brazil. However, the number of cases continues to rise throughout the globe and became a serious menace to public health. COVID-19 is majorly affecting many countries all over the world. The continent confirmed its first case of COVID-19 in Egypt on 14th of February, 2020, and from

sub-Saharan Africa the first case was reported in Nigeria on 27th of February, in an Italian patient who flew to Nigeria from Italy on 25th of February, 2020.

Later, as of 22 May 2020, 54 of 55 AU Member States (except Western Sahara) had reported over 100,000 cases and 3,100 deaths. The northern region of the AU had provided notification of the most cases at that time, reporting over 31% (over 31,000 cases) of the cases from Africa and the highest regional case-fatality rate (5%), with countries such as Egypt (15,003), Algeria (7,728) and Morocco (7,300) driving the overall numbers.

However, Africa is expected to be the most vulnerable continent where COVID-19 victim cases run into millions due to swamp environments and their inability to maintain hygiene and social distance as a result of overpopulation but there is no much cases of other continents. Different researches came up with various ecophilosophies ranging from our hot weather, chlorophyll emitted from herbs and other herbal medicines as a potential option to cure or prevent COVID-19.

COVID-19 pandemic

The introduction or outbreak of Corona Virus in December 2019 was firstly detected in Wuhan, China and since then, spread around the world. COVID-19 is an illness caused by a novel corona virus called severe acute respiratory syndrome corona virus 2 (SARS-CoV-2; formerly called 2019-nCoV) which was first identified amid an outbreak of respiratory illness cases and uncontrollable death cases. On January 30, 2020, the World Health Organization (WHO) announced that this outbreak had constituted a public health emergency of international concern (Mahase 2020). The novel coronavirus was initially named 2019-nCoV and officially as severe acute

respiratory syndrome coronavirus 2 (SARSCoV-2) (Smith, S.,2020). As of February 26, COVID-19 has been recognized in 34 countries, with a total of 80,239 laboratory-confirmed cases and 2,700 deaths (WHO 2020). According to recent research of Viral Etiology, similar to SARS-CoV and Middle East respiratory syndrome coronavirus (MERS-CoV), SARSCoV-2 is zootoxic, with Chinesehorseshoe bats (*Rhinolophus sinicus*) being the most probable origin. Majority of patients experienced fever and dry cough, while some also had shortness of breath, fatigue, and other atypical symptoms, such as muscle pain, confusion, headache, sore throat, fricaa and vomiting. Currently, the approach to COVID-19 is to control the source of infection and adhere to preventive measures (Franco FM, 2019).

COVID-19 in Africa

The most-affected countries so far are South Africa (confirmed cases = 2783, mortality = 1.8%), Egypt (confirmed cases=2844, mortality = 7.2%), Morocco (confirmed cases = 2564, mortality = 5.3%), Algeria (confirmed cases = 2418, mortality = 15.0%) and Cameroon (confirmed cases = 1016, mortality = 2.1%). However, due to inadequate testing capacity for COVID-19 the true number of cases may remain undetected, which makes it challenging to predict or conclude the true epidemiology of COVID-19 in the continent. Certainly, several major factors, such as late arrival of the pandemic, weak diagnostics including inadequate COVID-19 testing, lack of essential medical supplies and a large susceptible population will significantly affect and change the epidemiology of COVID-19 in the continent (Cunningham AB., 2020; Kanu 2020b).

According to Daou, M. (2020) Table 1. Epidemiology of COVID-19 cases in some African countries as of 18th of April, 2020.

Country	Confirmed cases	Deaths.	Recoveries	First case/s
Algeria	2,418	364	846	25 th Feb, 2020
Angola	19	2	6	21 st Mar, 2020
Benin	35	1.	18	16 th Mar, 2020
Botswana	15	1	0	30 th Mar, 2020
Burkina Faso	557	35	294	9 th Mar, 2020
Burundi	6	1	44	31 st Mar, 2020
Cameroon	1,016	21	168	6 th Mar, 2020
Cape Verde	56	1	1	20 th Mar, 2020
Egypt	2,844	205	646	14 th Feb, 2020

Ethiopia	96	3	15	13 th Mar, 2020
Ghana	641	8	83	12 th Mar, 2020
Gambia	9	1	2	17 th Mar, 2020
Guinea	477	3	59	13 th Mar, 2020
Gabon	108	1	7	12 th Mar, 2020
Kenya	246	11	53	12 th Mar, 2020
Liberia	76	7	7	16 th Mar, 2020
Mali	190	13	34	25 th Mar, 2020
Morocco	2,564	135	281	2 nd Mar, 2020
Niger	627	18	110	19 th Mar, 2020
Nigeria	493	17	159	27 th Feb, 2020

Sierra Leone	26	0	0	31 st Mar, 2020
South Africa	2,783	50	903	5 th Mar, 2020
Togo	83	5	48	6 th Mar, 2020
Tanzania	147	5	11	16 th Mar, 2020
Uganda	55	0	20	20 th Mar, 2020
Zambia	52	2	30	18 th Mar, 2020
Zimbabwe	24	3	2	15 th Mar, 2020

Medicinal Plant-Based Treatments

Researchers such as Geli, P. (2020) have claimed that medicinal plant-based treatments should be beneficial to treat and prevent COVID-19. Yang et al reported that plant species traditionally used as food can help to enhance the immune system of the body and help to prevent the manifestation of COVID-19. This led to experiments on the following:

Hot temperature and humidity

Visual inspection of world maps shows that coronavirus disease 2019 (COVID-19) is less prevalent in countries closer to the equator, where heat and humidity tend to be higher.

Among the several environmental factors that influence the survival and spread of respiratory viral infections, air temperature plays a crucial role. Cold weather makes the respiratory system sensitive to infections. This is why people tend to suffer from respiratory infections during cold winter months. In tropical climates, influenza and respiratory viruses are transmitted more during the cold rainy seasons.

According to Folke, C. et al, In sub-Saharan Africa, most African countries that have recorded cases of COVID-19 such as South Africa, Nigeria, Senegal, Togo, Cameroon and Benin have mean monthly temperatures of 20 to 32 degrees Celsius in this same period. Meanwhile, Algeria and Egypt. North African countries that have seen cases had monthly temperatures between 11 and 17 degrees Celsius (World Bank; 2001).

Many respiratory viral infectious diseases such as those caused by the human respiratory syncytial virus (RCV), influenza virus, and human corona viruses show seasonal oscillation and are prevalent during winter. Transmission of influenza was found to increase in colder and drier conditions. In addition, the severe acute respiratory syndrome (SARS), caused by the coronavirus SARS-CoV, is affected by temperature. The fact that SARS and COVID-19 are caused by coronaviruses and the outbreak of both diseases started during the winter seem to suggest that winter conditions could be promoting transmission of these infections (Intergovernmental Panel on Climate Change (IPCC),2001).

Therefore, previous coronaviruses spread more during the colder winter months. Also, there are marked temperature differences between the most affected (colder) and least affected countries (warmer) in the COVID-19 pandemic.

Herbal medicines-All Leaves and Lemon Grass

The new coronavirus disease (COVID-19) pandemic has caused global socio-economic disturbances with a worrisome number of deaths and health issues, and the world has been struggling to find medicine to treat and prevent COVID-19. A number of combinations and trials have been done, but so far, they have not produced promising results. The different types of misinformation related to COVID-19 have been spreading throughout the world through social media, including use of medicinal plant products to prevent or cure COVID-19. Due to this situation, ethnobiologists collaborated with local people and document the medicinal plants. (Adnan N, Othman N, 2019)

There is a strong inter-relationship between people and plants. People are dependent on plants for different purposes such as for food, medicine, and houses. Plant species have always been a fundamental source for the discovery of drugs. People had used medicinal plants to fight against pandemics in the past, and dependency of people on medicinal plants might have increased in these days around the world as medicinal plants can be an alternative option to prevent COVID-19. Different researchers in Africa have suggested herbal medicine as a potential option to cure or prevent COVID-19.

In Africa, the medicinal plants are often used in the traditional medicine system. More than 80% of the people have been using traditional medicine such as medicinal plants. Medicinal plants are the primary source of healthcare for the people in Africa and are an integral part of their culture. Most of the people in Africa have been using medicinal plants as the alternative to allopathic or western medicine. It has also been playing an important role in increasing the economic level of people as Africans export medicinal plants to different countries in the world. The elder

people living in rural areas have more knowledge of traditional medicine.(Harris DR, Hillman G.,2016).

Again, according to Wackernagel, M. et al., COVID-19 the health care system is fragile and has a lack of infrastructure. In this context, home remedies, like the use of medicinal plants supported by the relevant authorities, can serve as an alternative option to combat COVID-19. The government has also valued medicinal plants as an immunity power booster used with prescriptions.

According to Van der Veen M. (2014), medicinal plants were combined with western medicine to treat a similar disease, Severe Acute Respiratory Syndrome (SARS). There is no effective medicine available so far for the treatment of COVID-19; medicinal plants are being used globally that might have increased the demand for medicinal plants. Some plants are useful to treat viral disease, but COVID-19 is a new disease, and the effectiveness of the medicinal plants to cure it has not been tested yet. Therefore, the excessive use of medicinal plants, however, could be problematic and is a matter of concern.

Therefore, all the stakeholders including ethnobotanists and community leaders should come together to educate people about the proper use of medicinal plants. The validity and reliability of such medicinal plants should be tested further by phytochemical and pharmacological research, and invalid information should be monitored and controlled in different social media platforms and communities. It is recommended that people follow information from authentic sources related to the COVID-19 pandemic.

Hot Water Therapy with Ginger, Garlic, Uziza leaf, Uda Seed, Turmeric powder and Lemon As An Undeniable Last Resort To The Treatment of Covid-19 Both in Africa and Globally:

The greatest conspiracy of Covid-19 is that it is not curable and many doubt if it is actually preventable. But the fact is now clear that the outcome of the Covid-19 pandemic is no more impossible to predict.

At the time of this writing, many doctors, health workers and professionals have questioned the pandemic nature of COVID-19 with all the known and common symptoms and curative responses from across the globe. No doubt, the symptoms of Covid-19 infected patients are obviously synonymous to many of us in Africa e.g. African countries like Nigeria, Zambia, Lome-Togo, Ghana et cetera have been used to and accustomed with, instances remain the common malaria and Typhoid, Fever etc. However, this great killer called Corona virus pandemic, based on authentic and undeniable evidences and proofs majorly in Africa and by some brave Africans as Dr. Stella Immanuel [Cameroonian], confirms that COVID-19 pandemic is undeniably curable with some common medication that can be related to malaria medication. Equally COVID-19 patients have responded curatively to most traditional African medicinal herbs as uzizah, turmeric powder, ginger, garlic, hot water therapy and lemon leaves as already noted. Fortunately for Africans and her preventive climatic nature, there exists natural resources with regard to curative herbs constituting African Traditional medicine and the already quinine medication in Africa with the advent of the European explorers and their encounter with malaria pandemic. No doubt therefore that most dreaded diseases as have been termed deadly outbreaks and branded pandemic are actually regional diseases as Malaria in Africa and COVID-19 of the Western world.

It is no news that the aforementioned African Traditional herbs and remedies have been practically used to the treatment of many infected COVID-19 patients in Africa [Nigeria for example] and others globally, albeit, many studies projected that the severity and disaster of COVID-19 would have been a sorry sight in Africa. Thus, aside the benefits of these traditional African herbs and seed extracts to the treatment of Covid-19 as has obviously confirmed, the below stands as their other numerous health benefits.

Uda Seed (Negro Pepper):

Uda seed or Negro pepper is an aromatic spice commonly used in flavoring foods in certain parts of the world, including Nigeria, Ghana, Brazil, among others. It is called *uda* in Igbo language and *eeru-alamo* in Yoruba language. One thing about Negro pepper is that it is versatile in nature, i.e. its bark, seeds, stem, fruit and leaves can be used for several purposes, ranging from culinary, medicinal and sexual purposes.

Nutritional Value of Uda Seed

- **Has Anti-Inflammatory Purposes:** Inflammation is the body's way of responding to injuries, infections, wounds and any damage of any tissue.
- **Packed with Antioxidants:** This means that this spice can be used for educing the risk and effect of cancerous tumours.
- **It is a Great Remedy for Dermatological Problems:** It has been proven to be a great remedy for treating skin conditions including boils, itches, skin eruptions etc.
- **Treats Respiratory System Diseases**
- **Prevents and Treats Malaria:** Malaria is one of the life-threatening diseases in the world and is majorly caused by parasites spread to people via the bites of infected mosquitoes. No wonder it is a remedy to the treatment of

Covid-19 pandemic and it really works. Ostensibly, report shows that more than 500 to 1000 million cases of malaria are recorded yearly and it led to the death of over 700,000 people. Common symptoms of malaria include- fever, headach, chills, nausea, vomiting, fatigue, sweating, cough etc.

- It Keeps Rheumatism at Bay and Relieves Gastrointestinal Problems
- Also Used To Treat Menstrual Problems

Uziza: The spice is known to provide nutritional, culinary, insecticidal and medicinal benefits. The antioxidant (flavonoids) in uziza prevents oxidative cell damage and has strong anticancer and anti-ulcer activity. Uziza seeds are recommended for anti-inflammatory management and purposes. It is rich in dietary fibre. In Eastern Nigeria, Uziza seed is consumed by women after childbirth to enhance uterine contraction and expel retained matter from the womb.

Lemon: The bottom line is that lemon contains a high amount of vitamin C, soluble fibre and many compounds that give a number of health benefits. It aids weight loss and reduces risk of heart disease, anemia, kidney stones, digestive issues and cancer.

Complementary Possible Treatments and Curative nature of COVID-19

Management of the complications of COVID-19 relies on supportive care and oxygen supplementation via non-invasive or mechanical ventilation. Patients who are critically ill may require vasopressor support and antibiotics for secondary bacterial infections(Chaplin, 2020). The absence of an effective treatment against severe acute respiratory syndrome corona virus 2 (SARS-CoV-2) infections has led clinicians to redirect

drugs that are known to be effective for other medical conditions to the treatment of COVID-19. Key among these repurposed therapeutic agents are the antimalarial drug chloroquine and its analogue hydroxychloroquine, which is used for the treatment of autoimmune diseases, such as systemic lupus erythematosus and rheumatoid arthritis (Mehra *et al.*, 2020). These drugs have been shown in laboratory conditions to have antiviral properties as well as immunomodulatory effects. Other repurposed therapeutic agents include; remdesivir, lopinavir, interferon beta-1a, doxycycline and azithromycin.

Can COVID-19 be sustained and if so, for how long? Are the most pertinent questions to humanity now. According to WHO at the time of this write-up, “to date, there are no specific vaccines or medicines for COVID-19. Treatments are under investigation, and will be tested through clinical trials.” But testimonies abound against WHO’s stand. This stand that there is *no known cure* is against all known vocal dissensions and applied cure from the globe as well as the much sounded trumpet of victory from Africa and beyond that COVID-19 is curable with herbs and known dosage prescriptions of some curative drugs. Dr. Stella Immanuel (Gwandiku-Ambe) a bold medical professional from Africa that studied in Nigeria working in Houston Texas, who was actively involved in handling many COVID-19 patients, thundered alongside other medical professionals, in front of the Supreme Court in Washington DC:

I refuse to be chained by fake science. I have successfully treated over 250 COVID patients with *Hydroxy Chloroquine (HCQ) combined with Zinc and Zitromax*. No deaths. All these double blinded studies sponsored by big Pharma are fake science.

The speech was golden and consoling. It was in line with nature trying to regenerate itself. It fits into the known fact that there is always a way-out in every known predicament. Dr. Stella

Immanuel, a Cameroonian, who studied general medicine in University of Calabar, Nigeria, is an Emergency Medicine Specialist in Katy, Texas. She graduated with honors in 1990. Dr Stella Challenged the CNN experts on COVID19 for this long deception on the curative of COVID-19. However, Dr. Harvey A. Risch, MD, PhD, a professor of epidemiology at Yale school of public health, said the key to defeating Covid-19 already exists. Dr. Risch, who has authored over 300 peer-reviewed publications and currently holds senior positions on the editorial boards of several leading journals, is calling on government and health officials to start using hydroxychloroquine, which has been shown to reduce coronavirus death rate by half in covid-19 patients. He is of the opinion that hydroxychloroquine has shown to be highly effective when given very early in the course of the illness, especially when combined with the antibiotics azithromycin or doxycycline and zinc supplement.

At the time of this writing, many doctors and health workers have questioned the pandemic nature of COVID-19 with all the known and common symptoms and curative responses from across the globe. The Symptoms of COVID-19 infected patients are symptoms many of us in Africa, Nigeria, have been accustomed with, like the Malaria-Typhoid symptoms. But we can learn from pandemics in history to determine our best courses. However, upon being discharged from the Gwagwalada isolation centre in Abuja, the founder of DAAR Communications, Mr. Raymond Dokpesi, had told journalists that he could not differentiate between malaria and COVID-19 because he was placed on dosage of malaria drugs while at the centre. These are our teachers – the Spanish flu, the AIDS pandemic, and more. Prevention is better than cure. Nobody is against it. It remains the best cure to all human ailments, even spiritual and other wise. As already reiterated above, it is a fact

that most dreaded diseases that have been termed deadly outbreaks and branded pandemics are actually regional diseases like in the case of Malaria and Typhoid disease of Africa Continent and Pandemic of US and European extracts. In Nigeria for example, the hypes about COVID-19 were something else. People doubt if there was COVID-19 with shocking facts. And if there was, many believe that we are used to the symptoms. Equally some went out to show that it was curable against all odds like malaria and other dread diseases of the Western countries which are home ailments in Nigeria. In Nigeria Punch Newspaper of May 28, 2020 it was reported by the experts on the Presidential Tasks Force on COVID-19, 2020 as saying that “three of numerous claims of COVID-19 herbal cure validated”.

A renowned double Professor of Biochemistry and Toxicology, Emeka Ezeonu in the midst of these crises of confusion and misleading info gave a scholarly attention and professorial caveat on COVID-19, with special regard to Dr. Stella Immanuel’s comment on the hidden and much possible cure, reassures us in his pronounced take on the whole thing thus:

I believe there is sufficient empirical data to show that hydroxychloroquine is relevant for either protection or treatment of COVID-19 at the early stage of infection as it inhibits the cytokine storm but once that stage is overcome its use becomes unreliable. I believe that there are some powerful Pharma companies that are fighting the use of Chloroquine because it impedes their business interest. Chloroquine was a wonder drug discovered during the Second World War and was a frontline drug for malaria for almost six decades until Artemisinin was discovered. The WHO quickly put away a very cheap and affordable chloroquine for a far more costly Artemisinin

based drugs. Till today there are people who never recover from boost of malaria except they take chloroquine. Sure chloroquine is toxic and most drugs are anyway, but weighed on a scale of balance its benefits are far higher. For me the simple solution is to let chloroquine be provided, it is contraindicated for susceptible clinical cases and age groups.

In all the theatrics and geopolitics of COVID-19, there was a dose of conspiracy theories that destabilized the world in utter confusion as a global pandemic and an economic inferno. However, from the onset of this monster disease, the voice of Africans seems not to matter with regard to its preventative nature as well as the curative status. Rather, Africans seem to be at the mercy of the European supremacy. It's unfortunate that many studies projected that the severity and disaster of COVID19 will be a tale of sorry sight in Africa.

Fortunately for the Africans and thanks to African climate there exists natural resources with regard to curative herbs constituting *African Traditional Medicine* and the already quinine medication in Africa with the advent of the European explorers and their encounter with malaria pandemic.

Notwithstanding, the much lauded pandemic nature of COVID-19 the *Nigeria Centre for Disease Control* (NCDC) played it out in the Nigerian way as there were attempts made to declare fake COVID-19 cases in the state, hence, the concession. The NCDC, however, was established in the year 2011 in response to the challenges of public health emergencies. Equally, there are lots of conspiracies and lies with regard to COVID-19. One is tempted to questionably doubt what actually the authorities are

trying to hide and achieve by making COVID-19 look untreatable and non-preventive when in actual fact it is so. An exercise of African philosophy of education on COVID-19 shows that: Malaria was and is still regarded as pandemic in most of the continental regions of the world while it is a mere common disease in Africa and many tropical regions.

COVID-19 may be a pandemic in temperate regions like China, US and European Continents but it is not a pandemic in African continent and many tropical regions of the world. That is, in Continents where malaria is a pandemic, COVID-19 is so but in other countries where Malaria and flu are not pandemic, COVID-19 is not. There should not have been any lockdown with regard to this sickness that is curable and avertable. Leaving our schools under lockdown now is a sign that the stakeholders in Education Industry in Nigeria are well uninformed.

Otherwise, the authorities in question must have known that the so called pandemic is mere epidemic and even mere sickness in our environment. As the saying goes that *anything can wait except training a child. His name is now*. Hence the great need for a functional African Philosophy of Education which will place education first. Therefore, there is need for a good philosopher of education who should be able to understand that COVID-19 is full of conspiracies and as Africans and Nigerians in particular the approach ought to be quite different.

Conclusion

The COVID-19 pandemic has not spared the world. Every nook and cranny on Earth has felt the heat of the pandemic. The aftermath of this epidemic is one that has never happened before. The number of its victims keeps increasing daily but in Africa, there are relatively low Covid-19 cases. Despite different ecological theories and experiments on medicinal herbs, there's

no guarantee that the pandemic cannot return back to Africa. Therefore, we should help by adhering to its safety measures and the government should provide its vaccines and equipment. Success in controlling the virus in Africa is in the interests of the whole world for we will not be safe as long as the virus still exists somewhere. The United Nations will continue to stand by Africa as it confronts the COVID-19 threat both in its immediate and longer-term manifestations.

References

- Adnan N, Othman N. (2019) The relationship between plants and the Malay culture. *Proc Soc Behav Sci.* 2012;42:231–41. <https://doi.org/10.1016/j.sbspro.2012.04.186>.
- Africa C. D. C. (2020) 'Novel Coronavirus (2019-nCov) Global Epidemic – 10 March 2020', URL: <https://africacdc.org/disease-outbreak/novel-coronavirus-2019-ncov-global-epidemic-10-march-2020/> [accessed: 27/03/2020]. Africa CDC (n.d.) 'About us', URL: <https://africacdc.org/about-us/> [accessed: 27/03/2020].
- Boulware D. R., Pullen M. F., Bangdiwala AS, Pastick KA, Lofgren SM, Okafor EC, Skipper CP, Nascene AA, Nicol MR, Abassi M, Engen NW(2019). *A randomized trial of hydroxychloroquine as postexposure prophylaxis for Covid-19.* N Engl J Med. 2020;383(6):517–25.
- Cunningham A. B. (2020). *Applied ethnobotany: people, wild plant use and conservation.* London and Sterling: Earthscan; 2001.
- Africa, CDC (2020) 'COVID-19: UPDATE IN AFRICA, 25 MARCH 2020 – 9:30 AM EAT', Twitter tweet, URL: <https://twitter.com/AfricaCDC/status/1242724814458105857> [accessed: 27/03/2020].

- Daou, M. (2020) 'Is Africa, with its low rates so far, ready to face the coronavirus pandemic?', France24, URL: <https://www.france24.com/en/20200312-is-africa-with-its-low-rates-so-far-ready-to-face-the-coronavirus-pandemic> [accessed: 27/03/2020].
- Ezeonu, Emeka, S comment on Dr. Stella Immanuel <https://www.odogwublog.com/tag/hydrochloroquine/> Retrieved 03/08/2020
- Fagan, B. Floods (1999). *Famines and emperors. El Niño and the fate of civilisations*. New York, USA, Basic Books.
- Folke, C. et al. (1996). *Renewable resource appropriation*. In: Getting down to earth. Costanza, R. & Segura, O. eds. Washington, DC, USA, Island Press.
- Franco FM, Bussmann R. W. (2020). Rising to the occasion: outlining ethnobiologists' response to the coronavirus (COVID-19) pandemic. *Ethnobotany Res Appl* 20: 1–4.
- Geli, P. (2020) *Preparing for the coronavirus and other epidemics in Africa*. URL: <https://www.brookings.edu/blog/frica-in-focus/2020/02/28/preparing-for-the-coronavirus-and-other-epidemics-in-africa/> [accessed: 27/03/2020].
- Harris DR, Hillman G. (1989). *An evolutionary continuum of people-plant interaction*. London: Foraging Farming. Unwin Hyman 31:11–26.
- Harshberger J. W. (1896). The purposes of ethno-botany. *Botanical gazette*. 21(3):146–54. <https://doi.org/10.1086/327316>.
- <https://www.mphonline.org/worst-pandemics-in-history/>? Retrieved on 30/7/2020
- <https://www.ecdc.europa.eu/en/geographical-distribution-2019-ncov-cases>. Retrieved on 30/7/2020
- <https://www.mphonline.org/epidemic-vs-pandemic/> Retrieved on 29/7/2020

https://en.wikipedia.org/wiki/Coronavirus_disease_2019#:~:text=%22China%22). Retrieved on 01/8/2020

<https://www.cnbc.com/2020/04/30/coronavirus-trump-suspects-covid-19-came-from-china-lab.html> Retrieved on 27/7/2020

<https://www.mphonline.org/epidemic-vs-pandemic/>
Retrieved on 28/7/2020

Intergovernmental Panel on Climate Change (IPCC 2001).
Climate Change 2001: Third Assessment Report (Volume I).
Cambridge, UK Cambridge University Press.

Iroegbu, Pantaleon. 1994. *Enwisdomization and African philosophy*.
Owerri: International University Press.

Jim Meehan, MD & MeehanMD.com.
<https://healthimpactnews.com/2020/physician-and-medical-journal-editor-healthy-people-should-not-wear-face-masks/> Physician and Medical Journal Editor: Healthy People Should Not Wear Face Masks declared that . Retrieved 03/08/2020

Kanu, I. A. (2020). COVID-19 Pandemic and the Health of African Migrants. *AMAMIHE: Journal of Applied Philosophy*. Vol. 18. No. 2. Pp. 56-64.

Kanu, I. A. (2020). COVID-19 and the Economy: An African Perspective. *Journal of African Studies and Sustainable Development*. Vol. 3. No. 2. Pp. 29-36.

Kanu, I. A. (2020). Saint Augustine and COVID-19 Pandemic: The Future and Divine Providence. *Tansian University Journal of Arts, Management and Social Sciences*. Vol. 7. Pp. 151-162.

Keni R, Alexander A, Nayak PG, Mudgal J, Nandakumar K. (2020). COVID-19: Emergence, spread, possible treatments, and global burden. *Front Public Health*. 2020;8:216. <https://doi.org/10.3389/fpubh.2020.00216>.

- Martin GJ. *Ethnobotany: a methods manual*. Springer; Kew, United Kingdom: Royal Botanic Gardens; 2014.
- McMichael, A.J. (2001). *Human frontiers, environments and disease*. Cambridge, UK, Cambridge University Press.
- Smith, S. (2020) *What the Coronavirus means for Africa*, Africa Center for Strategic Studies, URL: <https://africacenter.org/spotlight/what-the-coronavirus-means-for-africa/> [accessed: 27/03/2020].
- Van der Veen M. (2014) The materiality of plants: plant-people entanglements. *World archaeology*. 46(5):799–812. <https://doi.org/10.1080/00438243.2014.953710>.
- Wackernagel, M. et al. (2002). *Tracking the ecological overshoot of the human economy*. *Proceedings of the national Academy of Sciences*. 99:9266–9271 (2002).
- World Bank (2001). *World development report. Development and the environment*. Oxford, UK, Oxford University Press, 1992.
- WHO on Cure.
<https://www.google.com/search?client=firefox-b-d&q=Cure+of+COVID-19>. Retrieved 0n28/07/2020