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Ogirima SAO
Department of Information Systems, Ladoke Akintola University of Technology, Ogbomoso, Nigeria

Arulogun OT
Department of Computer, Engineering, Ladoke Akintola University of Technology, Ogbomoso, Nigeria

Adigun EB
Department of Computer, Engineering, Ladoke Akintola University of Technology, Ogbomoso, Nigeria

Corresponding Author:
Ogirima SAO
Department of Information Systems, Ladoke Akintola University of Technology, Ogbomoso, Nigeria

The role of ICT during COVID-19 pandemic in Nigeria

Ogirima SAO, Arulogun OT and Adigun EB

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Abstract
ICT has played a significant role through social media platforms and other information media in providing accurate information and curbing the coronavirus disease 2019 (COVID-19) across Nigeria. The response to COVID-19 has reduced face-to-face contact and as a result communication via social media has increased. This study draws on information gathered during the process of mapping and discussion to present analysis and make recommendations about priority issues related to the use of ICTs in curbing the menace of Covid-19. ICT tools are used to facilitate communication, processing, and transmission of information and sharing of knowledge by electronic means among healthcare providers either through telephones, computers, electronic-based media such as digital text and audio-video recording, or the Internet. This paper aims to highlight the significance of ICT tools used during and after the pandemic. Therefore, the government should take necessary initiatives to deploy and technological development of ICT infrastructures or digital interventions followed by financial support and other basic amenities to combat the pandemic spread of COVID-19. This concludes that the importance of ICT tools during the pandemic cannot be overemphasize with a way out to information dissemination on updated cases regarding COVID-19 provided by Nigeria Centre for Diseases and Control (NCDC).

Keywords: ICT role, COVID-19, coronavirus, pandemic, health informatics, social media informatics, assessment

1. Introduction
Patients having COVID-19 or Coronavirus disease show symptoms of fever, dry cough, tiredness, aches and pains, sore throat, and shortness of breath. This infection was first reported in early December 2019 in Wuhan, China [1]. As of the end of January, over 7,800 cases were being reported from different countries including Asia, Europe, the USA, Canada, and many other countries outside China when immediately World Health Organization (WHO) declared Coronavirus outbreak as a global public health emergency [2] and [3]. As the cases of spread of the disease suddenly increases and healthcare systems became unbearable to handle the condition in the following months with over 100,000 cases in more than 120 countries all over the world, which WHO declared COVID-19 as a pandemic. As of 10 April, 2020 COVID-19 has spread transversely to 215 countries and territories that has affected over one and half million people and claimed over 105 thousand deaths [1]. People's daily lives and business activities are changing under stay-at-home orders and many are overwhelmed with information causing panic and crisis challenging the public health system in every country [4]. The pandemic of COVID-19 has forced many countries to impose a lockdown, of which people have suddenly found themselves having to reduce their social relations drastically [5].
In Nigeria, as of 30th September 2021, COVID-19 cases, it was reported that from the samples tested 3,043,321 from all the isolated centers, are Confirmed Cases 205,484, Active Cases 9,286, Discharged Cases 193,496, and Death 2,702 [6], and in Egypt, with infected cases Coronavirus Cases: 303,783 Deaths:17,294 Recovered:256,467 as at September 30th, 2021 [7]. With the number of COVID-19 infected patients increasing all over the world, a great number of survivors have reported changes in their quality of living or experience re-infection [8]. To me, I regard this COVID-19 as a "political pandemic" to cause economic havoc in the underdeveloped Nations to index the contested politics that have been woven around the world locally, nationally, and globally on the mistrust about the COVID-19 pandemic. To know how information technology is helping us through the coronavirus pandemic, it is necessary to be familiar with what IT encompasses.

Information technology (IT) is a wide field that covers all functionalities and processes relating to computers or expertise in an organization or business. It can be referred to as computers and networks, but it includes enormous scope of work that handles technological problems in a business setting, institutions, or any other organizations that manage information.

Information technology has gone through many breakthroughs and advancements over years and has infiltrated all part of people's daily life activities. Since the emerging of social networks and ICT infrastructure tools, especially as a source of information in critical situations, information technologies play a major significant role during the pandemic. Nowadays, people are faced with an abundance of information from various sources, such as telephone, internet, television, radio, etc [9].

ICT plays a major role in all States in curbing the menace of Coronavirus from spreading the disease to States in Nigeria. The awareness was given through telephone as short message service (SMS), Web (internet), Radio and television services and Newspapers. All Nigerians were able to know the precautions to be taken from being contracted by the disease.at least each citizen of the Federal Republic of Nigeria will be able to access information and precaution from at least one of the mediums provide information about the disease daily. ICT helps provide information on where an individual who contracted the disease on the available Isolation Centre close to the patients. Virtually all states in Nigeria has at least six isolation centers that patient receives urgent medication. Hotline numbers were provided for any emergency that can be used if someone has COVID-19. A Series of web seminars (webinars) was organized by so many ICT centers throughout Nigeria to give awareness precautions, preventions, and curation measures. Many Nigerian resulted to herbal medications for prevention and survival [10]. Populaces have forced the usage of face masks. However, despite all its potential, challenges are still faced because ICTs have not been widely used as a tool for the dissemination of information to all individuals because of social infrastructures.

Though, the majority of communities and professional users of ICTs in the health sector printed hand bills as a means of information to guide citizens on how to take preventive measures to curb the spread of coronavirus known as Corvid-19. Daily, ICT helps in providing the numbers of cases of Coronavirus pandemics at each isolations centers where the Nigerians get the numbers of deaths, discharged, and the new cases of patients through social media. However, ICT usage for the dissemination of information on precautions and preventions of Covid19 in Nigeria was so tremendous which offers an interesting aspect that touches upon technology, informatics, and societal issues beneficial to the society during this pandemic period [6].

Medical services and information distributed electronically or through telecommunication technology to enable remote care in which people have access to medical help by reducing the need to seek in-person care is called telemedicine. Through telemedicine technology is not that new, but the coming of COVID-19 and widespread stay-at-home orders mean that physicians are turning to telemedicine to engage patients on a much greater scale than ever expected till now. Nowadays, unless the need for hands-on medical attention is immediately palpable, a phone, internet, Video conferences chat, or other ICT media are used to book an appointment with a doctor or other healthcare providers are often the first step in seeking medical care. This process shows that telemedicine is in action [1], [4], and [11].

During the pandemic, information technology has provided us with infrastructure and apps that let us to keep in touch regarding information dissemination. For example, video and audio call with the ability to see and hear people, direct messaging enables patients and others to communicate in real-time without speaking with healthcare providers and sharing certain information among the people within the communities. IT infrastructures have enabled people to have easy and quick access to information during a crisis. Healthcare providers and government's decision-makers make use of information technology to improve public health by dispersion news related to the COVID-19. The preventive measures, and medical advice were spread to save lives during the pandemic [4].

WHO created websites that offer progressing updates and top stories on the COVID-19 during the pandemic? Many organizations are streaming on social media in an attempt to inform people on the latest update regarding disease and preventive measures to curb the menace. Dedicated lines were created that people can contact to get more information concerning the precaution, prevention, and curative measures for those that observe the symptoms in the people around them [4].

In every era, we have seen that there has been a remarkable connection between human beings and technology. We humans have been continuously putting in a lot of effort in innovations, technology advancements, and their adoption. I think we all realize that in addition to connecting; now the new key for business growth is the partnership between humans and machines. Digitalization is rapidly increasing; it's everywhere and will keep on increasing. Also, we all have seen how ICT has helped us during this pandemic whether it is the availability of information or helping affected patients, serving patients in quarantine or quickly delivering COVID-19 samples for testing, or helping us in surveillance. These are a few areas where humans are threatened to operate or have limitations but machines are helping us.

Technology today has undoubtedly played a significant role in providing all the required information regarding COVID-19 to every person and has proved to be very helpful. It also has the side effect of overflow of information which is overwhelming but with controlled measures and with human intelligence that also can be controlled. With these several tools, organizations can continue with their business during lockdowns and various restrictions by enabling their workforce to Work from Home (WFH). With the availability of a wide range of collaboration tools, organizations can establish effective and secure communication protocols within the teams and with their customers and partners. For a long, success for WFH was a dilemma for many organizations. But the current COVID-19 situation has resolved our long-existing dilemma by pushing all of us to adhere to the WFH model [11]. The emergence of the COVID-19 pandemic has a lot of detrimental consequences to the global financial system as a result of Work from Home or business from home which affected organizations in terms of business transactions where millions of people's transactions have declined drastically in which economic activity into a partial shutdown [24].

Since the whole world is fighting against the pandemic spread of COVID-19, the role of Information and Communications Technology (ICT) to enhance public awareness and prevention, surveillance, diagnosis, treatment and coordinate response for COVID-19 has become more significant. ICT interventions could be regarded as the most effective, widely used, and popular means that the world used to fight against the spread of the COVID-19. Some ICT-based initiatives have been taken all over the world; for example, developing dashboard or web portal to provide the updated statistical report on Coronavirus, digital interactive maps, awareness measures, and emergency calling information or hot-line numbers that made WHO go into partnership with different social media platforms such as Facebook, WhatsApp) to provide authentic information as well as health alert messaging service [1]. During this unprecedented time, we suddenly had to start living in isolation and had to survive in lockdown. With technology enablement, most organizations, industries can survive even in this tough period. The development and implementation of different technology solutions aimed at combating the COVID-19 outbreak are rapidly and continuously taking the shape [1].

With the global coronavirus pandemic in its second year and vaccine safety concerns easing, governments of the Federal Republic of Nigeria are still struggling to vaccinate their populations to approach herd immunity levels. Currently, new variants are emerging as many locales plan to reopen schools, domestic and international travel is increasing gradually, and people relax in vigilance around physical distancing, mask-wearing, and other public health interventions [6].

2. Related Works

As of June 15, 2020, the disease has spread to over 198 countries and over eight million people across the globe have been infected, which turned into the most global health catastrophe. The public health system in each country was alarming and shuddering social order. People's daily life changed under stay-at-home orders by the government of a Nation and some are overwhelmed with information. Lack of adequate information regarding the spread of disease so that government decided to meet people's daily information needs because, in Nigeria, there are misinformation, disinformation, and fake news around. The Nigeria Centre for Diseases and Control (NCDC) could not provide accurate information concerning the spread of the coronavirus Federal Republic of Nigeria to let citizens know the update on the cases of the affected people [6].

Technological challenges may not be as difficult to conquer as obtaining government endorsement in many cases. Setting up a comprehensive network for supporting emergency rescue may entail cooperation from various parties and the time needed to provide adequate training for healthcare professionals of varying capacities may be perceived as a time-consuming process for authorities. The long-term benefits brought to life-saving are very obvious, yet gaining support on the financial and time investments needed is another issue that needs to be worked on. During the pandemic, efforts are made to promote the good use of ICTs in making a social impact, and to provide useful and replicable information to states in Nigeria [10].

The COVID-19 pandemic has deeply impacted all spheres especially with social distancing norms in place when interacting with each other during gatherings [13]. After SARS in 2002, no one knows that in 2019 there will be an outbreak of coronavirus, known as COVID-19. It first started in Wuhan, China later started to spread across the globe that lead to the death of many lives of people. In Nigeria over 300 lives are gone as a result of the pandemic [14]. On February 15, 2020, Security Conference was held in Munich, where the WHO Director-General Tedros Adhanom Ghebreyesus, said, "We are not just fighting an epidemic; we are fighting an infodemic." WHO launched a new information platform called the Information Network for Epidemics (EPIWIN) after declaring COVID-19. The goal behind the new information platform was only to reveal customized information with concerned focus groups [2]. In February, the Egyptian government decided not to close airport travels, schools, or universities anymore. Instead, Egypt started to examine all tourists coming into Egypt and get them tested on arrival. It discovered cases of COVID-19 in a cruise ship in Luxor, and subsequently, the authorities prevented the onboard passengers and the crew from leaving the ship and until the medical team to take care of them [15].

ICT plays a comprehensive key role to make sure each individual has detailed record stating that the person is free of Covid-19 before embarking on journey air or sea movement these details are provided utilizing e-health checkups. Adequate ICT infrastructure facilitates interpersonal connections at a stage when much of the population is likely to have been forced into isolation. More so, technology can facilitate financial resiliency by means of allowing employees in certain staff of company or organization to work from home, facilitating direct payments to workers to save life of staff from being contracted by the disease, and this help in minimizing the required labor presence [16].

ICTs here include the internet, platforms, networks, computers, phones, apps, and databases, as well as fundamental infrastructure that is a pivotal factor in the existing social order, particularly during the COVID-19 global pandemic. The significance of ICTs is more identifying, tracing, understanding, managing, treating, and perceiving pandemics [17]. ICTs have helped the Nation the best chance to maintain social order during the pandemic so that people will not be infected. The use of ICT and tools to acquire, examine, re-examine and transmit electronically the information about patients to the NCDC isolation center to give medication to patients at distance The NCDC is a single point-of-access non-emergency phone number that allows the public to call in for informal on Government services/policies, make complaints, or report problems. To cope with the spread of the Coronavirus, Government took a set of measures including doubling free-of-charge medication to the affected patient throughout Nigeria [6]. During the Coronavirus outbreak, NCDC developed an online indicator that provides an analysis of the public interaction with the spread of the Coronavirus in all States of Nigeria during the time of the COVID-19 pandemic. This chart or indicator is an online dashboard that shows daily updates on the statistics about coronavirus cases in all the States via YouTube, Netflix, Facebook, phone, and Televisions [6]. On health matters, NCDC provides an automated screening model that alleviates the pressures on the health system by using an automatic question flow that gathers information on the people that might be infected with the coronavirus. All hospitals make availability

Checker has proved to be an efficient means to avoid having patients visit more than one isolation center looking for an available bed, therefore diminishing the risk of contagion [6]. Development activities of an ICT-based e-health system for community healthcare help greatly during the pandemic and the herbal practitioners came up with both handbills and online messages as precaution measures of being contracted by the disease [18]. Internet usage in Nigeria has gradually increased during the pandemic, a phenomenon that shows the country has a technologically friendly environment provided by NCDC in which the update of the spread of the disease is received. People's trust in online information and perceived information overload are strong predictors of unverified information sharing which the major factor is perceived COVID-19 severity and vulnerability influence to share news without verifying its reliability [6]. ICT infrastructural tools such as websites, online collaboration, and video conferencing tools, prerecorded and live-streamed video lectures, and social media platforms are proving to be effective means to curb the menace of Coronavirus [19]. The ICT provides guidance, support, and invaluable information for teachers working at home. There are several online life and recorded video options that schools may consider, ranging from mere setup an assignment from home or providing access to online resources through zoom tutorials and interactive video conferencing. Therefore, staff capability and the age of your children are going to determine your approach [4], [10], and [11].

ICT tools were being experimented with within schools, business centers, and religious places during the pandemic and it was found to be promising that aids the adoption of ICT on real-time value. Currently, medical practitioners and other allied professionals are evaluating the adoption and usage of technological tools to provide effective and safe ways to deliver instruction during the foreseeable future pandemic [20]. Misinformation poses a serious threat to public health during pandemics such as the COVID-19 but with help of ICT drastically reduced [2]. Many agencies, including the WHO, have made calls to develop interventions to reduce the spread of COVID-19 misinformation. The first step in developing the interventions is to understand why people engage in sharing unverified COVID-19 related information through social media. The possible consequence of social media use during COVID-19 which may be connected to the spread of misinformation is cyberchondria [21]. In Egypt, a strategy of online distribution of the survey involved emails and social media platforms, including WhatsApp, Facebook, Twitter and Telegram were used for disseminating information about COVID-19 to its citizens were used as a medium among Healthcare Providers (HCPs) professionals are looking into in identifying risk factors for Corona Virus Disease 2019 (COVID-19) among Healthcare Providers [22].

The COVID-19 pandemic has dramatically affected many economic operations, and within these circumstances, thereby making management experts to have proclaimed that prices of goods and services might fall [24]. But with help of ICT tools, businesses and services became easier because transactions were done online during the pandemic. The low COVID-19 pandemic in Egypt does not mirror the reality. Most SARS-CoV-2-infected patients passed without any laboratory confirmations, while some cases depend on CT scans in informal laboratories. Most people make use of medicinal plants as hot or cold beverages and favors added to foods could play a role in mitigating COVID-19 symptoms in Egyptians [23]. At the initial phases of the COVID-19 pandemic, accurate tracking has proven unfeasible in Spain. The first estimation methods pointed toward case numbers that were much higher than it was officially reported, the discrepancy appears to be even higher [24].

3. Materials and Method

In this section, the constraints and challenges facing ICT during the Pandemic, ICT Technological helps, Interventions and Social Drama in Combating the COVID-19 and assessment conducted through those that are involved ICTs infrastructure during the Pandemic.

3.1 Constraints and challenges facing ICT during the Pandemic

The constraints and challenges facing ICT during the Pandemic are as follow:

i. **Connectivity:** Concerning the connectivity, there are issues such as the lack of an enabling telecom policy and regulatory environment; access to electricity solar power options, UPS back-ups, insufficient infrastructure, connectivity access, and high costs, and the issues around broadcasting rights and regulations controlling the media. Connectivity access measured in terms of telephone access, personal computer ownership, and Internet connectivity varies widely around the world. Inequitable access also exists within societies.

ii. **Content:** Lack of local content creation, the language used, and the relevance of content to the local situation. The language is frequently neglected in ICT programmes and little content is available in local languages for health programmes. The major content issue is the quality and reliability of health information availability. The Internet can provide a wide range of users with timely, accurate, diverse, and detailed health information.

iii. **Capacity:** The capacity to adapt the information to ensure it is culturally appropriate and relevant which is a major challenge and a skilled ICT workforce is an essential ingredient for the effective use of ICTs in healthcare services. The most successful efforts to incorporate ICTs have occurred in countries with strong and efficient decision-makers and sound academic institutions that are committed to investing on research in education and technological advancement.

iv. **Community**: The communities are the ones that need ICT. An important approach that is highly needed to the design and implementation of an ICT-based health program is to identify the various stakeholders who need to be involved and find adequate mechanisms for the perspectives and concerns and find ways to mobilize community skills, expertise, and resources.

v. **Commerce:** The new technologies have made it possible to open up trade in medicines and services via the internet. This may have both positive and negative consequences. The major factor to consider is the degree to which is possible to develop an effective

transnational herbal business that promotes online transactional capabilities that could be beneficial for consumers, businesses, and public health interests.

vi. **Culture:** Another challenge that needs to be addressed during a pandemic is cultural inhibitions and barriers within the community.

vii. **Cooperation:** The application of ICTs for health and development involves local, regional, and international participants as stakeholders. For a Nation to put ICT in place needs technical knowledge, experience, and financial investments needed to establish ICT initiatives require tapping into resources and expertise.

viii. **Capital:** However, after the outbreak of Coronavirus government has started showing in ICT to provide enabling infrastructure for healthcare delivery especially in most States in Nigeria. The financial factor is common to each State of Nigeria.

ix. **Complexity/ Usability:** Some of the prescriber's offices do not make use of computer applications for daily routine operations.

x. **Incorporation into the workflow:** This is a factor that determines the professional that give medical solution online.

3.2 ICT Technological helps, Interventions and Social Drama in Combating the COVID-19

The existing ICT interventions around the globe are to fight against the COVID-19 pandemic by providing information on the disease, precaution, prevention, and curative measures. The Google and Yahoo search engine was used to find the related online content with search strings to find the available online content "use of ICT during COVID-19", "information technology and COVID-19", and "ICT intervention and Coronavirus" in Combating the COVID-19.

3.2.1 ICT Technological helps in Combating the COVID-19

i. **ICT Helps Social Distancing:** Nigeria's government implements several ICT measures to enhance social distancing. Using Radio, Television, and cellular broadcasting service to transmit emergency alert text messages daily through mobile telecom carriers. Since the coronavirus outbreak, the Nigerian government opened the website, Facebook page to provide information about precautions and prevention of the spread of the diseases.

ii. **ICT Traces COVID-19 with Speedy Testing:** The test kits for COVID-19 were quickly supplied to each isolation diagnostic center among the 36 States of Nigeria and Federal Capital, Abuja. The diagnostic centers comprised of researchers and healthcare professionals in the diagnosis and screening of patients with severe symptoms, as well as developing appropriate responses based on a thorough analysis of the situation on the COVID-19 spread, the numbers of cases, deaths, and discharged.

iii. **ICT Quickly Traces COVID-19:** COVID-19 diagnostic kit was imported China, USA, and other developed Nations developed using ICT to communicate to other diagnostic centers on the preventive measure to take by healthcare professionals on the spread of the diseases.

iv. **ICT Enables COVID-19 Treatment:** ICT was helpful during the COVID-19 pandemic in data collection of the patient's cases, deaths, and discharge to give the necessary supply of medication and tools needed for diagnosis of the patients.

v. **ICT Flattens the Curve on COVID-19:** The major information such as the accumulated count by States and number of tests performed is summarized and provided as visualization data on the main page of the website with the numbers of Cases, Deaths, and Discharged from the diagnostic centers and real-time data of publicly-distributed face masks is provided to people through mobile applications and web services, reducing confusion and inconvenience while raising distribution efficiency.

vi. **Enabling remote healthcare services:** In Nigeria, autonomous vehicles are delivering medicines and other essential goods in the affected areas. Large cities like Lagos, Kano, Kaduna, and Abuja were fumigated with disinfectants to prevent the spread of the virus.

vii. **Checking body temperature among the crowd:** Airports around the world have installed full-body infrared scanners to monitor passengers. These thermal imaging systems detect abnormal body temperatures and identify probably infected people. Many people coming to Nigeria have to be tested with this installed infrared scanner in the International airport, Lagos. So, apart from the full-body scanners, infrared thermometer guns are also used in schools, banks, offices, hotels, retail stores, and other public places.

viii. **Tracking people's location:** Technology is helping manage the mayhem by keeping track of infected individuals and whom they have interacted with.

ix. **Conferencing and consulting digitally:** In this worldwide outbreak, technology is bringing video conferencing and networking together for digital interactions. Virtual events have replaced in-person ones. National Health Service (NHS) has made Microsoft's video conferencing software. This helps in instant messaging and audio/video calls to share updates of the patients from anywhere. Many healthcare providers in Nigeria have started using Zoom for online consultations and likewise schools and Churches or Mosques or conference workshops to disseminate information.

x. **Encouraging online learning:** Schools and university campuses have opted for online tutoring mode. Many institutions are using video conferencing tools like Go To Meeting and Microsoft teams; others have built dedicated learning platforms.

xi. **Distant working streamlining:** Companies use technologies like virtual private networks, collaboration tools, and cloud conferencing to manage remote working seamlessly. More employees are now successful in adapting the practice of working from home. Apart from providing more flexibility in work, technology is also saving commute time for remote workers.

xii. **Enabling contactless movements:** Technology has also enabled safe movements in many places around Nigeria. To maintain social distancing, people are inclining towards online shopping and ordering. And the emerging technology in business is helping online retailers, food aggregators, and restaurants to make contactless deliveries. Customers place an order, make their payment online, and an agent delivers it at the door. Many companies are focusing on picking and dropping goods at designated locations, instead of hand-to-hand deliveries.

xiii. **Cumulative transparency in data:** Miscommunication and sharing wrong data during a virus outbreak can be catastrophic. And technology played a role in fighting against it. Popular services like Google, Facebook, and YouTube are creating a transparent scenario by displaying accurate information to the users.

3.2.2 ICT Interventions in Combating the COVID-19

ICT-based technologies that are being used for combating the pandemic spread of COVID-19 around the globe are as follows:

i. **Websites and Dashboards**: Most countries have created websites, dashboards, and national portals to fight within a local sphere mainly to provide updated Corona statistics, preventive and controlling information, government and medical declarations, awareness and mental health-related information, emergency contact information, hospital map, and facilitate for self-assessment and symptom reporting for the risk of COVID-19.

ii. **Mobile Application**: Most countries developed several mobile applications to provide treatment information or services, remote monitoring and assistance to Corona infected patients, provide updated statistics on COVID-19, making people aware about Coronavirus, providing communication service including live video chatting and emergency calls, assisting to improve self-confidence and mental health during the pandemic situation, and providing preventative and controlling information.

iii. **Robots and Tankers**: Robots and tankers were used in cities like Lagos, FCT (Abuja), Kano, Ibadan, and River to disinfect the motor parks, bridges, market places, schools, hospitals, and industrials areas.

iv. **Data Analytics**: Big data, data analytic, predictive analytic, or data science is used to provide a data dashboard as well as to track, predict, control, respond to, and combat the pandemic spread of COVID-19.

v. **Wearable Technology:** Wearable computing or sensor technology like Smart Helmet and portable lab-on-chip detection kit are being used to detect COVID-19 cases in a mass crowd using thermal imaging, checkers, monitor and ensure quarantine of suspected patients, and measure/collect patient's health data remotely.

vi. **Social Media and Learning Tools**: Social Media platforms like Facebook, Twitter, Instagram, and Telegram are playing a very effective role to raise awareness and spread preventive measures.

vii. **Interactive Voice Responses:** wide use of Interactive Voice Responses was introduced globally and locally to assist health workers during the pandemic. It gives government agencies and NGOs in the country the ability to provide relevant information to citizens responsively and proactively.

3.2.3 ICT Social Drama in Combating the COVID-19

During the COVID-19 pandemic, there was a social drama around and the political pandemic in Nigeria started immediately after the report of the disease. The government then took to the media. Among the first was the constitution of the NCDC by the President of the country media briefing through a nationally televised broadcast. The religious leaders were asked to pray for the country. This prayer can be ethically viewed as a spiritual way to cast the pandemic away. The government said any person who died of Covid-19 shall be buried by the isolation centers. Those people that were infected and admitted in isolation center hospitals, and those that some died, it was locally perceived that the government is biased for not returning the dead to the family to perform the final mourning or rituals rite but wealthy and powerful elites were allowed to take the dead away for burial. The poor complained bitterly about not receiving the dead viral bodies of beloved ones for a proper burial. Though, the government chose a team to bury dead viral bodies without the presence of family members.

3.2.4 What went wrong during the Pandemic?

i. **The Collapse of Nigeria's Economy:** At the national level, the lessons are clear, Nigeria went on an economic meltdown as a result of the pandemic, weak public health infrastructure, and public resistance to risk mitigation measures like wearing a face mask. Nigeria has formed an agency National Centre for Diseases and Control to curb the pandemic as directed by WHO.

ii. **Initial Failure of the Nigeria Health System:** SARS-CoV-2 is a highly transmissible pathogen, fueled by the asymptomatic spread. Delay in the detection of and response by the NCDC affected the health system because healthcare providers do not know the causes of the pandemic.

iii. **Healthier System for Outbreak Detection and Verification:** There is a need to empower the NCDC to independently verify official reports and to deploy support and containment personnel to the state of Nigeria to give reports and update status of disease in all the isolation centres.

iv. **Sufficiently Funded NCDC:** Nigeria needs a better-resourced NCDC. The agency's annual budget should be high to meet the demand of the center.

v. **Publicizing a Public Health Emergency of International Concern (PHEIC):** The NCDC should be criticized as a national health challenge like the way the WHO was well criticized for not declaring COVID-19 a global health emergency until January 30, 2020.

vi. **Synchronized National Responses:** After the declaration of PHEIC, many countries were slow to act. In partly because governments failed to build national emergency health centers are have core health system capacities, including surveillance, testing, and contact tracing.

vii. **Heeding the warnings for future pandemics:** Even after the catastrophic effects of Ebola virus disease in Nigeria years back, nations became complacent, failing to prepare domestically or fund national response capabilities.

3.3 Research Questions

i. What role does ICTs play during the Pandemic?
ii. How do ICTs affect the existing social order (Sit at Home)?
iii. Highlight the theoretical and practical implications of the role of ICT
iv. Is accessing information concerning Cases, Deaths, and Discharges free online?
v. Is the information of cases, deaths, and discharges accurate?
vi. What level of privacy of infected patients electronically?
vii. What is the level of mobility in terms of accessibility and deployment of ICT tools?
viii. How easy it is to use ICT to transmit information to the populaces of Nigeria?
ix. What is likely information concerning the common symptoms of COVID-19?
x. Where can individuals get tested and counseling?

The entire question above can summarily be answered in the following ways

i. During the COVID-19 crisis interventions, nonprofit organizations ICT provide online services, assisting governments' digital initiative implementation, and keeping silent in the digital world.` `
ii. ICT utilization during the COVID-19 crisis attracts much media, politics, and scholarly attention. During the "stay at home" order, isolated individuals from around the globe united online by their creative endeavors as part of imagined communities in providing social media platforms, such as Instagram, WhatsApp, and Facebook, during the COVID-19 pandemic.
iii. ICT platforms are designed to give detailed information regarding the Covi-19 and to maintain social connections, provide distributed services, continue to meet business needs, and for virtual education.
iv. While COVID-19 spreads all over the state there is an upsurge of fake news, rumors, myths, misinformation, disinformation, conspiracy theories, and even hatred between uninfected and infected people.
v. ICTs, especially social media, play an important role in meeting diverse information needs, demands for online consultation, and online inquiries for the public during this global health crisis. People believe the application of ICT is trustworthy, timely, and authoritative information in getting authentic information and avoiding misinformation and disinformation.
vi. On trust in public health information during a pandemic. A survey was carried out from the NCDC chart to know the update regarding the cases of COVID-19 in all the isolation centers. These factors influence the trust in public health information, including the human values, and public health information interventions that can be adapted to be effective for people of various ages, particularly through tailoring for individuals' values.

3.4 The Study Area and Sample Size

The populated study was secondary data collected from NCDC databases comprised of the Cases, Deaths, and Discharges of the affected patients tested in all the Isolation Centres throughout the Federal Republic of Nigeria, which comprises 36 states and the Federal Capital Territory.

3.5 Data Collection Instrument

The sampled data was collected online from the NCDC update of the COVID-19 case status. The study data was not deemed human subject research and not subject to review by the NCDC. It was analyzed and validated based on a statistical standard deviation of the number of confirmed cases of Coronavirus, deaths, and discharged patients from the entire isolation centers. Cronbach alpha reliability coefficient of $\alpha = 0.72$ was used.

3.6 Method and Tools for Data Analysis

The secondary sources of this study were collected online through NCDC, newspapers, and other online materials. Data obtained from this study were analyzed using Microsoft Excel content and descriptive techniques such as percentages for the statistical analysis. The study design used includes a case study derived through NCDC update.

4. Results and Discussions

The data collated is shown in Table 1 for the year 2019-2021. The total Confirmed Cases of COVID-19 as reported by NCDC in Nigeria as of 30th September 2021 is stated in Table 2. States like Bayelsa, Borno and Ebonyi reduced in death rate from 2020(2.05%, 2.73% and 2.28%) to (0.89%, 0.89% and 0.70%) in 2021 respectively. The total death of COVID-19 in Nigeria has risen from 1317 in 2020 to 2702 as of September 2021. As of September 30th, 2021, the NCDC reported that the samples tested were 3,043,321 from all the isolation centers are Confirmed Cases 205,484, Active Cases 9,286, Discharged Cases 193,496, and Death 2,702. Lagos and FCT with 24.57% and 6.81% respectively was the most affected state in Nigeria with the spread of the pandemic as a result of the influx of people from foreign Nations through the International Airports in the two locations. Kogi state with 0.074% was the least affected; though the state does not believe in COVID-19. It was regarded as a rich man disease created by the Western world to hinder the development of the underdeveloped nations. Kogi state, therefore, resulted in the usage of herbal

medication as a source of precaution and prevention measures [10]. In 2021, the spread of coronavirus has reduced drastically with awareness, precaution, and prevention through social media such as radio, television, internet, handbills anther online seminars. The ICT infrastructures help to curb the further spread of Coronavirus. The updates of the confirmed cases are received through social media. However, the major important benefit of ICT during the pandemic is a quick electronic transfer of the COVID-19 and related cases of information to the Citizens of Nigeria. During the COVID ICT tools were used for teaching, assessing, and managing students through videoconferencing, online business transaction was the best way because of social distances. From NCDC cumulative destruction report shows that the incidence of COVID-19 raised steadily in Nigeria from January 2020 to 2021in the spread of the disease. Nigeria country recorded a rise in total cases of the transmission of COVID-19 in June 2020 when the lockdown was relaxed.

Table 1: Cases of Coronavirus and Status of Patients in Each State of Nigeria between 2019 and 2021

S/N	States	Number of Confirmed			Number of Cases Admission			Number of Discharged			Number of Deaths		
		2019	2020	2021	2019	2020	2021	2019	2020	2021	2019	2020	2021
1	Lagos	0	31,321	76,700	0	4,279	3,686	0	26,795	72,350	0	247	664
2	FCT	0	12,083	21,888	0	4,391	1,128	0	7,588	20,576	0	104	184
3	Kaduna	0	5,447	12,126	0	4,708	359	0	686	11,613	0	53	154
4	Plateau	0	4,997	9,646	0	393	176	0	4,560	9,397	0	44	73
5	Rivers	0	3,572	9,381	0	299	98	0	3,209	9,218	0	64	65
6	Oyo	0	4,035	8,694	0	581	584	0	3,402	7,919	0	52	191
7	Edo	0	2,902	6,434	0	104	708	0	2,681	5,506	0	117	220
8	Ogun	0	2,552	5,367	0	226	35	0	2,292	5,253	0	34	79
9	Kano	0	2,324	4,464	0	1,930	122	0	326	4,250	0	68	92
10	Ondo	0	1,843	4,326	0	39	518	0	1,763	3,764	0	41	44
11	Kwara	0	1,414	4,185	0	289	49	0	1,094	4,023	0	31	113
12	Delta	0	1,888	3,835	0	99	123	0	1,737	3,650	0	52	62
13	Osun	0	1,019	3,472	0	30	820	0	965	2,556	0	24	96
14	Enugu	0	1,400	2,916	0	14	39	0	1,348	2,792	0	21	85
15	Nasarawa	0	898	2,682	0	560	64	0	325	2,589	0	13	29
16	Katsina	0	1,636	2,447	0	1,429	63	0	180	2,345	0	27	39
17	Gombe	0	1,338	2,444	0	300	69	0	1,001	2,327	0	37	48
18	Ebonyi	0	1,107	2,309	0	5	22	0	1,072	2,268	0	30	19
19	Anambra	0	328	2,220	0	35	3	0	274	2,182	0	19	35
20	Akwa Ibom	0	437	2,059	0	43	24	0	385	2,003	0	9	32
21	Abia	0	1,028	1,958	0	50	36	0	968	1,896	0	10	26
22	Imo	0	766	1,929	0	31	70	0	722	1,818	0	13	41
23	Bauchi	0	1,020	1,721	0	143	103	0	860	1,592	0	17	26
24	Borno	0	806	1,641	0	32	199	0	738	1,418	0	36	24
25	Benue	0	532	1,613	0	52	4	0	469	1,592	0	11	17
26	Adamawa	0	424	1,352	0	161	0	0	385	1,314	0	25	38
27	Taraba	0	217	1,227	0	23	111	0	187	1,088	0	7	28
28	Niger	0	417	1,157	0	84	27	0	320	1,098	0	13	32
29	Bayelsa	0	534	1,092	0	92	14	0	421	1,054	0	27	24
30	Ekiti	0	415	1,022	0	14	4	0	395	998	0	6	20
31	Sokoto	0	380	796	0	270	0	0	92	768	0	18	28
32	Jigawa	0	407	579	0	368	-6	0	28	569	0	11	16
33	Kebbi	0	173	576	0	144	15	0	20	538	0	9	23
34	Yobe	0	201	502	0	49	3	0	144	490	0	8	9
35	Cross River	0	169	458	0	0	9	0	157	433	0	12	16
36	Zamfara	0	112	261	0	25	7	0	82	246	0	5	8
37	Kogi	0	5	5	0	3	0	0	0	3	0	2	2

Table 2: Confirmed Cases of Coronavirus in Nigeria as of 30th September 2021

S/N	States Affected*	No. of Cases (Confirmed)	No. of Cases (admission)	No. Discharged	No. of Deaths
1	Lagos	76,700	3,686	72,350	664
2	FCT	21,888	1,128	20,576	184
3	Kaduna	12,126	359	11,613	154
4	Plateau	9,646	176	9,397	73
5	Rivers	9,38-1	98	9,218	65
6	Oyo	8,694	584	7,919	191
7	Edo	6,434	708	5,506	220
8	Ogun	5,367	35	5,253	79
9	Kano	4,464	122	4,250	92
10	Ondo	4,326	518	3,764	44
11	Kwara	4,185	49	4,023	113
12	Delta	3,835	123	3,650	62

13	Osun	3,472	820	2,556	96
14	Enugu	2,916	39	2,792	85
15	Nasarawa	2,682	64	2,589	29
16	Katsina	2,447	63	2,345	39
17	Gombe	2,444	69	2,327	48
18	Ebonyi	2,309	22	2,268	19
19	Anambra	2,220	3	2,182	35
20	Akwa Ibom	2,059	24	2,003	32
21	Abia	1,958	36	1,896	26
22	Imo	1,929	70	1,818	41
23	Bauchi	1,721	103	1,592	26
24	Borno	1,641	199	1,418	24
25	Benue	1,613	4	1,592	17
26	Adamawa	1,352	0	1,314	38
27	Taraba	1,227	111	1,088	28
28	Niger	1,157	27	1,098	32
29	Bayelsa	1,092	14	1,054	24
30	Ekiti	1,022	4	998	20
31	Sokoto	796	0	768	28
32	Jigawa	579	-6	569	16
33	Kebbi	576	15	538	23
34	Yobe	502	3	490	9
35	Cross River	458	9	433	16
36	Zamfara	261	7	246	8
37	Kogi	5	0	3	2

*Ranked according to how the states are affected by COVID-19

Table 3: COVID-19 cases in Nigeria as of 30th September 2021

States	Confirmed Cases	Discharged Cases	Death Cases	Percentage of deaths (%)
Lagos	76,700	72,350	664	24.57439
FCT	21,888	20,576	184	6.809771
Kaduna	12,126	11,613	154	5.699482
Plateau	9,646	9,397	73	2.701702
Rivers	9,381	9,218	65	2.405625
Oyo	8,694	7,919	191	7.068838
Edo	6,434	5,506	220	8.142117
Ogun	5,367	5,253	79	2.92376
Kano	4,464	4,250	92	3.404885
Ondo	4,326	3,764	44	1.628423
Kwara	4,185	4,023	113	4.182087
Delta	3,835	3,650	62	2.294597
Osun	3,472	2,556	96	3.552924
Enugu	2,916	2,792	85	3.145818
Nasarawa	2,682	2,589	29	1.073279
Katsina	2,447	2,345	39	1.443375
Gombe	2,444	2,327	48	1.776462
Ebonyi	2,309	2,268	19	0.703183
Anambra	2,220	2,182	35	1.295337
Akwa Ibom	2,059	2,003	32	1.184308
Abia	1,958	1,896	26	0.96225
Imo	1,929	1,818	41	1.517395
Bauchi	1,721	1,592	26	0.96225
Borno	1,641	1,418	24	0.888231
Benue	1,613	1,592	17	0.629164
Adamawa	1,352	1,314	38	1.406366
Taraba	1,227	1,088	28	1.036269
Niger	1,157	1,098	32	1.184308
Bayelsa	1,092	1,054	24	0.888231
Ekiti	1,022	998	20	0.740192
Sokoto	796	768	28	1.036269
Jigawa	579	569	16	0.592154
Kebbi	576	538	23	0.851221
Yobe	502	490	9	0.333087
Cross River	458	433	16	0.592154
Zamfara	261	246	8	0.296077
Kogi	5	3	2	0.074019

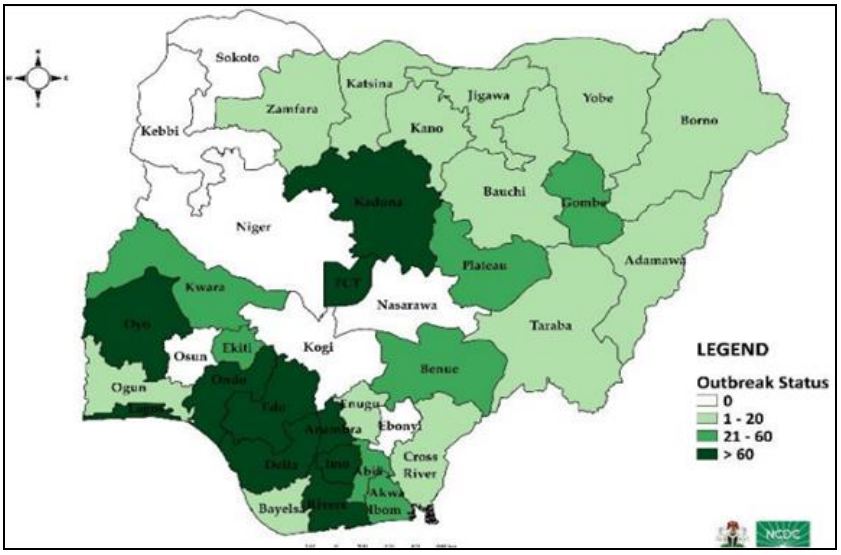

Fig 1: Distribution of COVID-19 cases (NCDC, 2021)

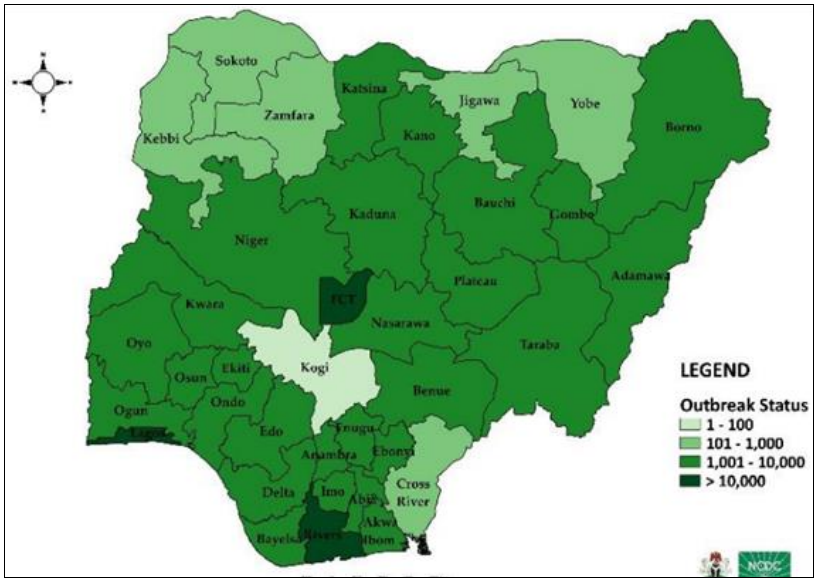

Fig 2: Distribution of cumulative COVID-19 cases (NCDC, 2021)

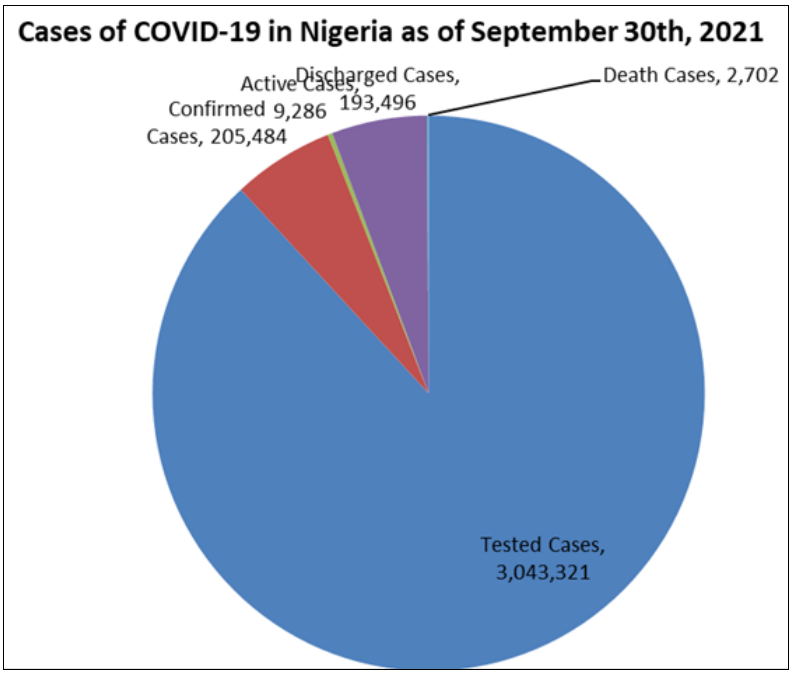

Fig 3: Cases of Coronavirus Distribution as of September 2021

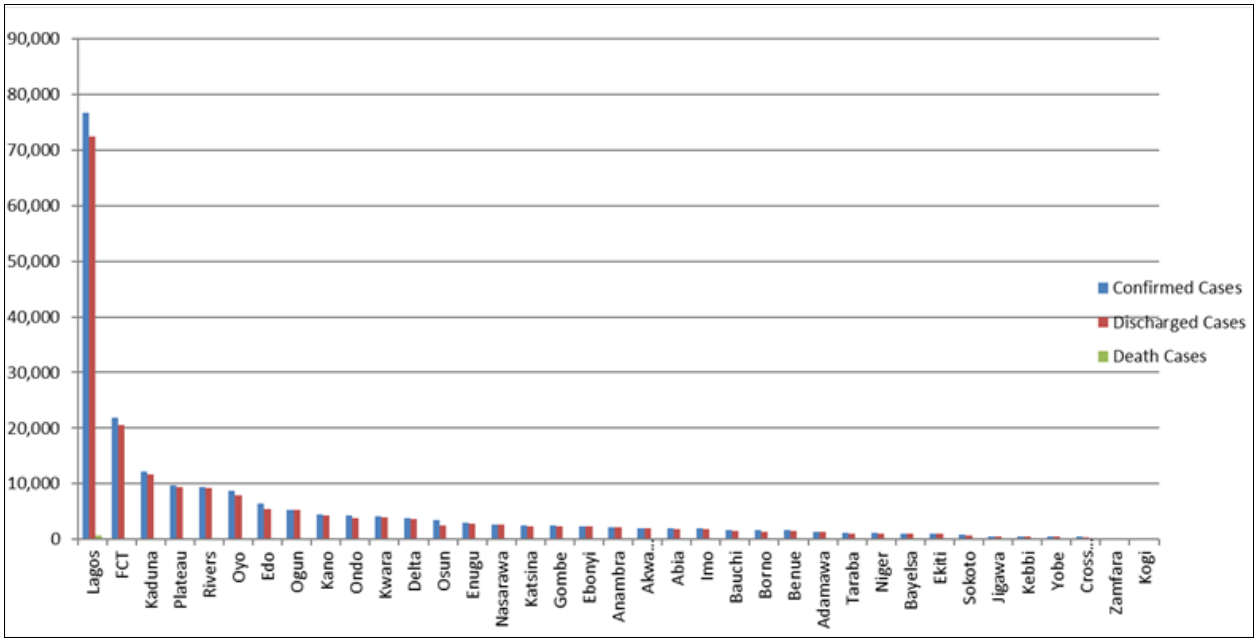

Fig 4: Confirmed cases of COVID-19 pandemic in the States of Nigeria as of September 2021

Figures 1 and 2 showing in the maps, the Distribution and Cumulative Distribution of COVID-19 cases respectively by the outbreak status. The Legend Key shows how the states are affected. Figure 3 shows the cumulative COVID-19 status numerically on how it affected the citizenry of Nigeria and Figure 4 shows the confirmed cases of COVID-19 pandemic in a graphical chart indicating the ranked affected state of Nigeria.

5. Conclusion

This paper present the role played by ICT during the Coronavirus pandemic with an update on the cases. The ICT tools help greatly in combating the COVID-19 pandemics in terms of social distancing, locates COVID-19 with speedy testing, quickly traces COVID-19, facilitates COVID-19 treatment, flattens the curve on COVID-19, facilitating remote healthcare services, monitoring body temperature among the crowd, tracking people's location, conferencing and consulting digitally, promoting online learning, remote working streamlining, enabling contactless movements, and increasing transparency in data. The usage of ICT tools was being experimented with during the pandemic to evaluate the updated cases and the circumstances for the adoption and provide real-time value and adoption. Therefore, the use of ICT tools during the period creates awareness, precautions, and preventions and above all dispensing medications by NCDC staff to all isolation centers improving quality, safety, and healthcare services to the affected patients. With the results obtained from the study, ICT provides necessary information regarding the spread and update on the status of the pandemic, so that members of the public will not fall prey to disinformation on varying social media outlets rather than updates on information provided by NCDC are authentic and reliable. The ICT infrastructure put in place for teaching during the pandemic and online business transaction on the much-needed foundation and impetus of creating awareness for on foreseeing pandemic in future there will be quick response diagnostic efforts, risk communication practices, and coordination processes in which the spread of infectious diseases is assessed to inform the individuals about the treatment by healthcare providers.

Abbreviations

NCDC : Nigeria Centre for Diseases and Control
COVID-19: coronavirus disease 2019
EPIWIN: Information Network for Epidemics
HCPs : Healthcare Providers
ICT: Information Communications Technology
IT: Information Technology
PHEIC : Public Health Emergency of International Concern
NHS : National Health Service
SMS: Short message service
UPS: Uninterrupted Power Supply
WHF: Work from Home
W.H.O: World Health Organisation

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