Utilization of ICT Software Resources for Business, News, Education and Health Before and During Coronavirus Outbreak in Nigeria

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Abstract

This work carried out a comparative study on the utilization of ICT resources (software and radio/television broadcast) for applications such as business, news, education and health before and during coronavirus outbreak in Nigeria. Borgu local government, Niger state was purposively selected for the study. The study adopted survey method of enquiry in which selection of participants in the study area has only one inclusion criteria which is interest in participating in the survey. A self-constructed software resources utilization questionnaire (SRUQ) was administered via Google form to the interested participants in the study area and the responses retrieved were statistically analysed. The results obtained showed decreasing utilization order for software resources (μ[e-education]>μ[e-news]>μ[e-business]>μ[e-health]) and decreasing utilization order (μ[e-news]>μ[e-education]>μ[e-health]>μ[e-business) for radio/television broadcast. It was also found that utilization of software resources for all itemised applications increased but not significantly ($p>0.5$) and while that of radio/television broadcast increased significantly ($p<0.5$) during coronavirus outbreak. Moreover, radio/television broadcast possessed significantly higher utilisation for all applications as compared with software resources before and during coronavirus outbreak. It was therefore recommended that relevant agencies take necessary steps that would afford proper utilization of software resources for national development as witnessed in the developed countries.

Keywords: Remote Working, Online Virtual Meetings, Radio/Television broadcast, Social distancing, Lockdown

1. INTRODUCTION

Since the invention of Information and Communication Technology (ICT) decades ago, it brought many waves to the society. The application of ICT has not been limited to a particular field but rather its relevance has been seen across various disciplines and professions.

Given the myriad of information and communications challenges which were presented by the Covid-19 pandemic, ICT came in handy to proffer solutions to the problems that emerged over the course of these catastrophic events [1]. ICT helped to record, store, process, retrieve, transfer, and receive information [2].

With the outbreak of coronavirus in December 2019, which the World Health Organization (WHO) declared as a Pandemic in March, 2020, measures such as lockdown, social distancing, self-isolation or self-quarantine and observation of simple hygiene habits like regular washing of hands, wearing of facemasks were introduced to contain the spread of the disease [3]. The effort to respect social distancing and other lockdown measures adopted to limit the spreading of the infection led to a shift in the fruition and supply of a wide number of services [4]. The restrictions limited the mobility of people across the world and this necessitated remote working (working from home), online virtual meetings, e-learning session, e-business and several online services through the use of ICT.

With a significant proportion of the world's inhabitants living under lockdown, there was a spike in the download of a number of applications to help people stay connected during the COVID-19 pandemic. As the world becomes increasingly interconnected, so was the risks associated with it. The COVID-19 pandemic has not stopped at national borders; it has affected people regardless of nationality, level of education, income or gender. But the same has not been true of its consequences, which had a greater hit on the most vulnerable countries [2].

The rationale behind further adoption of ICT services across the globe during the pandemic is not farfetched. Even though the lockdown and social distance measures brought great significance to controlling the spread and death rate, but many public and private sectors could not afford to bear the consequences of a total lockdown which could lead to a total collapse of the economy and other key areas of life. To achieve and maintain a continuous running of the economy, ICT tools for virtual engagements became imperative.

The health sector whose job description is saving lives possesses a workflow that is highly collaborative in nature prompting the need for effective communication and interactive medium. This is why the 'communication space' is so vast, and the quality of communication is so important for the quality of care [5]. As such, many ICT applications for health care aims at the enhancement of collaborative work [6]. ICT applications have been proven to be helpful in the health sectors during the pandemic. For instance, E-health applications offer remote consultation which reduces the workloads on medical professionals as required during the pandemic [7].

In business, the availability of Jumia, Konga, Alibaba, eazebuy online marketplace and many more has made buying and selling of products and services easier and better for everyone.

In education, e-education technologies have changed the traditional way of education to the modern way of learning, through artificial intelligence [8]. YouTube, mobile apps, and thousand other types of free available websites/tools for blended learning now exists inclusive of other various ICT resource that enhanced the flow of impartation and the academic growth level [9].

Development in communication keeps on growing from voice mode of communication to text, video which has substantially brought virtual communication. Social media apps like 2Go, Facebook, WhatsApp, and many more apps that aid teleconferencing like Skype, Zoom, Houseparty and number of such other apps keeps on increasing as developers keeps developing apps to fill in any loopholes in this area

Despite the possibility presented by ICT in combating the challenges presented by the coronavirus pandemic, many rural and underserved communities in developing countries including Nigeria, seems to be left behind as they are not equipped to adapt or transit to the new normal.

1.1 Purpose of study

The aim of this study is to examine the rate of utilization of popular ICT software resources

before and during corona virus outbreak in Nigeria. The objectives of this study are:

- To provide a checklist of some popular software (mobile, desktop and web apps) used in the study area
- To examine the rate of utilization of the software resources for business, news, education and health before and during corona virus pandemic
- To examine the rate of utilization of the radio and television broadcast for business, news, education and health before and during corona virus pandemic
- To determine the difference between the rate of utilization of software resources and radio/television broadcast for business, news, education and health during corona virus pandemic

1.3 Research Hypotheses

The following research hypotheses guided by the study.

- H_01: There is no significant difference between rate of utilization of electronic business, news, education, and health software resources before and *during* coronavirus outbreak
- H_02: The rate of utilization of electronic education *software* resources is not significantly different from *radio/television* broadcast adopted for business, news, education, and health *before* coronavirus outbreak
- H_03: The rate of utilization of electronic education *software* resources is not significantly different from *radio/television* broadcast adopted for business, news, education, and health *during* coronavirus outbreak
- H_04: The rate of utilization of electronic education *software* resources for business, news, education, and health is not significantly different from each other *before* coronavirus outbreak
- H_05: The rate of utilization of electronic education *software* resources for business, news, education, and health is not significantly different from each other *during* coronavirus outbreak
- H_06: Utilization of *radio/television* broadcast for business, news, education, and health is not significantly different

from each other *before* coronavirus outbreak
- H_07: Utilization of *radio/television* broadcast for business, news, education, and health is not significantly different from each other *during* coronavirus outbreak

2. Literature Review

Many researches have been carried out on diverse means of virtual engagements since the outbreak of the pandemic. A Necessity in light of COVID-19 Pandemic was carried by Wahab [10]. The research examined how teaching and learning can still continue in educational institutions during the pandemic that has led to closure of institutions. Findings revealed that universities worldwide are moving more and more towards online learning or E- Learning and also identified important functions in ICT integrated learning such as staff readiness, confidence, student accessibility and motivation. This established the vital point that the world educational learning system could only stand on the provision and availability ICT resources during the pandemic.

A study by Arfan, *et. al.* [9] focused on comparisons between male and female counterparts on E-learning portal usage among university students in Malaysia during the COVID-2019 period. The study included service quality, system quality, information quality, user satisfaction, system use, and E-learning portal success. The results established the fact that E-learning portal usage is more towards female students in Malaysian Universities. Impact of convid-19 on educational professional was presented by Luis *et. al.* [11]. The study offers a proposal that optimizes the work of education professional by using ICT through a novel approach of the contribution of neuro-education in the field of managing emotions and motivational processes contributing meaningful learning to student. Ukata and Onuekwa [12] used a correlation research design on application of ICT and pointed out the need for tertiary institutions in River state in Nigeria to adopt the ICT applications and resources over the traditional classroom teaching methods to curb the convid-19 threats to the academic system. Furthermore Hughes *et. al.* [13] established the fact that WhatsApp application became a teaching

platform to deliver plastic surgery learning class during the pandemic.

ICTs and Public Health in the Context of COVID-19 was carried out by Nirupam *et. al.* [1], The Taiwan's National Health Insurance Administration (NHIA) made the better use of digital central record keeping and the interoperability of its patient identification systems with data from the National Immigration Agency (NIA) to compile a list of citizens and foreign residents alike, whether hospitalized or not, who had a travel history in affected areas within the past 14 days, etc. Those identified through the new system were then directed via mobile phone notification to go into quarantine. China also made a great use of telemedicine in the fight against the pandemic.

The overview of the impact of Covid-19 and the corresponding impact of ICT-based solutions in Italy was presented by Mauro and Floriano [14], key roles of ICT was presented which include; proposed Immuni app designed using tracing and Bluetooth technology meant for human tracing, the use of Internet of Things (IoT) to capture health data from various locations of the infected patient and manage all the data using the virtual management system which helps to control the data and follow up on the report attained and the full adoption of some readily available collaborative tools and learning platforms such as Zoom, Edmodo, Skype, Google suit and Microsoft teams which most have been inexistence before the outbreak of coronavirus but became more prominent and pivotal especially in education field and in use for virtual meetings among governmental and private sectors.

The use of ICT by medical educators amid the covid-19 pandemic and beyond was highlighted by Ipshita and Pinaki [15], it discussed the role and ICT tools in filling the gaps and ensuring educational continuity in medical education, collaboration, and learning, across the world in the current pandemic. It further identified various software and social media applications such as WhatsApp, Instagram, Facebook, Twitter and the immediate switch to online and video conferencing sessions to foster medical education and research which was essential due to unavailability of medical teachers who are also serving as frontline health-care providers in the pandemic.

Jad and Alain [16] pointed out the emerging role of ICT in facilitating a continuous education for medical student in the area of plastic surgery during the pandemic through virtual learning tools. Another work by Kamran and Mohammadreza [17] reemphasized the role of ICT by filling in the gap for virtual medical education in Iran during the pandemic lockdown. Innocent [18] evaluated the effects of Covid-19 on the Nigeria's economy and recommended the adoption of e-business model, e-learning, acquisition of relevant ICT skills for the citizens as businesses, government offices and other organizations during this pandemic has made ICT skills indispensable since many employees work from home (that is. teleworking) and have software applications like WhatsApp, Zoom, Skype and many more have been adopted for virtual meeting/video conferencing platforms.

Latest trend on electronic news and services was presented by Zaufishan [19], it was observed that ICT has influenced traditional media (printed newspapers) and developed corresponding electronic news version such CNN, PUNCH, Channels all on online based. In the survey findings of Casero-Ripollés [20] on Communicative and democratic consequences of news consumption during the coronavirus, its findings established the fact that rate of news consumption during coronavirus increased compared to when there was no outbreak across all media platforms and it was established that television (network and cable) achieved the highest percentages of frequent news consumption but the social media has the largest increase which justified the adopting of social media applications by greater number of societies as a news media during the pandemic.

3. Methodology
This study adopts a survey design with no special treatment given to the subjects and without a control group using a multi stage sampling technique. Furthermore, interest in participating in the study is the basic inclusion criteria of selecting participants as parts of the study.

3.1 Settings and Participants

In order to obtain a precise and concise data for the study, at the first stage of the sampling technique Borgu local government, Niger state, Nigeria was purposively selected as the study area because the researchers reside there and would ease data collection.

The study area is one of 25 Local Government Areas (LGAs) in the state, with the headquarters in New Bussa. Borgu LGA was formally part of Kwara state but on 27th August 1991 was transferred to Niger state [22]. The area has an area land of about 16,200 sqkm and a population of 172,835 as at the 2006 Census and shares boundaries with Benin Republic to the west, Agwara local government to the south. The major occupation of the people in the area includes crop and livestock farming; civil service, other occupations include trading, artisan, carpentry, tailoring, mechanics etc. The major languages spoken in the area are Bussan, Hausa, Yoruba. Others include Boko, Nupe, Igbo, Kambari, Lari, Duka and Lopa. The people belong to different religions but the major ones are Islam and Christianity [22]. The local government comprises of 10 wards, the wards include New Bussa, Konkoso, Rafi, Dogongari, Pissa, Wawa, Babanna, Shagunnu, Dugga and Karabonde.

The study was conducted after the lockdown imposed by coronavirus outbreak was lifted in many parts of the country including the study area. At the time, many organizations were just resuming work gradually. Furthermore many schools, especially higher institutions were yet to resume physical classes as the lockdown was still followed by industrial strike action by Academic Staff Union of Universities (ASUU) that still kept the university students at home for a long time after the coronavirus lockdown. As such, the second stage of sample selection adopts a simple random sampling procedure in which fifty (50) social media contacts of each of the seven (7) researchers involved in the study that are based in Borgu Local government (the study area) were randomly selected without any exclusion criteria (as such 350 respondents were sampled at this stage). In the third and final stage of the sampling procedure, only one hundred and eighty seven (187) contacts that showed interest in being part of the study were selected, such contacts were administered the research instrument and followed up until the study was concluded.

3.2 Research Instrument and Instrument Administration

Before the study was commenced, a checklist of popular ICT resources (proprietary software resources and radio/television programs) for business, news, education and health available in Nigeria were obtained and these were drafted into the research instrument which was a self-constructed Software Resources Utilization Questionnaire (SRUQ). The questionnaire consists of sections A – E, section 'A' collects information about the demographic characteristics of the respondents while section 'B' consists of items that measures respondents' awareness about the existence of the popular software resources for business, news, education and health while sections 'C' and 'D' collect information about level of usage of ICT resources (both software and radio/television program) for business, news, education and health before and during the corona virus outbreak while section E collect information about purpose of usage of the various popular social media channels. Some of the questionnaire items are open-ended questions while some are in various point likert scales and others are graded scale questions.

3.3 Administration of Research Instrument

The SRUQ was inputted into Google form and the website link to access the Google form was sent via social media to the selected participants. Follow up messages were sent to the selected one hundred and eighty-seven (187) respondents within two weeks. The SRUQ Google form was made accessible to participants between the 18th of October and the 30th of November, 2020. The selected participants were reminded periodically and guided on how to fill the questionnaire adequately within the stated period. A total number of one hundred and sixty (160) responses were retrieved. The criteria presented in Table 1 were considered to ensure a high return rate.

Table 1: Respondents' enrolment criteria

Inclusion Criteria	Exclusion Criteria
1. Possession of mobile communication devices	Non willingness to be part of the experiment
2. Possession of social media accounts such as WhatsApp and Facebook	Inability to undertake the study within stipulated time frame
3. Been a social media contacts of the researchers	

3.4 Data Analysis method

The data collected from the participants were analysed using charts, Pearson correlation statistics, paired sample and independent sample T-Test statistics with the aid of Microsoft Excel and Statistical Package for Social Sciences (SPSS).

4. RESULTS AND DISCUSSIONS

4.1 Personal Data Section

The personal data of the respondents is presented in the frequency count and percentages presented in figures 1, 2 and 3 and Table 2.

Figure 1 shows the gender, figure 2 shows the marital status and figure 3 shows the qualifications of the respondents while Table 2 shows the means distribution of the respondents

by age, monthly income and internet access value. Figure 1 showed that 69.4% of the respondents were male, while 30.6% were females. Figure 2 showed that highest qualifications that were acquired by majority of the respondents included Bachelor's degree (38.1%), National Diploma (18.1%), Masters' degree (18.1%), and Higher National Diploma (10.6%). Other educational qualifications were possessed by a few numbers of respondents. Figure 3 showed that 44.4% of the respondents were married, 53.8% were single while negligible percentage were divorced.

Table 2 showed that the age of the respondents were between 16 and 56 years with a mean age of 30.81. The Table went on to show that 55% of the respondents were less than the mean age as such 45% were above the mean age. This implies that near even distribution of the respondents were above and below the mean age.
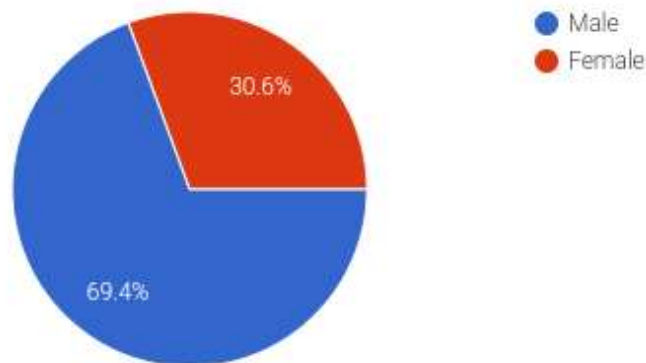
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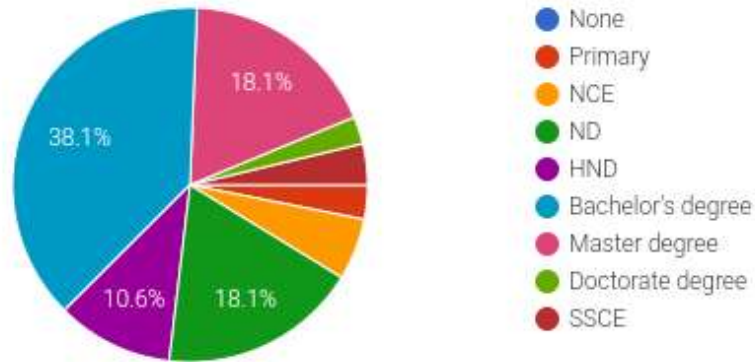*Figure 1: Pie chart of frequency distribution of respondents by gender*

Figure 2: Pie chart of frequency distribution of respondents by educational qualifications
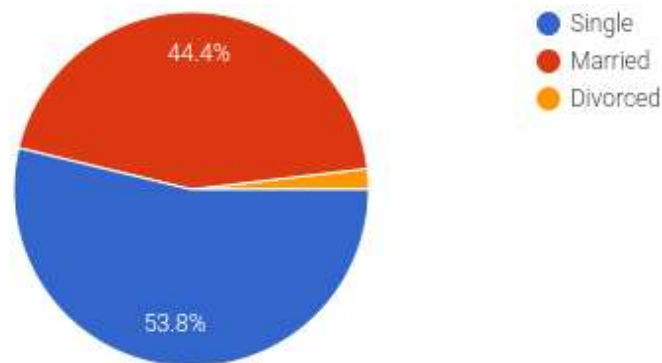

Figure 3: Pie chart of frequency distribution of respondents by frequency distribution of respondents by marital status

Table 2: Mean distribution of the respondents by age, monthly income and average monthly internet access value

	N	Minimum	Maximum	Mean	N<Mean
Age	160	16	56	30.81	88 (55%)
Income	160	0	300000	49988.04	119 (74.4%)
InternetVal	159	0	70000	4834.29	104 (65.0%)

4.2 Data Analysis Section

Figure 4 presents data on the respondents' awareness about existence of the various software applications (desktop, mobile or web based) for business, news, education or health. In figure 4, the order of awareness about the proprietary software resources itemised are e-News > e-Business > e-Education > e-Health with only e-

News (85 representing *53.1%*) having above 50% of the respondents been aware of its existence.

Table 3 shows a multiple response breakdown of how much the respondents employ popular social media channels for business, news, education or health during coronavirus pandemic while Table 4 was presented to test the hypotheses stated.
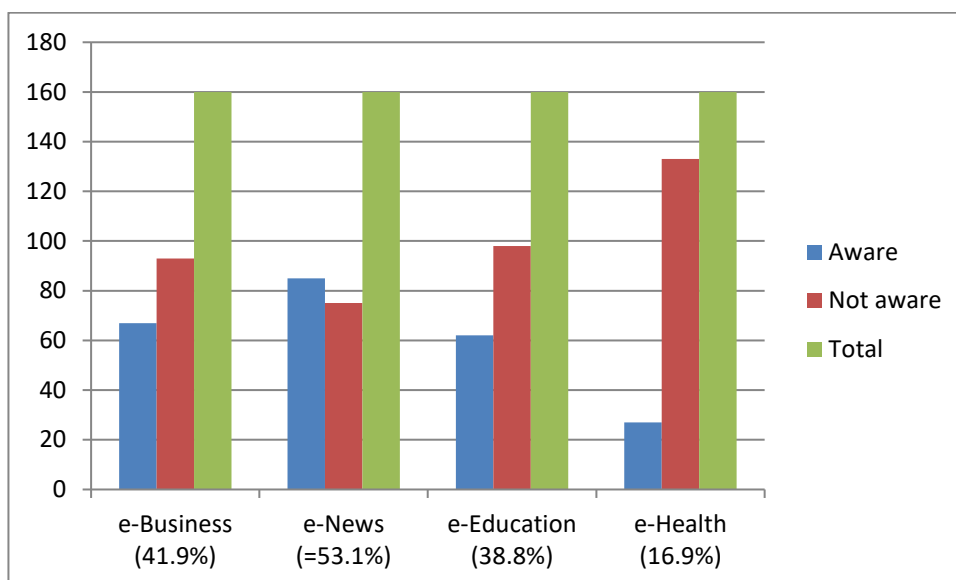
Figure 4: Column chart depicting respondents' awareness about existence of the various software applications for business, news, education and health

Table 3: Breakdown of usage of various generalised apps and social media channels for business, news, education and health

Generalised app channels	Business 84 (52.5%)		News 114 (71.3%)		Education 125 (78.1%)		Health 78 (48.8%)	
	N	Percent	N	Percent	N	Percent	N	Percent
Facebook	24	15.0%	68	42.5%	49	30.6%	27	16.9%
WhatsApp	35	21.9%	70	43.8%	71	44.4%	27	16.9%
Google Search	29	18.1%	52	32.5%	75	46.9%	36	22.5%
Zoom	20	12.5%	17	10.6%	46	28.8%	14	8.8%
Skype	13	8.1%	12	7.5%	34	21.3%	12	7.5%
Twitter	6	3.8%	13	8.1%	22	13.8%	11	6.9%
Telegram	23	14.4%	29	18.1%	44	27.5%	16	10.0%
Instagram	32	20.0%	12	7.5%	25	15.6%	13	8.1%
Youtube	14	8.8%	33	20.6%	73	45.6%	24	15.0%

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Table 4: Comparison of usage of various software resources (website and mobile apps) before and during coronavirus outbreak

Variables	Mean	Mean difference	p-value
App_business _use_before	3.24 ± 0.173^{abc}	0.03	0.785
App_business_use_during	3.27 ± 0.182^{fgh}		
TV_business_use_before	3.27 ± 0.162^{rst}	0.40	0.018
TV_business_use_during	3.67 ± 0.184^{xyz}		
App_news_use_before	3.67 ± 0.171^{adk}	0.11	0.526
App_news_use_during	3.78 ± 0.190^{fijl}		
TV_news_use_before	4.78 ± 0.177^{kruv}	0.26	0.038
TV_news_use_during	5.04 ± 0.171^{lx12}		
App_Education_use_before	3.72 ± 0.186^{bem}	0.18	0.223
App_Education_use_during	3.90 ± 0.198^{gio}		
TV_Education_use_before	4.53 ± 0.172^{msuw}	0.30	0.032
TV_Education_use_during	4.83 ± 0.172^{oy13}		
App_Health_use_before	2.61 ± 0.158^{cdeq}	0.13	0.346
App_ Health_use_during	2.74 ± 0.168^{dhjp}		
TV_ Health_use_before	4.06 ± 0.168^{qtvw}	0.47	0.001
TV_ Health_use_during	4.53 ± 0.172^{pz23}		

Data are presented as Mean ± S.E (n<=7). Values with the same superscript letter(s) and number(s) along the same column are significantly different (P≤0.05).

4.3 Discussion

Figure 4 shows that electronic news applications were the ones that majority of the respondents were aware of their existence. More than half of the respondents (53.1%) were aware of electronic news. 41.9% were aware of electronic business applications, 38.8% of the respondents were aware of software (website and mobile) application for electronic education while only 16.9% were aware of electronic health software applications. This supported the findings of Casero-Ripollés [20] that reported that news consumption increases enormously during the coronavirus outbreak. The study went on to report that in the case of Covid-19, 92% of adults in the United States frequently accessed the news about the pandemic, registering an increase of 32 percentage points over the period before the health emergency.

Table 3 shows that generalised apps and social media channels were used mostly for electronic education. A total of one hundred and twenty-five (125 representing 78.1%) respondents use one or more social media channel for electronic education, electronic news followed with 114 (representing 71.3%) respondents, generalised and social media apps were patronised for business dealings by 84 (52.5%) respondents while 78 (representing 48.8%) make use of the generalised software and social media channels for electronic health. This supports findings of some researchers that reported the use of social media apps during the lockdown as both Instagram is used for live streaming [16] and WhatsApp [15] and [22] as online virtual teaching resources for teaching medical students. Furthermore, Google search engine and WhatsApp were the favourite social media and generalised applications adopted to support electronic education while twitter and Instagram were the only social media applications whose adoption for electronic education tend to be lowest.

The rating scale presented in Table 4 was from 1 to 7, as such it was seen that radio and television adoption for all applications (e-business, e-news, e-education and e-health) were generally appreciable (higher than average expected score of 3.5) while that of software applications were generally lower or around the average expected score.

The result presented in Table 4 for testing hypothesis 1 shows that during coronavirus

outbreak, even though there was higher usage of software resources for electronic business ($\Delta\mu$ =0.03), news ($\Delta\mu$ =0.11), education ($\Delta\mu$ =0.18) and health ($\Delta\mu$ =0.13), the higher usage was not significantly different from usage rate before coronavirus outbreak ($\Delta\mu > 0$, p>0). However, the usage of radio/television for business ($\Delta\mu$ =0.40), news ($\Delta\mu$ =0.26), education ($\Delta\mu$ =0.30) and health ($\Delta\mu$=0.47) during coronavirus outbreak was significantly increased ($\Delta\mu > 0$, p<0.05), this supports the findings of Zaufishan [19] and [22] that Covid-19 has given relevance to television.

The result of testing hypothesis 2 as presented in Table 4 shows that before coronavirus outbreak, adoption of radio/TV for all applications (business, news, education, health) was higher than adoption of software resources ($\Delta\mu > 0$), meanwhile, the higher difference in patronage recorded for adoption of radio/TV were significant for news, education and health (p<0.05) but not significant for business (p>0.05). Conversely for hypothesis 3, during coronavirus outbreak, the same situation was also experienced. As such, the findings presented reject H_02 and H_03 for e-news, e-education, and e-health *before* and *during* coronavirus outbreak but accept H_02 and H_03 for e-business. This supports the findings of Koblin [23], EdTech [24] and Henny [25] that found that coronavirus outbreak has shown developing countries how much radio and television broadcast can be effectively used for education continuity.

As pertaining to hypothesis 4 as presented in Table 4, before coronavirus outbreak, software resources for e-education was mostly used, followed by e-news, e-business was next while e-health software resources had the least patronage (μ[e-education]>μ[e-news]>μ[e-business]>μ[e-health]). However, the difference in usage of e-education and e-news (p>0.5) application was not significant, while differences between e-news and e-business (p<0.5) and e-business and e-health (p<0.5) were significant. Hence it was concluded that e-education and e-news had similar usage levels with e-business and e-health trailing behind them before the coronavirus outbreak. Similar result (μ[e-education]>μ[e-news]>μ[e-business]>μ[e-health]) was discovered in the result for testing hypothesis 5 except that the differences in education and news was also significant (p<0.5).

The result of testing hypothesis 6 and 7 also presented in Table 4 shows that before coronavirus outbreak, radio/television broadcast was for e-news was mostly used, followed by e-education, e-business was next while e-health software resources had the least patronage, more so, the difference in usage of all are significant (μ[e-news]>μ[e-education]>μ[e-health]>μ[e-business], p<0.5). Similar result (μ[e-news]>μ[e-education]>μ[e-health]>μ[e-business], p<0.5) was discovered in the result for testing hypothesis 7.

5. CONCLUSION

This study analysed the impacts of coronavirus outbreak on utilization of ICT resources for business, news, education and health in Nigeria. The following results were obtained:

i) Electronic news software resources were the most popular in the study area, they were trailed by electronic business, followed by electronic education, while electronic health software resources were the least popular in the study area

ii) Generalised apps and social media application were adopted for electronic education, electronic news, business and health in decreasing order of adoption rates.

iii) Both software resources and television broadcast were shown to possess increased adoption for e-education, e-news, e-health and e-business during coronavirus outbreak, however higher increase in adoption rates of software resources were not significant while that of radio/television broadcasts were significantly higher during coronavirus outbreak

iv) Radio/Television broadcasts were shown to be more adopted for business, news, education and health as compared with software resources before and during coronavirus outbreak

v) Before and during coronavirus outbreak, usage of software resources for the applications listed were in the order μ[e-education]>μ[e-news]>μ[e-business]>μ[e-health].

vi) For radio/television broadcasts, their usage for the applications listed before and during coronavirus outbreak were in the order μ[e-news]>μ[e-education]>μ[e-health]>μ[e-business].

It was expected that there would be significant increase in utilization of the itemised software resources during the coronavirus outbreak due to lockdown imposed in the country, however, the increase in utilization witnessed was found to be insignificant. Moreover, a significant increase in

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radio/television broadcast utilization during the outbreak in comparison with software resource utilization is a pointer to an insignificant utilization in software resources witnessed in developing countries. It is therefore recommended that relevant agencies take necessary steps including implementing policies that would enforce proper utilization of software resources for national development.

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