COURSE CODE: **ENG 384**

COURSE TITLE: **Engineering Law and Managerial Economics**



**SECOND SEMSTER**

A TERM REPORT ON THE ROLE OF COMPUTER ENGINEERS IN “ENGINEERING STRATEGIES FOR HANDLING COVID-19 FOR ENVIRONMENTAL HEALTH & ECONOMIC STABILITY

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**IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE AWARD OF THE BACHELOR OF ENGINEERING (B. ENG.) DEGREE IN COMPUTER ENGINEERING**

CERTIFICATION

This is to certify that the project is written by ADAMU ABDULQUDDUS with matriculation number 17/ENG02/004 in the department of Computer Engineering College of Engineering Afe - Babalola University, Ado Ekiti (ABUAD) during the 2019/2020 academic session under my supervision and under lockdown.

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**CHAPTER ONE**

 What is COVID-19?

 First of all, I want to use this chance to stay: PLEASE STAY INDOORS AND STAY SAFE, FOLLOW ALL PROTOCOLS, GOD SAVE US ALL.

 The disease caused by the novel coronavirus first identified in Wuhan, China, has been named coronavirus disease 2019 (COVID-19) – ‘CO’ stands for corona, ‘VI’ for virus, and ‘D’ for disease. Formerly, this disease was referred to as ‘2019 novel coronavirus’ or ‘2019-nCoV.’

 The COVID-19 virus is a new virus linked to the same family of viruses as Severe Acute Respiratory Syndrome (SARS) and some types of common cold. Current estimates suggest a median incubation period from five to six days for COVID-19, with a range from one to up to 14 days. A recent modelling study confirmed that it remains prudent to consider the incubation period of at least 14 days.

Over the course of the infection, the virus has been identified in respiratory tract specimens 1-2 days before the onset of symptoms and it can persist up to 8 days in moderate cases and up to 2 weeks in severe cases. In terms of viral load profile, SARS-CoV-2 is similar to that of influenza, which peaks at around the time of symptom onset, but contrasts with that of SARS-CoV, which peaks at around 10 days after symptom onset, and that of MERS-CoV which peaks at the second week after symptom onset. Older age has also been associated with higher viral loads. The high viral load close to symptom onset suggests that SARS-CoV-2 can be easily transmissible at an early stage of infection.

There are many conspiracy theories about the COVID-19, and its only human to be curious to research on some of those theories. I, came to a conclusion to believe one of these Theories that; the covid-19 is a means of population control and deem to support life as the earth was falling on the downside, demand would eventually become more than supply and many other factors, I don’t support the notion of using this medium to cut down the population, I feel we would need a more specific method of cutting down the population and smarter ways to do so, but what do I know as I am not in government and just an ignorant teenager going through a phase.

**Survival in the environment**

Recent publications have evaluated the survival of SARS-CoV-2 on different surfaces. The environmental stability of viable SARS-CoV-2 is up to 3 hours in the air post aerosolisation, up to 4 hours on copper, up to 24 hours on cardboard, and up to 2–3 days on plastic and stainless steel, albeit with significantly decreased titres. These findings are comparable with the results obtained for environmental stability of SARS-CoV-1. However, as these are results from experimental studies, they do not directly translate to fomite infectivity in the real world.

Different levels of environmental contamination have been described in rooms of COVID-19 patients, ranging from 1 positive out of 13 samples to 13 out of 15 samples testing positive for SARS-CoV-2 before cleaning. No air samples were positive in these studies, but one sample from an air exhaust outlet was positive indicating, according to the authors, that virus particles may be displaced by air and deposited on surfaces.

**Public Health and Social Measures for the COVID-19 Pandemic**

The purpose of this note is to outline public health and social measures useful for slowing or stopping the spread of COVID-19 at national or community level. Guidance for case finding and management, personal and environmental measures, travel measures, and mass gatherings is available on the WHO website available here*.*

Public health and social measures are measures or actions by individuals, institutions, communities, local and national governments and international bodies to slow or stop the spread of COVID-19. These measures to reduce transmission of COVID-19 include individual and environmental measures, detecting and isolating cases, contact-tracing and quarantine, social and physical distancing measures including for mass gatherings, international travel measures, and vaccines and treatments. While vaccines and specific medications are not yet available for COVID-19, other public health and social measures play an essential role in reducing the number of infections and saving lives.

Social and physical distancing measures aim to slow the spread of disease by stopping chains of transmission of COVID-19 and preventing new ones from appearing. These measures secure physical distance between people (of at least one metre), and reduce contact with contaminated surfaces, while encouraging and sustaining virtual social connection within families and communities. Measures for the general public include introducing flexible work arrangements such as teleworking, distance learning, reducing and avoiding crowding, closure of non-essential facilities and services, shielding and protection for vulnerable groups, local or national movement restrictions and staying-at home measures, and coordinated reorganization of health care and social services networks to protect hospitals. The measures are used in conjunction with individual protective measures against COVID-19 such as frequent hand washing and cough etiquette.

### ****Treatment****

There is currently no approved specific treatment or vaccine against COVID-19 infection. Patients require supportive care and oxygen supplementation. This can be done through non-invasive ventilation (if performed in a negative pressure room or through a helmet) or via mechanical ventilation. Critically ill patients may also require vasopressor support and antibiotics for secondary bacterial infections. Clinician reports from Italy and the USA refer to a number of complications such as cardiomyopathy and sudden onset death, as well as thromboembolic episodes (pulmonary embolism). Data collection through the World Health Organization’s COVID-19 Clinical Network is ongoing to assess the frequency of these complications.

COVID-19 effects on the economy

 As the world grapples with the coronavirus, the economic impact is mounting.

the whole world is expecting a recession as the best outcome out of this whole pandemic situation,cause there can be worse situations from this.

**Predicted slump for China**

China is the world’s second-largest economy and leading trading nation, so economic fallout from the original COVID-19 epi-centre will be critical to watch.

The poll of more than 40 economists, based both in and outside mainland China, forecast growth to fall to a median of 3.5% in the first quarter, from 6.0% in the fourth quarter of 2019, a full percentage point lower than predicted in a 14 Feb poll.

The Chinese economy is likely to be hit further by reduced global demand for its products due to the effect of the outbreak on economies around the world.

Data released on 16 March showed [China's factory production plunged](https://news.trust.org/item/20200316071843-1rb9t/) at the sharpest pace in three decades in the first two months of the year - something which could mean an even greater economic slowdown than predicted in that poll.

**Monetary policy: central banks act but stocks, oil continue to come under steep pressure**

 To combat the economic fallout, the US [Federal Reserve](https://www.reuters.com/article/us-global-oil/u-s-crude-falls-below-30-as-fed-move-fails-to-calm-markets-idUSKBN2121FT) on 15 March cut its key interest rate to near zero.

But the move, [coordinated](https://www.reuters.com/article/us-health-coronavirus-economy-policy-fac/factbox-the-economic-remedies-for-the-coronavirus-idUSKBN2121C4) with central banks in Japan, Australia and New Zealand in a joint-effort not seen since the 2008 financial crisis, failed to shore up global investor sentiment, with oil prices dipping below $30 a barrel on 16 March, and a 9% slump in share values [when Wall Street opened](https://www.reuters.com/article/us-usa-stocks/sp-500-tumbles-as-trading-on-wall-street-resumes-idUSKBN2131B1).

China is the world’s biggest oil importer. With coronavirus hitting manufacturing and travel, the International Energy Agency (IEA) predicted [the first drop in global oil demand in a decade](https://www.iea.org/reports/oil-market-report-february-2020).

On 9 March, [oil prices lost as much as a third of their value](https://www.reuters.com/article/us-global-oil/oil-prices-plunge-by-a-third-as-rivals-saudi-and-russia-turn-on-the-taps-idUSKBN20V131) - the biggest daily rout since the 1991 Gulf War, as Saudi Arabia and Russia signaled they would hike output in a market already awash with crude, after their three-year supply pact collapsed.

Anyone hoping cryptocurrencies might prove a safe haven was disappointed. Bitcoin lost more than 30% of its value in the five days to 12 March, [Reuters reported](https://www.reuters.com/article/us-health-coronavirus-bitcoin/bitcoin-plummets-as-cryptocurrencies-suffer-in-market-turmoil-idUSKBN20Z1GA), outpacing losses for stocks and oil.

Meanwhile, the European Central Bank (ECB) also took action, launching on 18 March a [€750 billion Pandemic Emergency Purchase Programme](https://www.google.com/search?safe=strict&rlz=1C1GCEB_enCH861CH861&biw=1266&bih=559&tbm=nws&ei=2v11XqntK-yr1fAPiZWn-AE&q=oil+price+corona+economy&oq=oil+price+corona+economy&gs_l=psy-ab.3...14605.16703.0.16822.18.13.1.3.3.0.115.877.10j3.13.0....0...1c.1.64.psy-ab..1.9.368...0j33i10k1.0.G_g-FkQQJsM) that is expected to last until the end of this year.

**The impact on employment**

 More than 6.6 million Americans - a record weekly high - filed new claims for unemployment benefits in the week ending 28 March, according to [Department of Labor data](https://www.dol.gov/ui/data.pdf).

Data from Spain shows nearly [900,000 people have lost their jobs since its lockdown started in mid-March](https://www.bbc.co.uk/news/world-europe-52131756). The official unemployment figure has risen to 3.5 million - the highest level since April 2017.

Meanwhile, [Bloomberg reports](https://www.bloomberg.com/news/articles/2020-04-02/supply-chains-latest-virus-threatens-half-of-all-jobs-in-africa-k8inetqv) that around half of jobs in Africa are at risk as a result of the outbreak, according to the United Nations Economic Commission for Africa.

**Impact on air travel**

On 5 March - before the US travel ban was announced - the International Air Transport Association (IATA) predictied the COVID-19 outbreak could cost airlines [$113 billion in lost revenue](https://globalnews.ca/news/6634345/coronavirus-costs-airlines/) as fewer people take flights.

“The industry remains very fragile,” Brian Pearce, the IATA’s chief economist, told the Associated Press. “There are lots of airlines that have got relatively narrow profit margins and lots of debt and this could send some into a very difficult situation.”

On March 16, British Airways said it would cut flying capacity by at least 75% in April and May. Other [UK airlines](https://www.reuters.com/article/health-coronavirus-easyjet/update-4-big-uk-airlines-ground-most-of-their-fleets-to-survive-coronavirus-idUSL8N2B959E), including Virgin Atlantic and easyJet also announced drastic cuts.

The travel and tourism industries were hit early on by economic disruption from the outbreak.

Besides the impact on airlines, the[UN’s International Civil Aviation Organization](https://www.icao.int/Newsroom/Pages/Economic-impact-estimates-due-to-COVID-19-travel-bans.aspx) (ICAO) forecast that Japan could lose $1.29 billion of tourism revenue in the first quarter due to the drop in Chinese travellers, while Thailand could lose $1.15 billion.

IMPACT ON AFRICA

The coronavirus pandemic continues to take its toll on the African continent. While the continent as a whole still accounts for relatively few deaths from the disease, the numbers are rising, with [more than 4,700 confirmed cases](https://www.who.int/docs/default-source/coronaviruse/situation-reports/20200402-sitrep-73-covid-19.pdf?sfvrsn=5ae25bc7_4) and 127 deaths. As countries scramble to contain the virus, and are affected by the efforts of other countries to do the same, The economic impacts grow.

##  Growth and income analysis

 [McKinsey proposes different scenarios](https://www.mckinsey.com/featured-insights/middle-east-and-africa/tackling-covid-19-in-africa) for Africa’s growth; in the wake of COVID-19. Before the crisis, the 2020 growth estimate for the continent was 3.9 percent. In the “least-worst case,” characterized by the outbreak being somewhat contained both globally and in Africa, growth drops to 0.4 percent. In other scenarios (including a lack of containment globally and in Africa), the rate drops as low as -3.9 percent. The scenarios explicitly do not take into account either fiscal stimulus packages or currency devaluations.

## Sector and sub-population analysis

 [Reardon, Bellemare, and Zilberman propose](https://www.ifpri.org/blog/how-covid-19-may-disrupt-food-supply-chains-developing-countries) seven ways that COVID-19 will likely affect the food supply. They also discuss policy paths for the short, medium, and long run: “In the short run, implement new, broad safety nets for SMEs and workers in the midstream and downstream segments of FSCs; for example, governments could use cash-for-work schemes to employ workers to distribute emergency food rations, upgrade sanitation in wholesale markets and wet markets, and maintain essential operations in their own enterprises so that the latter are there when the crisis passes.”

The [World Food Programme’s analysis](https://reliefweb.int/report/world/economic-and-market-impact-analysis-covid-19-west-and-central-africa-wfp-regional) for West and Central Africa highlights that 2019/2020 had been a strong agricultural season “with overall higher than average production of cereals,” which is good for food security. But despite that

the “consumer price index for food is at its highest since 2008 in the Monetary Union of West Africa zone.”

## Economic policy responses

Various countries are implementing social safety net policies, as reported by Gentilini: [Uganda](https://twitter.com/Ugentilini/status/1245333586112282625) is allowing businesses to reschedule social security contributions, [Namibia](https://twitter.com/Ugentilini/status/1245359983438553089) is offering an emergency income grant to workers who lost jobs, [Cabo Verde](https://twitter.com/Ugentilini/status/1244045318091571200) is offering cash transfers and food assistance, and the [Central Bank of West African States](https://twitter.com/Ugentilini/status/1244040947291369474) has abolished a number of transaction fees.

[Dell’Ariccia and others at the International Monetary Fund](https://blogs.imf.org/2020/04/01/economic-policies-for-the-covid-19-war/) propose three key objectives of economic policy in the face of COVID-19—guarantee functioning of essential sectors, provide resources for people hit by the crisis, and prevent excessive economic disruption. At the end of their post, they propose a series of economic policy options to target households, businesses, and the financial sector.

**COVID-19 effects on general and environmental health**

Much remains unknown about how SARS-CoV-2, the virus that causes COVID-19, spreads through the environment. A major reason for this is that the behaviors and traits of viruses are highly variable -- some spread more easily through water, others through air; some are wrapped in layers of fatty molecules that help them avoid their host's immune system, while others are "naked". This is a new virus and we do not know enough yet about how it affects children or pregnant women. We know it is possible for people of any age to be infected and transmit the virus, although older people and/or those with pre-existing medical conditions seem more likely to develop serious illness. Children may be disproportionately affected by measures taken to control the outbreak, such as school closures and physical distancing measures. Special attention needs to be paid to prevent and minimize negative consequences for children as much as possible.

We can although say that the COVID-19 may have both positive and negative effects on our environmental health and general health lifestyle and would leave a huge effect over the long run eventually.

POLLUTION AND GREENHOUSE GAS EMISSION HAVE FALLEN ACROSS COUNTRIES AND CONTINENTS:

 It is all aimed at controlling the spread of Covid-19, and hopefully reducing the death toll. But all this change has also led to some unexpected consequences. As industries, transport networks and businesses have closed down, it has brought a sudden drop in carbon emissions. Compared with this time last year, levels of [**pollution in New York have reduced by nearly 50% because of measures to contain the virus**](https://www.bbc.com/news/science-environment-51944780).

In China, [**emissions fell 25% at the start of the year**](https://www.carbonbrief.org/analysis-coronavirus-has-temporarily-reduced-chinas-co2-emissions-by-a-quarter) as people were instructed to stay at home, factories shuttered and [**coal use fell by 40% at China’s six largest power plants since the last quarter of 2019**](https://www.axios.com/coronavirus-china-carbon-emissions-3453d9a1-1ae9-4789-8a41-3ed257946dbd.html). The proportion of days with “good quality air” was up 11.4% compared with the same time last year in 337 cities across China, according to its Ministry of Ecology and Environment. In Europe, satellite images show [**nitrogen dioxide (NO2) emissions fading away over northern Italy**](https://www.esa.int/ESA_Multimedia/Videos/2020/03/Coronavirus_nitrogen_dioxide_emissions_drop_over_Italy). A similar story is playing out in [**Spain**](https://english.elpais.com/society/2020-03-24/pollution-in-spain-falls-to-record-lows-under-coronavirus-lockdown.html) and [**the UK**](https://www.standard.co.uk/news/uk/pollution-falling-uk-coronavirus-lockdown-a4396051.html).

"Air pollution exceeds malaria as a global cause of premature death by a factor of 19; it exceeds violence by a factor of 16, HIV/AIDS by a factor of 9, alcohol by a factor of 45, and drug abuse by a factor of 60."

So, it's well established that air pollution really does kill.

**CHAPTER TWO**

Engineering strategies on handling COVID-19

 The World Health Organization (WHO)’s March 11 recognition of COVID-19 as a global pandemic has removed any doubt about the threat that the virus poses to every country in the world. The virus has now been detected in [152 countries](https://www.nytimes.com/news-event/coronavirus?action=click&module=Spotlight&pgtype=Homepage), with more than 180,000 infected and more than 7,000 killed. Though Africa remains one of the regions with the fewest cases, the number of countries affected has increased over the past week. As of this writing, nearly 450 cases have been reported in 30 countries, concentrated in northern Africa and South Africa, with 10 deaths reported.

## CONTAIN THE SPREAD OF THE VIRUS

 Because many African countries have relatively weak health care systems, proactive measures to prevent the spread of the virus will be critical. Countries should step up campaigns to educate the public on best practices, including promoting good hygiene and social distancing, discouraging large public gatherings, and encouraging employers to protect the jobs of employees who require quarantine or treatment. Campaigns should elicit the help of religious and civil society leaders for maximum effect. Rwanda, which has set up [portable sinks throughout public areas to encourage handwashing in its capital, Kigali](https://www.reuters.com/article/us-health-coronavirus-rwanda/rwanda-keeping-coronavirus-at-bay-with-campaign-of-public-handwashing-idUSKBN20Y2R8), provides a good example of how some of these measures can be undertaken.

In addition, governments should suspend all international travel to or from the most-affected countries, and quarantine citizens who have traveled to or through those areas for at least two weeks. Several countries, including Ghana, Kenya, Morocco, Senegal, and South Africa, have already taken these measures. Others should emulate them.

 All and any possible mean of coping with this deadly virus would require the use of Engineering from trying to tackle the disease to curing and caring for those who has the disease. For examples : VENTILATORS

According to the World Health Organization (WHO), some 80% of people with Covid-19 - the disease caused by coronavirus - recover without needing hospital treatment.

But one person in six becomes seriously ill and can develop breathing difficulties.

In these severe cases, the virus causes damage to the lungs. The body's immune system detects this and expands blood vessels so more immune cells enter.

But this can cause fluid to enter the lungs, making it harder to breathe, and causing the body's oxygen levels to drop.

To alleviate this, a machine ventilator is used to push air, with increased levels of oxygen, into the lungs.

The ventilator also has a humidifier, which adds heat and moisture to the medical air so it matches the patient's body temperature.

Patients are given medication to relax the respiratory muscles so their breathing can be fully regulated by the machine.

JUST AS SAID ABOVE, people recover without needing hospital treatment, but still in the country we do not have enough ventilators in the Nation, so how can we possible tackle this grave problem our nation is facing.

Roles of computer engineers in handling the Virus

 As a computer engineer in study, I have an idea on how we could track and contain the spread of the disease, but this may only happen in a first world country with sufficient technology and clear advancement

TRACKING AND CROWD CONTROL THROUGH THE USE OF SOCIAL MEDIA AND CCTV

an app that will use Bluetooth and other wireless signals as a proxy for interactions between people, also the app would ask for permission to go through the users phone and go through chats and check for and any chats relationg to symptoms and asked users to report flu-like symptoms.

If you’d had lunch with someone who later got sick, the app would let you know. Besides slowing the spread of the flu, the app promised to help health authorities monitor and model the spread of influenza.

As the deadly [Covid-19](https://www.wired.com/tag/covid-19/) respiratory virus stalks, this app could be very reliable to curb the spread of the virus. This app would be controlled by the government only for the aim of curbing the virus and nothing else. With the database being connected to the same as a nationwide CCTV database, we can track and quarantine people even before the symptoms show in a patient.

With the nation being under lockdown, these infected people could be fished out and taken care of, but such an idea is to ensure optimum safety and require a well growth nation, not a 3rd world country like Nigeria.

COMMUNUAL TEMPERATURE TEST

 The best I feel we could do are to have machines that could test for flu like symptoms working in building and at pathways leading to major facilities. These machines could consist of a thermometer and x-ray to check for the temperature and to see how well your vital organs are in shape.

Anyone who shows high temperature sign would be taken to run a test just to be on the safe side, cause the test takes not more tha 2 days to get your result depending on the type of test.