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COVID – 19 PANDEMIC AND INFORMATION TECHNOLOGY

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ABSTRACT
The study examined the roles of information technology in COVID-19 pandemic. The researcher was faced with the problem of controlling COVID-19 disease by the third world and developing countries. The objectives of the study are to find out the roles of information technology in COVID-19 pandemic and to find out the risks of information technology in COVID-19 pandemic. Two research questions were posed to guide the study. The area of study is two social media Apps – WhatsAPP and FacebookApp. A 10 – item questionnaire was used to collect data from the respondents. Ten – item likert type instrument was validated and CronbachAlpha reliability Coefficient of .96 was yielded. The study attempted to answer two research questions using descriptive statistics. The result indicated that information technology can be used to track COVID – 19 disease activity in real-time, screen individuals and populations for COVID-19 disease, implement quarantine, diagnose infected persons, provide telemedicine and virtual care. Findings further revealed that if risks of IT in COVID-19 such as breach of privacy, high costs, requirements of management, regulation and validation of IT systems, violation of civic liberties, unable to diagnose patients accurately are tackled, IT could help eradicate COVID-19 disease. Based on the findings, recommendations were made among others that to effectively implement information technology globally, intervention should be tailored to the target regions and broadband access requires federal and private sectors investment in technology and infrastructures.
Keywords: COVID-19, IT, Roles, Risks.

INTRODUCTION

COVID-19, an infectious disease caused by the novel severe acute respiratory syndrome coronavirus 2 (SARS – CoV – 2) is a global pandemic. Pandemic is a disease or problem that affects everybody over a very wide area (BBC English Dictionary, 1992). Over the past two decades, the current emergence of COVID-19 is the third CoV outbreak in humans (Munster, Koopmans, vanDoremalen, vanRiel & dewit, 2020). It is no coincidence that Fan, Zhae, Shi & Zhou (2019) predict potential SARS – or MERS (Middle East Respiratory Syndromes) like CoV outbreaks in China following pathogen transmission from bats. The COVID-19 that emerged in China spread rapidly throughout the country and subsequently to other countries.

Due to the severity of this outbreak and the potential of spreading on an international scale, the WHO (World Health Organization) declared a "global health emergency" on January 31st, 2020. Subsequently, on March 11th, 2020, a pandemic situation was declared. At present, neither approved vaccines nor specific antiviral drugs for treating human CoV infections are available (Lu, 2020). Most nations are currently making efforts to prevent further spreading of this potentially deadly virus by implementing preventive and control strategies.

Information technology with its varied systems has helped a lot in the creative awareness of the outbreak of the disease globally and strategies that should be adopted to maintain low COVID-19 per-capital mortality rate. According to Owuamanam (2011, p.38), information technology "is the acquisition, processing, storing and dissemination of vocal, pictorial, textual and numeric information by a micro-electronic based combination of computers and telecommunication". Similarly, Osuagwu (2004, p. 102) sees information technology as "the scientific technological and engineering uses in information handling, processing and their application; computers and their interaction with man, machines, associated socio-economic and cultural matters".

Information technology can facilitate COVID-19pandemic strategy and response in ways that are difficult to achieve manually. Information technology with its powerful systems can be the fastest and easiest means to disseminate all information concerning COVID-19pandemic.

However, several information technology health interventions, particularly those that track individuals and enforce quarantine can infringe on privacy, while increasing risk among individuals with mental illness and restrict access to food and essential services. Inspite of the view above, information technology tools – WhatsApp video call, Zoom and Microsoft Teams help the people who are in quarantine to stay in touch with their family members as well as have conference meetings and work at the same time (Marketdataforecast, 2020). Hence, the thrust of this study is on the roles of information technology in COVID-19 pandemic.

Statement of the Problem

The immediate control over the ongoing COVID-19outbreak appears a mammoth task especially for the third world and developing countries due to their inability to allocate quarantine stations that could screen infected individuals' movement and the adoption of strategic preventive and control measures. These inabilities by the third world and developing countries could be as a result of poor information technology systems available in these countries.

The Objectives of the Study

The objectives of the study are as follows:

1. To find out the roles of information technology in COVID-19pandemic.
2. To find out the risks of information technology in COVID-19pandemic

Research Questions

Two research questions were posed to guide the study:

1. What are the roles of information technology in COVID-19pandemic?
2. What are the risks of information technology in COVID-19pandemic?

LITERATURE REVIEW

Theoretical Framework

The theoretical base of this study stems from Bandura's social cognitive theory. Bandura (1986, p.18) social cognitive theory postulates that "learning is a cognitive process that is place in a social context and occur purely through observation or direct instruction, even in the absence of motor reproduction or direct reinforcement". In addition to the observation of behaviour,

learning also occurs through the observation of rewards and punishments, a process known as vicarious reinforcement (Dembo, 1994).

Social learning theory integrated behavioural and cognitive theories of learning in order to provide a comprehensive model that could account for the wide range of learning experiences that occur in the real-world. Key tenets of social learning theory are as follows:

- Learning is not purely behavioural, rather it is a cognitive process that takes place in social context.
- Learning can occur by observing a behaviour and by observing the consequences of the behaviour (vicarious reinforcement).
- Learning involves observations, extraction of information from those observations and making decisions about the performance of the behaviour (observational learning or modeling). Thus, learning occurs without an observable change in behaviour.
- Reinforcement plays a role in learning but is not entirely responsible for learning.
- The learner is not a passive recipient of information. Cognition, environment and behaviour all mutually influence each other (reciprocal determinism).

Social learning theory draws heavily on the concept of modeling or learning by observing a behaviour. Bandura (1986) outlines three types of modeling stimuli:

- Live model in which an actual person is demonstrating the desired behaviour.
- Verbal instruction in which an individual describes the desired behaviour in details and instructs the participants on how to engage in the behaviour.
- Symbolic in which modeling occurs by means of the media, including movies, television, internet, literature and radio. Stimuli can be either real or fictional characters.

An important factor in social learning theory is the concept of reciprocal determinism. This notion states that just as an individual's behaviour is influenced by the environment, the environment is also influenced by the individual's behaviour. In order words, a person's behaviour, environment and personal qualities all reciprocally influence each other (Bandura, 1986).

The present study relates to the social learning theory in that the three types of modeling stimuli outlined by Bandura lend themselves better to information technology. For instance, information technology acts as a live model to human beings by demonstrating the process of transmission, spread and emergence of COVID-19. Information technology also provides verbal instruction to people about COVID-19by teaching them the symptoms, prevention, control and management of COVID-19. Finally, information technology showcases COVID-19in its entirety to the world through its resources, including migration maps such as mobile phones, mobile payment applications, social media, coronavirus dashboard, web-based platforms Health Map, television and radio.

COVID-19

COVID-19, an infectious disease caused by the novel severe acute respiratory syndrome coronavirus 2 (SARS – CoV-2) is a global pandemic. The recently emerging SARS – CoV-2 has

caused havoc in China and pandemic situation to the worldwide population, leading to current disease outbreaks that have not been controlled to date though high efforts are being put in to counter this virus. COVID-19 was first identified in Wuhan city, Hubei Province, China on December 12th, 2019. On February 11th, 2020 the World Health Organization (WHO) announced the official designation for this current CoV associated disease to be "COVID-19" caused by the SARS – CoV-2 (Rodriguez-Morales, Bonilla-Aldana, Balbin-Ramon, Rabaan, Sah, Paniz-Modolfi, Pagliano & Esposito, 2020).

The primary cluster of patients was found to be connected with the Huanan South China Seafood Market in Wuhan (Gralinski & Menachery, 2020). CoVs belong to the family of coronaviridae (subfamily coronavirinae), the members of which infect a broad range of hosts, producing symptoms and diseases ranging from a common cold to severe and ultimately fatal illness such as SARS, MERS and as of present COVID-19.

The SARS – CoV-2 (formerly 2019-nCoV) is considered as one of the seven members of the CoV family that infect humans and it belongs to the same lineage of CoVs that causes SARS. However, this novel virus is genetically distinct. Until 2020, six CoVs known to infect humans include HCoV-229E, HCoV-NL63, HCoV-OC43, HCoV-HKUI, SARS-CoV and MERS-CoV (Zhu, Zhang, Wang, Li, Yang, Song, Zhao, Huang, Shi, Lu, Niu, Zhan, Ma, Wang, Xu, Wu, Gao & Tan, 2020). Though SARS-CoV and MERS-CoV have resulted in outbreaks with high mortality, others remain associated with mild upper respiratory track illnesses (Wei, Li & Cui, 2020).

Newly evolved CoVs are thus posing a significant threat to global public health. Over the past two decades, the current emergence of COVID-19is the third CoV outbreak in humans (Munster, et al., 2020). It is no coincidence that Fan et al. (2019) predict potential SARS – or MERS – like CoV outbreaks in China following pathogen transmission from bats. The COVID-19that emerged in China spread rapidly throughout the country and subsequently to other countries. Due to the severity of this outbreak and the potential of spreading on an international scale, the WHO declared a "global health emergency" on January 31st, 2020.

Subsequently, on March 11th, 2020, a pandemic situation was declared. At present neither approved vaccines nor specific antiviral drugs for the treatment of human COVID-19 infections are available (Pillaiyar, Meenakshisundaram & Manickam, 2020). Most nations are currently making efforts to prevent further spreading of this potentially deadly virus by implementing preventive and control strategies.

In domestic animals, infections with CoVs are associated with a broad spectrum of pathological conditions. Apart from infectious bronchitis virus, canine respiratory CoV and mouse hepatitis virus and all other CoVs are predominantly associated with gastrointestinal diseases. The emergence of novel CoVs may have become possible because of multiple CoVs being maintained in their natural host which could have favoured the probability of genetic recombination. High genetic diversity and the ability to infect multiple host species are a result of high-frequency mutations in CoVs which occur due to instability of RNA- dependent and RNA polymerases along with higher rates of homologous RNA recombination (Su, Wong, Shi, Liu, Lai, Zhou, Liu, Bi & Gao, 2016).

The most common symptoms associated with COVID-19 were fever, cough, dyspnea, expectoration, headache and myalgia or fatigue. In contrast, less common signs at the time of hospital admission included diarrhea, hemoptysis and shortness of breath. Recently, individuals with asymptomatic infections were also suspected of potentially transmitting infections which further add to the complexity of disease transmission dynamics in COVID-19infections. The COVID-19is associated with afflictions of lungs in all cases and generated characteristics chest computer – to mography finding such as the presence of multiple lesions in lung lobes that appear as dense ground-glass opaque structures and occasionally co-exist with consolidation shadows (Rodriguez – Morales et al., 2020).

COVID-19 Transmission, Spread and Emergence

The novel coronavirus was identified within one month (28days) of the outbreak. Immediately after the confirmation of viral etiology, the Chinese virologists rapidly released the genomic sequence of SARS – CoV-2 to the public. This bold move will play a crucial role in controlling the spread of this newly emerged novel coronavirus to other parts of the world (Gralinski et al., 2020). It is opined that the common SARS – CoV-2 exposure history at the Wuhan seafood market might have originated from the human – to – human transmission rather than animal – to – human transmission. Meanwhile, pointing out the zoonotic spillover in COVID-19 is too early to fully endorse (Rodriguez – Morales et al., 2020).

After passing of struggling last four months from December 2019 to March 2020 now as COVID-19conditions seem to be under control in China, again wet animal markets have been started and people are anthusiastically buying bats, dogs, cats, birds, scorpions, rabbits, snapping turtles, ducks and other animals available there but without optimizing any standard food safety and sanitation practices (Yang, 2020). Advanced studies using Bayesian phylogeographic reconstruction identified that the most probable origin of the SARS – CoV-2 is from the Bat SARS – like coronavirus, circulating in the Rhinolophus bat family.

Phylogenetic analysis of 10 whole – genome sequences of SARS – CoV-2 showed that they are related to two CoVs of bat origin, namely bat – SL - CoV2C45 and bat – SL – CoV2XC21 which were reported during 2018 in China. It was reported that SARS – CoV-2 had been confirmed to use ACE-2 (Angiotensin – Converting Enzyme – 2) as an entry receptor while exhibiting similar RBD (Receptor – Binding Domain) with SARS – CoV (Xu, Wu, Jiang, Xu, Ying, Ma, Li, Wang, Zhang, Gao, Sheng, Cai, Qiu & Li, 2020). The occurrence of super – spreading events in the COVID-19outbreak cannot be ruled out until its possibility is evaluated. Similar to SARS and MERS, the COVID-19can also infect the lower respiratory track with milder symptoms. The basic reproduction number of COVID-19 was found to be in the range of 2.8 – 3.3 based on real-time reports and 3.2 – 3.9 based on predicted infected cases (Xu et al., 2020).

COVID-19 Prevention, Control and Management

Even though complete lockdown was declared following the COVID-19outbreak in Wuhan, large – scale movement of people have resulted in a radiating spread of infections in the surrounding provinces as well as to several other countries. The current scenario warrants the need for implementing robust preventive and control measures due to the potential of COVID-19for nosocomial infections (Repici, Maselli, Colombo, Gabbiadini, Spadaccini, Anderloni, Carrara, Fugazza, Dileo, Galtieri, Pellegatta, Ferrara, Azzolini & Lagioia, 2020).

A follow-up of infected patients by telephone on day seven and fourteen are advised to avoid any further unintentional spread or nonocomial transmission. The availability of public datasets provided by independent analytical teams will act as robust evidence that would guide us in designing interventions against the COVID-19outbreak. The newspaper reports and social media can be used to analyze and reconstruct the progression of an outbreak. They can help us to obtain detailed patient – level data in the early stages of an outbreak. The immediate travel restrictions imposed by several countries might have contributed significantly to prevent the spread of SARS – CoV-2 globally (Repici et al., 2020).

Following the outbreak, a temporary ban was imposed on the wild life trade, keeping in mind the possible role played by wild animal species in the origin of SARS – CoV-2/COVID-19. Taking a permanent and bold decision on the trade of wild animal species is necessary to prevent the possibility of the virus spread and initiation of an outbreak due to zoonotic spillover (Rodriguez – Morales, et al., 2020).

Personal protective equipment (PPE) like face masks will help to prevent the spread of respiratory infections like COVID-19. Face masks not only protects from infections aerosols but also prevent the transmission of disease to other susceptible individuals while traveling through public transport systems (Liu & Zhang, 2020). Another critical practice that can reduce the transmission of respiratory diseases is the maintenance of hand hygiene.

However, the efficacy of this practice in reducing transmission of respiratory viruses like SARS – CoV-2 is much dependent upon the size of droplets produced. Hence, it is better not to overemphasize that hand hygiene will prevent transmission of SARS – CoV-2 since it may produce a false sense of safety among the general public that further contribute to the transmission of COVID-19. Even though airborne spread has not been reported in SARS – CoV-2 infection, transmission can occur through droplets and fomites, especially between the infected and susceptible individuals. Hence, hand hygiene is equally important as the use of appropriate PPE like face masks to break the transmission cycle of the virus – both hand and face masking help to reduce the risk of COVID-19transmission (Lai, Tang, Fung & Li, 2020).

Medical staffs come under the riskiest group of individuals that can get the COVID-19infection. This is because they are exposed directly to the frontline of infected patients. Hence, proper training must be given to all the hospital staff on methods of prevention and protection so that they become competent enough to protect themselves and others from this deadly disease. As a preventive measure, health care workers caring for infected patients should take extreme precautions against both contact and airborne transmission. They should use PPE such as face masks (N95 or FFP3), eye protection (goggles), gowns and gloves to nullify the risk of infection (Chu, Yang, Wei, Yue, Zhang, Zhao, He, Sheng, Chen, Li, Wu, Zhang, Zhang, Wang, Miao, Li, Liu & Zhang, 2020).

There is a need for strengthening the regulatory mechanism for wild animal trade. Deploying efficient public health interventions might help to cut the spread of this virus globally. Instead of entirely relying on lockdown protocols, countries should focus mainly on the alternative intervention strategies such as large – scale testing, contract tracing and localized quarantine of suspected cases for limiting the spread of this pandemic virus. Such intervention strategies will

be useful either at the beginning of the pandemic or after lockdown relaxation. Lockdown should be imposed only to slow down the disease progression among the population so that the health – care system is not overloaded. Still, to prevent further spread of disease, mass gatherings should stop, functions remain canceled in the affected cities and persons also should be asked to work from home. It is a relief that the current outbreak of COVID-19 infection can be brought under control with the adoption of strategic preventive and control measures along with the early isolation of subsequent cases in the coming days.

Information Technology

The term "information technology" will be better understood if the words are explained fully. According to Owuamanam (2011, p.37), information "is knowledge derived from data. Data, in turn is recorded as facts or figures". Buttressing, Owuamanam (2011) identifies three qualities of good information thus:

a. Information must be pertinent: The information statements must relate to the business at hand and to the matters that are important to the person who has requested the information. Information should help the person deal, in some way with the issues in his or her world.
b. Information must be accurate.
c. Information must be timely. It must be available when needed.
d. Information must reduce uncertainty. In short, good information involves differences that make a difference.

Technology on the other hand is man's answer to a great deal of his cosmic and environment limitations. According to Okafor (1988, p.2), technology connotes "the practical arts ranging from hunting to animal husbandry, from agriculture, transportation and communication mechanism to production of military hardware". When information is combined with technology the result is "information technology". Information technology is concerned with the management techniques used in information handling and processing. Information technology is a set of tools for working with information and the process of improving knowledge by acquiring information (Adiele, 2005).

According to Adiele (2005, p.35), information technology "is the acquisition, processing, storing and dissemination of vocal, pictorial, textual and numeric information by a micro-electronic based combination of computers and telecommunication". However, Osuagwa (2004, p.101) sees information technology as "the scientific technological and engineering uses in information handling, processing and their application; computers and their interaction with man and machines and associated socio-economic and cultural matters. Information technology has opened up such tremendous vista for modern societies that tiny failure to master it would mean a life of permanent sub-ordination, for information technology is more than a form of power, it is a power system. The technology which it involves is not just one form of technology among others but an ability to make use of other techniques to give or to refuse access to a whole range of scientific data and knowledge and thus to design new models of development (Osuagwu, 2004).

Similarly, information technology is the use of computers to store, retrieve, transmit and manipulate data or information (Daintith, 2009). An information technology system is generally

an information system, a communications system or more specifically speaking a computer system – including all hardware, software and peripheral equipment – operated by a limited group of users (Wikipedia, 2020). Leavitt & Whisler (as cited in Wikipedia, 2020) state that information technology consists of three categories:

a. Techniques for processing,
b. The application of statistical and mathematical methods to decision-making,
c. The stimulation of higher – order thinking through computer programmes.

Information technology is commonly used as a synonym for computers and computer networks and it also encompasses other information distribution technologies such as television and telephones. Several products or services within an economy are associated with information technology, including computer hardware, software, electronics, semiconductors, internet, telecommunication equipment and e-commerce (Chandler & Munday, 2011).

Functions of Information Technology

There are many functions of information technology. However, five functions stand out as particularly crucial:

- The Function of Communication
  Communication has always been an important aspect of organization, even long before information technology came along. However, with the rise of computers and the internet, communication has been defined. Communication is not just the given of information, it is the given of understanding information and receiving and understanding the message and this is what makes the output of information technology available to people (Daramola, 2005). Communication has now become possible to contact anyone no matter what part of the world they are in. The IT department allows the organization to achieve communication at very high speeds through multiple channels:
  - Email: You can easily send your employees an email when you need to communicate something without having to see them in person. Email is also a great channel for sending official communication to clients and leaves a clean 'virtual' paper trail which allows you to keep a steady record of correspondence.
  - Video conferencing: Video conferencing is a great way to communicate with a far away team and being able to see them at the same time. It is easier to have remote meetings and even collaborate on a project together. With video conferencing, you might as well be in the same room.
  - Collaboration Software: Collaboration software allows teams to work together on projects in a manner that is both efficient and fast. With the right collaboration software, you can do away with needless meetings since everything can be done in a virtual meeting room.
  - Social Media: Social media not only allows your employees to keep up to date with the latest organization information but also presents a fun way to wind down and socialize.

- The Function of Data Management
  This is another function that makes information technology indispensation. With the increasing complexity of the world of business comes an increasing amount of data that

businesses have to deal with. This data comes in multiple dimensions such as text data, audio data and video data among others. In order to control this data, an organization will need to run something called a database. The database will allow the organization to do three things:

- Store Data: By putting the data in a storable format, a database allows you to store vast amounts of data in a small space. Long gone are the days when data had to be stored on paper and other bulky mediums. In an age where information is power, it helps to be able to hold a lot of it conveniently.
- Manage Data: Data is not very useful in its original form known as raw data. It needs to be sorted into a meaningful form that can be meaningfully deciphered and used to make decisions in the organization. The IT provides the tools with which this data can be managed including analyzing it and drawing conclusions from it.
- Access Data: No matter what kind of data your organization needs to store, that data is valuable and needs to be controlled so that only the right people can have access to it. IT provides the security measures that will safeguard that data and prevent unauthorized access to it.
- Transmit Data: Data transmission has three aspects: transmission, propagation and reception. It can be broadly categorized as broadcasting in which information is transmitted unidirectionally downstream or telecommunications with bidirectional upstream and downstream channels.

- The Function of Marketing

  Marketing has been a core aspect of business for as long as businesses have been around. With the rise of computers and the internet, marketing campaigns are becoming increasingly digital. IT can help with the marketing function of business in numerous ways:

  a. Content Creation: You can create advertising and sales copy and a computer using word processing software. You can also create beautiful graphical ads using powerful computers with graphics capabilities.
  b. Online Advertising: Social media is becoming increasingly important to advertising and since it lives on the internet, what better department to help you with your efforts than the IT department? By launching social media marketing campaigns, IT can improve sales and increase revenue. It can also launch marketing campaigns for the business organization on other platforms such as Google AdWords.
  c. E-commerce: With more and more business going online, the use of computers has become invaluable to how you conduct your business and sell your products and services. IT would be instrumental in the processing of orders made on your online store.
  d. Marketing Research: With the rise of search engines, it is now possible to conduct research online about consumer trends and the most profitable opportunities. IT can also be instrumental in this.

- The Function of Process Improvement

  It can prove to be quite important in the improvement of processes and efficiency in order to save the organization money. A small business could save on printing and copying costs by relying purely on paperless communication. Collaboration software and video conferencing would save on logistics expenses which would have been incurred every time different teams needed to meet and work together. It would also save on time as not much time would be wasted on transit.

- The Function of Enterprise Resource Planning

Enterprise resource planning is all about linking the different functions of an organization such as accounting, human resources, manufacturing and sales using software systems. These systems can help in operations as well as strategic decision making. For a small business, the reduced complexity means these systems can be installed one module at a time and can be scaled as the need arises (Nicky, 2018).

The Roles of Information Technology in COVID-19Pandemic

With computers and computer networks, people have been able to achieve in the span of a few decades what would otherwise have taken us many centuries to achieve. People have democratized the internet, vastly improved communication, increased our ability to design and invent by multiples and made life easier overall. Information technology roles in COVID-19 are enormous.

Tools such as migration maps which use mobile phones, mobile payment applications and social media to collect real-time data on the location of people, allowed Chinese authorities to track the movement of people who had visited the Wuhan market the pandemic epicenter. With these data, machine learning models were developed to forecast the regional transmission dynamics of SARS – CoV-2 and guide border checks and surveillance (Wu, Leung & Leung, 2020).

China are using drones attached with thermal sensors to identify the symptoms for coronavirus and get immediate medical help. In Australia, the government had launched a chat-bot to keep the citizens up to date with the situation and answer their questions so that they will be able to decrease the spread of misleading information and stop the panic that could be created in public. In South Korea, the local government has launched a smartphone app that keeps the self-quarantine employees in touch with their co-workers to keep the updates to the work process and to ask any questions. In January, in China, the telecom AHS designed a 5G powered system to enable the consultations and diagnoses of people affected by the virus by connecting the physicians at West China Hospital to 27 other hospitals in the area to treat the illness affected people. This not only helps doctors to communicate faster and come up with a diagnosis but also helps to keep track of the emergency patients who need immediate medical help and if a hospital is not able to provide that the patient could immediately be shifted to the nearest equipped hospital for assistance (Marketdataforecast, 2020).

Using information technology such as artificial intelligence, digital thermometers, mobile phone applications, thermal cameras and web-based toolkits, individuals and populations are being screened for infection of COVID-19. These information technology resources provide information on COVID-19disease prevalence and pathology, identifies individuals for testing, contact tracing and isolation. For example, in Singapore, people have their temperature measured at the entries of workplaces, schools and public transport. The data from the thermometers is tracked and used to identify emerging hot spots and clusters of infection where testing could be initiated (NewsNational, 2020). Also, using mobile technology, Iceland collects data on patient-reported symptoms and combines these data with other datasets such as clinical and genomic sequencing data to reveal information about the pathology and spread of the virus (UnitedStatesToday, 2020).

Information technology has helped in the identification and tracking of individuals who might have come into contract with an infected person. For example, South Korea has implemented tools for aggressive contact tracing using security camera footage, facial recognition technology, bank card records and global positioning system (GPS) data from vehicles and mobile phones to provide real-time data and detailed timelines of people's travel. By identifying and isolating infections early, South Korea has maintained among the lowest per-capita mortality rates in the world (TheNewYorkTimes, 2020). Singapore launched a mobile phone application that exchanges short distance Bluetooth signals when individuals are in proximity to each other. The application records these encounters and stores them in their respective mobile phones for 21 days. If an individual is diagnosed with COVID-19, Singapore's Ministry of Health accesses the data to identify contacts of the infected person (News National, 2020). Also, Germany launched a smartwatch application that collects pulse, temperature and sleep pattern data to screen for signs of viral illness. Data from the application are presented on an online, interactive map in which authorities can assess the likelihood of COVID-19incidence across the nation. With widespread testing and digital health interventions, Germany has maintained a low per-capital mortality rate, relative to other countries despite a high prevalence of cases (Thomas, 2020).

Information technology identifies and tracks infected individuals and implements quarantine. With information technology, quarantine can be implemented in individuals who have been exposed to or infected with the virus with less strict restrictions imposed on other citizens. China's quick response (QR) code system in which individual are required to fill out a symptom survey and record their temperature allows authorities to monitor health and control movement (Liu, 2020). In Taiwan electronic monitoring of home quarantined individuals is facilitated through government – issued mobile phones tracked by Global Positioning Systems (GPS); in the event of a breach in quarantine, this so-called information technology resource triggers messages to the individual and levies fines (Wang, Ng & Brook, 2020). In South Korea, individuals in self-isolation are instructed to download a mobile phone application that alerts authorities if they leave their place of isolation (TheNewYorkTimes, 2020). In Hong Kong, people in self-isolation are required to wear a wristband linked through cloud technology to a database that alerts authorities if quarantine is breached (Liu, 2020).

Information technology diagnoses infected individuals, monitors clinical status, predicts clinical outcomes, provides capacity for telemedicine services and virtual care. Artificial intelligence (AI) can facilitate rapid diagnosis and risk prediction of COVID-19. COVID-Net, an open-source deep convolutional neural network design available to clinicians across the globe can quickly detect COVID-19cases from other lung diseases on chest X-rays (Li, Qin & Xu, 2020). Machine learning algorithms developed in China can predict the likelihood of developing acute respiratory distress syndrome and critical illness among infected patients (Li et al., 2020). Virtual care platforms using video conferencing and digital monitoring have been used worldwide to deliver remote health care to patience as a means of reducing their exposure to SARS – CoV-2 in health-care institutions. All these teleconferencing tools – WhatsApp video call, Zoom and Microsoft Teams help the people who are in quarantine to stay in touch with their family members as well as have conference meetings and work at the same time (Marketdataforecast, 2020).

Risk of Information Technology in COVID-19 Pandemic
The following are the risks of information technology in COvid-19 pandemic:

- Digital health initiatives can amplify socio-economic inequalities and contribute to health care disparities. Information typically involves the use of the internet and the mobile phones. Although 4 billion people used the internet world wide in 2019, usage was disproportionally higher in high-income areas than low income and middle-income areas (82% Europe VS 28% in Africa) (Whitelaw Mamas, Tropol and Vanspall, 2020). Even within high-income countries, susceptible groups such as those low-income neighborhoods or remote regions might not have access to broad-brand signals, smartphones or wearable technology such as smart watches.
- Several information technology resources' health interventions, particularly those that track individuals and enforce quarantine infringe on privacy, while increasing risk among individuals with mental illness and restricted access to food or water (whitelaw et al., 2020).
- Information technology involves high costs and requires management and regulation.
- It can fail to detect asymptomatic individuals if based on self-reported symptoms or monitoring of vital signs and also requires validation of screening tools.
- It could fail to detect individuals who are exposed if the application is deactivated, the mobile device is absent or wi-fi or cell connectivity is inadequate.
- It could fail to accurately diagnose patients and equipment may malfunction.

METHODOLOGY

Design: The research design is a descriptive survey. It is a descriptive survey because the sturdy described a sample of the roles and the risks of information technology in the COVID-19pandemic.

Participants: The population comprises of all group of friends in two (2) social media Apps-Whatsapp and Facebook App. A total of 50 and 50 friends from whatsapp and Facebook app were randomly selected, given a sample size of 100.

Instrument: The instrument was structured on a 4-point likert scale type questionnaire on which the respondents acted on. It consists of ten (10) close ended items that targeted the roles and risks of information technology in COVID-19pandemic. The items in the questionnaire were weighted as follows: Strongly agree (SA) – 4 points, Agree (A) – 3 points, Disagree (D) – 2 points and Strongly disagree (SD) – 1point. Respondents were required to tick their various options as regards the roles and risks of information technology in COVID-19pandemic. The Cronbach Alpha Reliability Coefficient of the instruments was .96. The value was adjudged suitable for use of the instrument for the study.

Analysis: The data collected were analyzed using mean scores. Any item with a rating of 2.50 and above was accepted value while item with a mean rating below 2.50 was rejected.

RESULTS

The results of the data from the study are presented in tables 1 and 2 according to the research questions.

Research Question One
What are the roles of information technology in COVID-19pandemic?

Table 1

Roles of Information Technology in COVID-19Pandemic

S/N	Items	SA	A	D	SD	Mean	Decision
1	Information technology resources were used to track COVID-19disease activity in real-time.	160	90	40	10	3.00	Accepted
2	IT resources were used for screening individuals and populations for COVID-19 disease.	120	90	40	20	2.70	Accepted
3	IT identifies and tracks infected individuals and monitors who might have come into contact with an infected person.	80	120	70	05	2.75	Accepted
4	IT identifies and tracks infected individuals and implements quarantine.	160	90	40	10	3.00	Accepted
5	Information technology tools were used to diagnose infected individuals, monitor clinical status, predicts clinical outcomes, provides capacity for telemedicine services and virtual care.	80	120	70	05	2.75	Accepted
	Grand Mean			2.84			

Data presented above in table 1 shows that the respondents agreed that all these items are the roles of information technology in COVID-19Pandemic. All the items have mean scores above 2.50 which is the criterion mean of acceptance. The grand mean is 2.84.

Research Question Two
What are the risks of information technology in COVID-19pandemic?

Table 2

Risks of information Technology in COVID-19pandemic

S/N	items	SA	A	D	SD	Mean	Decision
6	IT could breach privacy, involves high costs and require management and regulations.	160	90	40	10	3.00	Accepted
7	IT could fail to detect a symptomatic individuals if based on self-reported symptoms or monitoring of vital signs and also requires validation of screening tools.	40	135	60	15	2.50	Accepted
8	IT could fail to detect individuals who are exposed if the application is deactivated, the mobile device is absent or Wi-Fi or cell connectivity is inadequate.	160	90	40	10	3.00	Accepted
9	IT violates civil liberties; restrict access to food and essential services and fails to detect individuals who leave quarantine without devices.	40	200	50	15	3.05	Accepted
10	IT could fail to accurately diagnose patients and equipment may malfunction.	160	90	40	10	3.00	Accepted
	Grand mean	2.91					

Table 2 revealed that all the respondents agreed that all the above are the risks of information technology in COVID-19pandemic. Hence, the grand mean of 2.91 is greater than the criterion means of 2.50.

Discussion
The findings of this study on the roles of information technology in COVID-19pandemic revealed that: Information technology resources were used to track COVID-19disease activity in real-time, IT resources were used for screening individuals and populations for COVID-19disease, IT identifies and tracks infected individuals and monitors who might have come into

contact with an infected person, IT identifies and tracks infected individuals and implements quarantine and IT tools were used to diagnose infected individuals, monitor clinical outcomes, provides capacity for telemedicine services and virtual care. The roles of information technology in COVID-19 pandemic was articulated by Wu et al. (2020), thus, tools such as migration maps which use mobile phones, mobile payment applications and social media to collect real-time data on the location of people, allowed Chinese authorities to track the movement of people who had visited the Wuhan market the pandemic epicenter. With these data, machine learning models were developed to forecast the regional transmission dynamics of SARS-COV-2 and guide border checks and surveillance. Similarly, Li et al. (2020) observed that IT diagnoses infected individuals, monitors clinical status, predicts clinical outcomes and virtual care. The risks include breach of privacy, high costs, requirement of management and regulation, violation of civic liberties, requirement of validation of screening tools and unable to diagnose patients accurately. The risks of IT in COVID-19 were examined by Whitelaw et al. (2020) thus, several information technology resources health interventions, particularly those that track individuals and enforce quarantine can infringe on privacy, while increasing risk among individuals with mental illness or restricted access to food or water. Finally, from the findings of this study, if the risks of the use of information technology are tackled, IT could help eradicate COVID-19 disease.

CONCLUSION

The role of information technology in COVID-19 pandemic is a welcome development. This is because information technology systems can be used to track COVID-19 disease activity in real-times, screen individuals and populations for COVID-19 disease, monitor who might have come into contact with infected person, implement quarantine, diagnose infected persons, predicts clinical outcomes, provide capacity for telemedicine and virtual care. Inspite of these loudable roles of information technology in COVID-19, the study established some risks of IT in COVID-19 pandemic like breach of privacy, high costs, requirement of management and regulation, violation of civic liberties, requirement of validation of screening tools and unable to diagnose patients accurately. Finally, the study concludes that if the risks of information technology are tackled, IT could help eradicate COVID-19 disease.

RECOMMENDATION

Based on the findings, the following recommendations are made:

1. To effectively implement information technology globally, interventions should be tailored to the target regions; broadband access requires federal and private sector investment in technology and infrastructure.

2. At a regional level, subsidized mobile phone plans, loaner devices, free WiFi hotspots and training programmes could provide temporary solutions to these disparities.

3. In regions without information technology resources or insufficient funds to support cellular and data coverage, automated applications and devices that do not require continuous network access, should be considered.

4. To balance the need for contact tracing and privacy, European authorities have proposed that date be retained for only 14 days, the period of possible viral transmission and that non-essential information technology measures be lifted once the pandemic ends.

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