

ENGINEERING STRATEGIES FOR HANDLING COVID-19 FOR ENVIRONMENTAL HEALTH AND ECONOMIC SUSTAINABILITY

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ELECTRICAL ELECTRONICS ENGINEERING

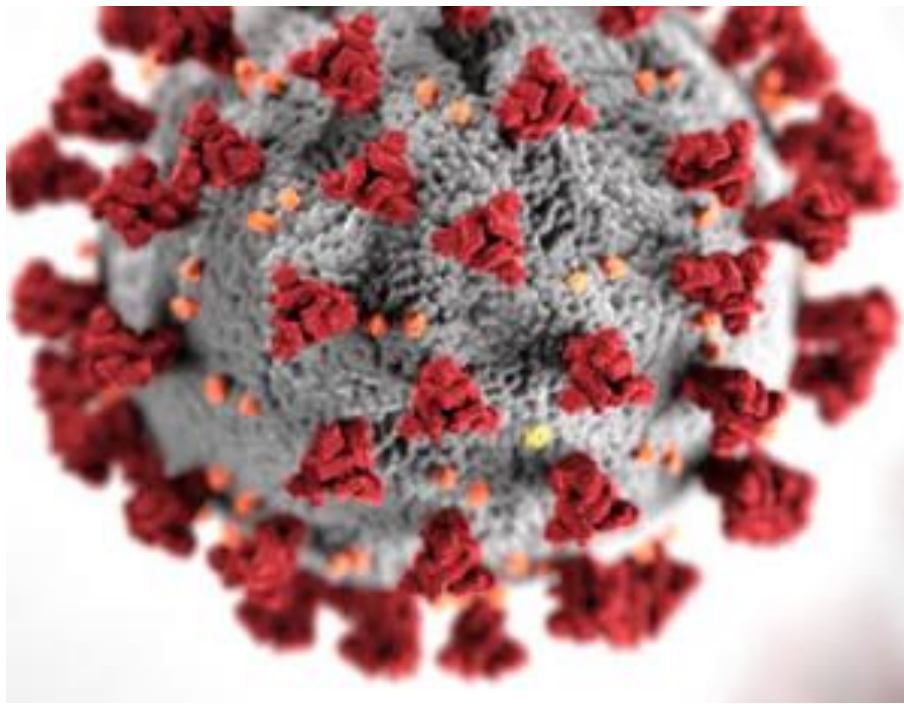
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Abstract

This presentation gives information about the current pandemic outbreak and its evolutionary background; its stand in Nigeria and the impacts it has on the Nigerian economy and the nation as a whole. It highlights some Engineering strategies for handling the pandemic for favourable environmental health as well as economic sustainability are herein discussed. The rate of the COVID-19 effect will be subdued to maintain favourable environmental health and foster economic growth if these engineering strategies are implemented

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COVID-19

CORONAVIRUS DISEASE 2019

Did you know that throughout history, nothing has killed more human beings than the infectious disease COVID-19?

Introduction

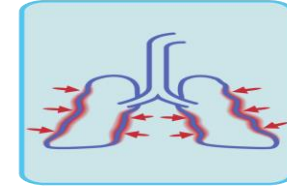
- **What is COVID-19?**

The coronavirus disease 19 (COVID-19) is a highly transmittable disease caused by pathogens crossing from animals to humans. This pathogenic viral infection causes severe acute respiratory syndrome, which emerged in Wuhan, China and spread around the world.

Introduction contd.

SYMPTOMS OF THE COVID-19

- Fever
- Cough
- Shortness of breath
- Fatigue
- Sneezing
- Stuffy nose
- Sore throat
- Mild to moderate chest discomfort and cough



Introduction contd.

PREVENTION OF COVID-19

- ✓ As at April 4th, 2020 no specific medicine to CURE coronavirus disease (covid-19) has been developed. There are several preventive measures that cannot be overemphasized, they include:
- Wash your hands regularly for 20 seconds, with soap and water or alcohol-based hand rub
- Cover your nose and mouth with a disposable tissue or flexed elbow when you cough or sneeze.
- Avoid close contact (1 meter or 3 feet) with people who are unwell
- Stay home and self-isolate from others in the household if you feel unwell
- Don't touch your eyes, nose, or mouth if your hands are not clean.



Figure 1: Demonstrating the preventive measures against Corona Virus

Environmental Health and Economic Sustainability.

- Environmental health consists of preventing or controlling disease, injury, and disability related to the interactions between people and their environment.
- Economic sustainability refers to the practice that supports long term economic growth without negatively impacting social, environmental and cultural aspect of the community

Effects of COVID-19 on Economic Health and Economic Sustainability

- The COVID-19 has also taken on a tremendous toll on people's wellbeing and the global economy. Obviously, the epidemic has undermined the global population's health and well-being, undermining attempts to achieve target of sustainable development, which strives to maintain a healthier world by reducing mortality, rising life expectancy and economic growth.

Effects of COVID-19 contd.

If the COVID-19 situation persists longer than anticipated THE FOLLOWING effects will arise:

1. slow economic activities
2. significant decline in government revenue and expenditure
3. potential job losses
4. erode economic gains achieved in recent years and significantly slow down economic sustainability development.
5. Declining net exports
6. Declining assets

COVID-19 IN NIGERIA

- The major fear of this disease in Nigeria is not because of the disease itself, but because of Nigeria's large population, high levels of poverty, and most importantly, the shortage of healthcare workers, health infrastructure and facilities.
- Presently, there are more than 230 cases of COVID-19 in Nigeria, but there are fears that the number could be much higher, as relatively few tests have still been conducted.
- UNICEF is supporting the Nigerian Government's response to the outbreak, including through encouraging preventive actions in communities with risk communications, providing hygiene and medical kits to health clinics and also providing awareness campaigns by health educators in all local governments.

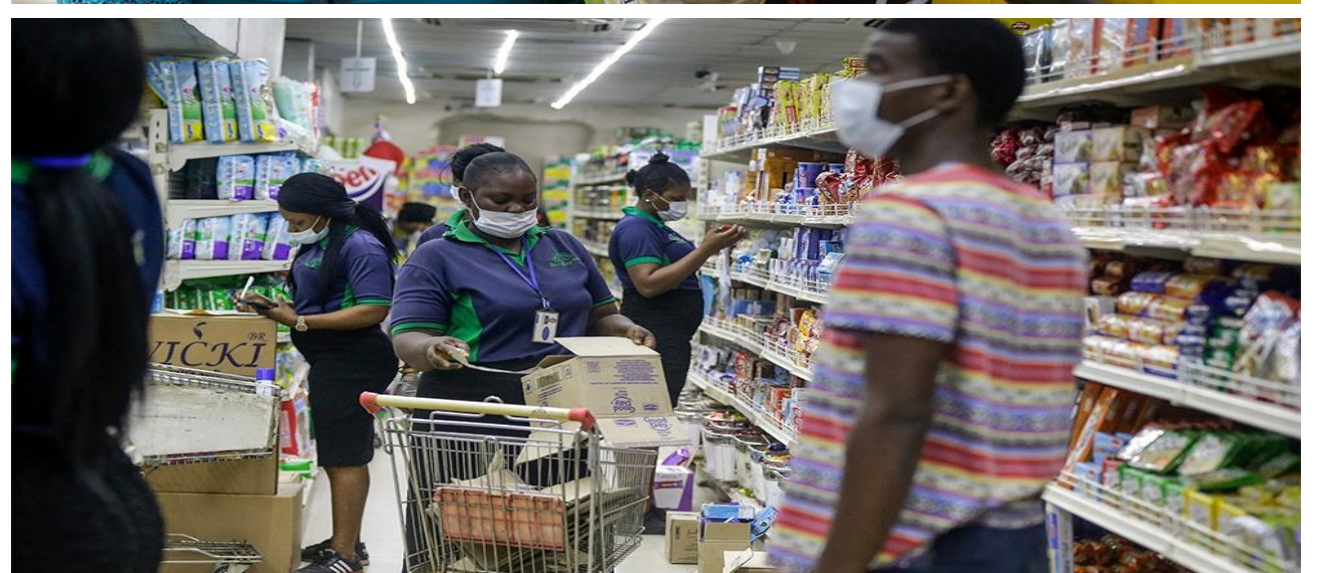


Figure 2: Nigerian's complying to combat the spread of covid-19

EFFECTS OF COVID-19 IN NIGERIA

NEGATIVE EFFECTS

- Declining consumption:
- Declining investments:
- Declining net exports:
- Increasing rate of poverty:
- Increase in rate of unemployment:

POSITIVE EFFECT INCLUDES:

- steep decline in oil prices
- Improvement in the health care sector
- Increase in government expenditure

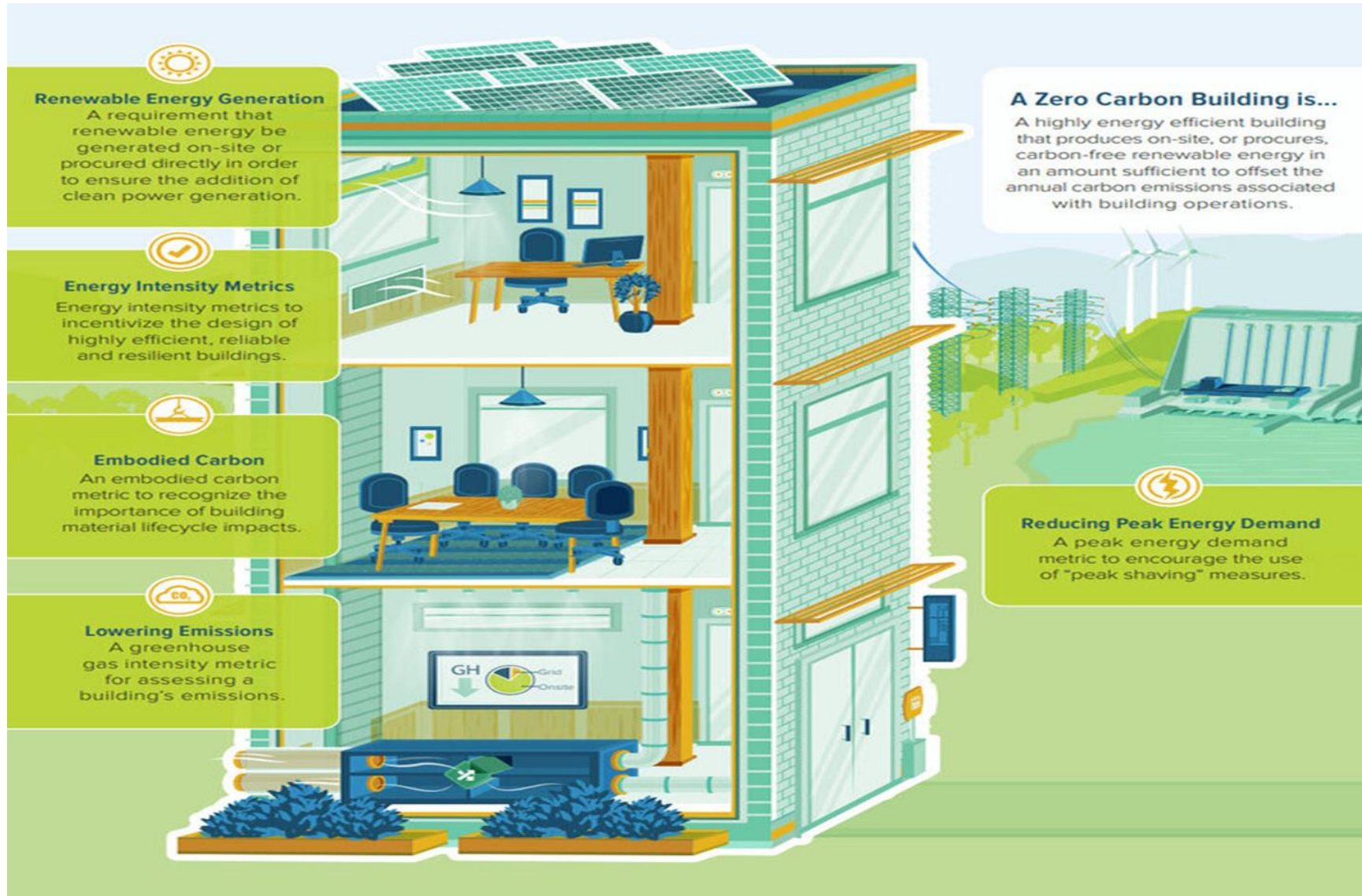
ENGINEERING STRATEGIES FOR HANDLING COVID-19



- **Building of health center's**



• The use of zero-carbon power and transport systems



A zero-carbon future in which communities and the economy are resilient to the impacts of climate change. One where investments contribute to reducing emissions, ensuring clean air and providing SUFFICIENT POWER as well as safeguarding economic growth.

- **The use of water sinks having Leg-Controlled pedals**



- **Manufacturing of Corona Virus Isolation Pods**



- **The use of Robots to populations affected by the pandemic worldwide.**



Brief Case Studies

□ CASESTUDY#1

Media outlets report the result of the coronavirus conducted in various countries and collated by the world health organization is as follows: the total number of covid-19 cases was 1,836,959 worldwide; number of recovered cases was 421,363, and the total number of deaths was 113,266.

ANALYSIS AND SOLUTION:

It is shown that the number of people recovering from this disease is beyond the number of deaths. It was reported that, when doctors made use of the various engineering strategies the recovery case increased by far. A major solution that was implemented was the use of modified sleep apnea for minor covid-19 patients and the use of ventilators for major patients, also they made sure of the demarcated rooms for each individual.

Brief Case Studies Contd.

□CASESTUDY#2

It was reported by a hospital specialist in china that, the rate at which doctor and nurses get infected when treating patients with covid-19 is fast rising. The fear of doctors and nurses being at risk to this virus increased. So, due to this most doctors and nurses stayed back home with their families to ensure their safety.

ANALYSIS AND SOLUTION

A solution that can be implemented to lessen the risk of doctors and nurse's exposure to this disease is the use of robots. Robots that utilize 5G technology to monitor coronavirus patients while keeping doctors in the loop from afar, and the use of isolation pod to carry the infected patients. If this solution is critically put into action, more doctors and nurses will show up as they won't really be at risk.

Brief Case Studies Contd.

□CASESTUDY#3

It was reported that in a city in Nigeria, there was excess water wastage due to running taps being left on. And from this, excess power was consumed in order to provide more water. Although there were taps available to wash hands and stay clean in this horrifying pandemic, the rate of infections increased and most people who were infected had gotten the disease from the available taps.

ANALYSIS AND SOLUTION

Mechanical system was proposed to prevent infection and decrease water consumption in washing of hands and faces, utensils, and similar activities. This study presents a suitable cost of mechanical way with easy implementation to save water and prevent infection. The proposed methods depend on controlling the water flow valve using leg-controlled pedals instead of hands because, hands are already busy while washing.

Brief Case Studies Contd.

□CASESTUDY#4

It was reported that an influenza epidemic simulation model to estimate the likelihood of human-to-human transmission of severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) in a simulated Singaporean population was adopted. Under three infectivity scenarios (basic reproduction number [R_0] of 1.5, 2.0, or 2.5) and assuming 7.5% of infections are asymptomatic, and then assessed the effect of four intervention scenarios compared with a baseline scenario on the size and progression of the outbreak for each R_0 value. These scenarios included isolation measures for infected individuals and quarantining of family members, school closure, workplace distancing; and quarantine, school closure, and workplace distancing (hereafter referred to as the combined intervention).

Brief Case Studies Contd.

ANALYSIS AND SOLUTION

Implementing the combined intervention of quarantining infected individuals and their family members, workplace distancing, and school closure once community transmission has been detected could substantially reduce the number of SARS-CoV-2 infections. We therefore recommend immediate deployment of this strategy if local secondary transmission is confirmed within Singapore. However, quarantine and workplace distancing should be prioritized over school closure because, at this early stage symptomatic children have higher withdrawal rates from school than do symptomatic adults from work. At higher asymptomatic proportions, intervention effectiveness might be substantially reduced requiring the need for effective case management and treatments, and preventive measures such as vaccines.

A message to all Nigerians

- “Nigerians need to see this as the actual pandemic that it is and take all the outlined precautions. A lot of people are still moving around and visiting neighbours’ and friends like it's a public holiday. If we can all adhere strictly to the rules of this lockdown, then we have a fighting chance to beat this virus.”

Conclusion

It shows that engineering strategies are efforts that should be put forward in order to attain a healthy environment as well as sustain the economy during COVID-19 pandemic. Also the use of a zero carbon method of power generation and the developed design structures of ventilations using sleep apnea should be adopted.