Post-print version of the paper by Bokolo Anthony Jnr in Journal of Science and Technology Policy Management, (2023) 1-33 https://doi.org/10.1108/JSTPM-05-2022-0079

Examining the Adoption of Telehealth During Public Health Emergencies Based on Technology Organization Environment Framework

Bokolo Anthony Jnr.[1, 2]
anthony.bokolo@ife.no[1]; anthony.j.bokolo@hiof.no[2]

[1]Department of Applied Data Science, Institute for Energy Technology, Os Alle 5, Halden 1777, Norway
[2]Department of Computer Science and Communication, Østfold University College, Halden, Norway

Abstract

Purpose

Disasters and pandemics pose challenges to health care provision. Accordingly, the need for adopting innovative approach is required in providing care to patient. Therefore, the purpose of this study is to present telehealth as an innovative approach for providing care to patients and reducing spread of the infection and advocates for the adoption of telehealth for digitalized treatment of patients.

Design/methodology/approach

An integrative review methodology of existing evidence was conducted to provide implications for integration of telehealth for digitalized treatment of patients. This paper draws on Technology Organization Environment (TOE) framework to develop a model and propositions to investigate the factors that influence telehealth adoption from the perspective of the supply side and the demand side of medical services.

Findings

Findings from this study discuss applications adopted for telehealth and recommendations on how telehealth can be adopted for medical-care delivery. More importantly, the findings and propositions of this study can act as a roadmap to potential research opportunities within and beyond the pandemic. Additionally, findings from this study help provide guidelines on how health practitioners can rapidly integrate telehealth into practice for public health emergencies.

Originality/value

This study identifies the social, technological, and organizational factors that influence telehealth adoption, and opportunities of adopting telehealth during the public health emergencies. This study concludes that specific policy changes to improve integration of interoperable solutions, data security, better physical infrastructures, broadband access, better transition and workflow balance, availability of funding and remuneration, regulations and reimbursement, awareness and training will improve telehealth adoption during public health emergencies.

Keywords: Telehealth adoption; Telemedicine adoption; e-health technologies; Technology organization environment framework; Public health emergencies; Pandemic.

1. Introduction

Public health emergencies such as the coronavirus disease 2019 (COVID-19) infection has challenged medical practices across the world to dramatically change healthcare practices to contain spread of the virus (Watson et al., 2020). Many physicians have appropriately rescheduled non-emergent procedures and changed in-person appointments to phone calls or remote consultation (Gadzinski et al., 2020; Saleem et al., 2020). In this regard, Information

Technology (IT) would be impactful and beneficial to contribute during and after public health emergencies such as the COVID-19 outbreak (Anthony et al., 2020; Garfan et al., 2021). Thus, there is a growing interest in research related to how IT can be rapidly employed (Anthony Jnr, 2020c; Mardani et al., 2020). IT based tools such as telehealth and digital solutions can effectively support medical centers during public health emergencies by enabling the immediate widespread dissemination of information, tracking rate of transmission in real time, creating digital meetings (Golinelli et al., 2020; Nagra et al., 2020; Agarwal et al., 2022), monitoring patient's health progress, and most importantly offering follow-up visits for patients (Reeves et al., 2020). As such the Centers for Disease Control and Prevention (CDC) in United States (US) has advised medical practitioners to employ alternatives to physical face-to-face visits, recommending IT based tools such as telehealth as a potential solution (Zimmerman et al., 2021).

As a response hospitals and clinics are shifting outpatient care to IT solutions (Grenda, 2020; Rajasekaran, 2020), and are now adopting IT driven tools such as telehealth (Bell, 2020; Anthony Jnr et al., 2021). Telehealth refers to medical care services delivered to patients by healthcare providers using digital technologies from a geographical distance (Abdel-Basset et al., 2020; Ramírez-Correa et al., 2020). Due to public health emergencies such as in the case of COVID-19 pandemic health providers are now widely adopting telehealth to provide care to patients with mild conditions while reducing their exposure to other patients with more severe health conditions (Sasangohar et al., 2020; Lew et al., 2021). Therefore, hospitals and clinics have transitioned to telehealth to decrease emergency room visits via remote triaging (Reeves et al., 2020). Telehealth has in the past proved useful during epidemiological crises, including through adoption of live video therapy with patients, virtual monitoring of patient, and mobile applications for observing symptoms of patients (Grenda, 2020; Reeves et al., 2020). Telehealth was previously employed to extend healthcare access to underserved and rural, populations but has recently been widely adopted as a safer means of providing health care during the pandemic (Khan, 2020; Smith et al., 2020b).

Telehealth has rapidly evolved in the last decade, especially due to development in wireless broadband and smart devices (Rana et al., 2019; Watson et al., 2020; Maleka and Matli, 2022). In addition, telehealth not only decrease the potential risk of infectious disease transmission (Basil et al., 2020; Patel et al., 2020), but also reduce travel costs for patients and help in decision support of clinical procedures, analytics, and reporting for physicians (Lee et al., 2020; Comer, 2021). Thus, telehealth offers a sustainable health care for the environment as well as the economic well-being of patients, many of whom are income earners (Smith et al., 2020b). However, for telehealth to be adopted during public health emergencies, there is need to ensure that telehealth is appropriately adopted into the current medical service to ensure that the value of telehealth is fully achieved (Kojima and Klausner, 2020; Smith et al., 2020a). Additionally, there are fewer studies that examined the factors that influence the adoption on telehealth during emergency situations. Therefore, this study aims to review and synthesize prior studies to investigate the adoption of telehealth hospital-at-home treatment during public health emergencies based on the following research questions:

RQ1. Which current theories have been employed to explore use of telehealth in public health emergencies related studies?

RQ2. What factors influence adoption of telehealth for treatment during public health emergencies?

Therefore, this study is motivated to identify the factors that influence the adoption of telehealth and further proposes a conceptual model derived from Technology Organization Environment (TOE) (Tornatzky et al., 1990), that can be employed as a guideline to health care providers to determine the technology readiness of their institutions to adopt telehealth. This study has important implications for increasing the adoption of telehealth among health care providers for hospital-at-home treatment during public health emergencies such as the COVID-19 pandemic and beyond. The reminder of the article is structured as section 2 is literature review and section 3 is research methodology. Section 4 is findings and section 5 is discussion and implications. Section 6 is limitations and future works and lastly section 7 is conclusion.

2. Literature Review

This section provides a review on the state-of-the-art of telehealth adoption and discusses existing theories employed to explore adoption of telehealth for public health emergencies.

2.1.Theoretical Background

Telehealth was first utilized in the late 1950s for long-distance health services. However, its extensive adoption was not well accepted until the 1990s when there was a recognized need to provide health service to rural communities. Telehealth refers to the utilization of telecommunications technology to provide health information and services (Lin et al., 2020). Telehealth leverages IT to enable health providers to remotely provide healthcare services and consultations to patients through audio and video conferencing. During the COVID-19 pandemic a few studies has examined how IT can be adopted to deliver health care. Among these studies Anthony Jnr (2020a) examined the adoption of digital care solutions and telehealth during COVID-19 pandemic based on qualitative literature review approach. The author suggested that human, infrastructure, and institutional are key determinants that influence the adoption of telehealth during the pandemic. A recent study by Békés and Aafjes-van Doorn (2020) investigated the psychotherapists' attitudes toward online therapy amidst the COVID-19 pandemic. Data was collected from 145 psychotherapists from Europe and North America. Findings from the study suggest that psychotherapists' attitudes toward digital psychotherapy are impacted by their previous experiences.

Bokolo (2020) examined the adoption of virtual software and telemedicine for treatment of outpatients during and after COVID-19 pandemic. The author employed literature and document review and suggested that organizational, social, and technological factors impact adoption of telemedicine. Jnr (2020) investigated the use of virtual care and telemedicine for remote treatment in response to COVID-19 pandemic. Grounded on literature review the author provided practical guide based on the utilization of virtual care and

telemedicine during the COVID-19 pandemic. Mardani et al. (2020) employed an extended method under hesitant fuzzy sets to develop a model for assessing the key issues of digital health adoption during the COVID-19 crises. An illustrative case study was employed to test the efficacy and practicability of the developed model. Ramírez-Correa et al. (2020) investigated telemedicine adoption during the COVID-19 pandemic based on the theory of planned behavior or the technology acceptance model. Data was collected using an online survey of patients. The findings from their study indicated that that attitude has the most significant direct impact on behavioral intention to utilize telemedicine systems.

Rout (2020) explored the factors that influences users' intention to adopt a contact tracing mobile health application amidst COVID-19 pandemic. The extended Technology Acceptance Model (TAM 2) was employed to develop a conceptual model to explore the factors that impacts the usage intention of m-health app. Tanhan et al. (2020) proposed a conceptual framework grounded on literature review of online contextual mental health services to improve the wellbeing and reduce psychopathology during the COVID-19 in Turkey. Touson (2020) employed the Harrison's system theory model to facilitate rapid expansion of telehealth during the COVID-19 pandemic. The researchers aimed to create a method for rapid usage of existing telehealth systems in an academic medical center. Data was collected using informal interviews with executive leadership to align institutional goals. Similarly, Walrave et al. (2020) explored the adoption intention of a contact-tracing technology grounded on an extended unified theory of acceptance and use of technology model (UTAUT) during the COVID-19 pandemic. Data was collected using survey administered in Belgium from 1,500 participants. Zhong et al. (2020) investigated the correlation of social media usage and mental health of residents' depression in Wuhan China during the COVID-19 outbreak. Based on the health belief framework and the crisis and emergency risk communication framework a conceptual model is proposed. The model factors comprise of informational support, emotional support, peer support, social media usage, health behaviour change, and mental health toll. Data was collected from 558 participants via an online survey.

The reviewed 10 studies suggest that IT have been adopted to aid the traditional medical care system. Findings from the literature (Kamal et al., 2020) suggest that telehealth is increasingly becoming the most prominent IT service adopted to provide medical care to patients. Hence, telehealth services are improving the efficiency of medical practitioners decreasing medical costs and facilitating access to health care services (Kamal et al., 2020). Presently, due to the pandemic, outpatient providers had to rapidly adjust to adoption of telehealth to provide continuity of medical care, while lessening burden to heath practitioners. Thus, telehealth is being employed in most medical specialty as it shows promising results in treating outpatients. However, no research exists regarding the factors that influences adoption of telehealth during public health emergencies, particularly in treatment of outpatients (Brown et al., 2020). Likewise, little is known about the theories that have been employed to explore the adoption of telehealth and the factors that impact adoption of telehealth amidst the pandemic. Therefore, this current study employs the technology organization environment framework to develop a model and propositions to investigate the factors that influence

telehealth adoption during the COVID-19 pandemic. This evidence will provide information to support health provider usage and sustained use of telehealth during and after the pandemic.

2.2.Theories Employed to Explore Adoption of Telehealth and COVID-19 Research

Currently, prior studies have proposed telehealth adoption models rooted in behavioral theories or technology acceptance theories to investigate telehealth adoption during public health emergencies. This section reviews theories employed to explore use of telehealth and public health emergencies related studies. Each of which are discussed below;

2.2.1. Theory of Reasoned Action (TRA)

The TRA is one of the most well-known theories that described the relationship among attitudes, intentions, and user perceptions. TRA aimed to forecast and perceive observable behaviors associated to individual's control based on the attitude, social norms, and behavioral intention. Thus, TRA suggested that attitude toward subjective norms and behavior directly influences individual's behavioral intention Sadoughi et al., 2019). Attitude relates to how people perceive behavior. If the behavior (*intention to adopt telehealth*) is seen as valuable to themselves, they are more likely to participate in the behavior (*adopt telehealth*). Social norms relate to the way that people see others' views concerning their behavior. If individuals see the behavior to be useful by those close to them, they may be influenced to partake in the behavior. Lastly, behavioral intention relates to how likely people are to be involved in the observed actions (Sadoughi et al., 2019).

2.2.2. The Theory of Planned Behavior (TPB)

TPB was developed as a framework for systematically investigating the factors that influences choices of behavior. TPB assumes that individuals make rational decisions based on the availability of information (Sadoughi et al., 2019). Therefore, the TPB framework was proposed as an extension of the TRA framework based on the prevailing limitations in TRA in exploring behaviors that individuals have partial cognitive controls of as regards to adoption of new technologies (Sadoughi et al., 2019). The TPB included a new variable (perceived behavioral control) to TRA. Perceived behavioral control relates to individual's perceived ability to carry out the observed behavior. It assesses if the individual believes that implementing the behavior is within their abilities. If they think that the action is within their capability, then they are likely to possess a higher intention to adopt the behavior (Ramírez-Correa et al., 2020).

2.2.3. Diffusion of Innovation (DoI)

DoI theory was proposed by Rogers to provide in depth description regarding how new inventions are adopted, and how usage decisions are determined by diffusion of the ICT as well as the characteristics of the institution adopting the technology and their environment (Sadoughi et al., 2019). Over the years DoI theory has been one of the most employed theories utilized by researchers to examine ICT adoption and innovation in different disciplines. According to DoI theory ICT innovation adoption in organizations is influenced by innovation

characteristics and organizational features (Sadoughi et al., 2019). DoI theory main variables comprises of external characteristics of the institution, institutional innovativeness, internal characteristics of institutional structure, and individual characteristics.

2.2.4. Technology Organization Environment (TOE)

The TOE framework was proposed by Tornatzky and Fleischer (Tornatzky et al., 1990), and has been used in ICT based research to effectively predict organizational adoption of innovations (Ahmadi et al., 2019; Sadoughi et al., 2019; Anthony Jr, 2020). The TOE framework is explained from the lens of three variables which comprises of environmental, technological, and organizational context. These variables help policy makers and researchers to better understand ICT adoption within organizational context (Ahmadi et al., 2019). The TOE framework mainly aims to explore adoption process of innovation in the organizational level (Ahmad et al., 2020; Pendergrass and Chandrasekaran, 2019).

2.2.5. Institutional Theory

The institutional theory was proposed by sociologist between 1970s and 1980s. Theoreticians proposed that for organizations to achieve legitimacy, they are confronted with three environmental forces or pressures namely normative, coercive, and mimetic (Sadoughi et al., 2019). Furthermore, theoreticians argued that these pressures influence the decision-making of organizations in adopting technologies. However, the institutional theory is mostly suitable to be adopted in an institutionalized environment and can be well employed in several other types of environments (Sadoughi et al., 2019).

2.2.6. Technology Acceptance Model (TAM)

The TAM is an intention-based model derived from TRA and developed by Davis (Davis, 1989), originated from the fields of psychology and sociology and is one of most widely adopted model in various research areas. The TAM aims to predict the adoption of novel technology among end-users and identify design problems of ICT before its adoption becomes dominant among people (Jacob et al., 2019). TAM constructs comprise of attitude, perceived use, and perceived ease-of-use which are utilized to measure the individual's behavioral intention to utilize technology (Kamal et al., 2020). Accordingly, TAM provide an explanation of the determinants of ICT acceptance that generally explains end-user behavior (Ramírez-Correa et al., 2020). Thus, TAM was developed to explain why end-users of new IT may reject or accept the adoption of technology (Sadoughi et al., 2019).

2.2.7. Unified Theory of Acceptance and Use of Technology (UTAUT)

The UTAUT was conceptualized by combining eight prior models or theories, namely TRA, TAM, the, the TPB, the motivational model, social cognitive theory, the model of PC utilization, a combined TAM/TBP, and innovation diffusion theory (Sadoughi et al., 2019). The UTAUT model has been employed as a technology-acceptance model for exploring the adoption and acceptance of new technologies (Walrave et al., 2020). It comprises of four constructs (performance expectancy, effort expectancy, facilitating conditions, and social influence) that are anticipated to determine user's intention to adopt a specific technology.

Performance expectancy is the extent of the benefits that users expect from using a technology (Walrave et al., 2020). Effort expectancy measures the degree of ease needed for using the technology. Facilitating conditions refers to available resources and support provided by the technology. Social influence refers to users' beliefs in relation to what others think regarding using the technology.

2.2.8. Absorptive Capacity Theory

The absorptive capacity theory believes that an institution's broad basis of knowledge is developed through the integration of different individual capabilities. Thus, new talent from human resources can foster the exchange of new ideas, transition, and strategic changes into an area for better competitive advantage. Hence the absorptive capacity theory is aligned to the ability of employing available knowledge and innovation during the pre-adoption and adoption phases of IT use within the organization (Ahmadi et al., 2019). According to the absorptive capacity theory organizations can benefit from prior skills, experience, and knowledge to achieve a structured environment where innovation and knowledge ultimate influences adoption of IT. The absorptive capacity theory examines the impact of knowledge flow and its significant role in improving technology diffusion particularly in organizational settings (Ahmadi et al., 2019).

2.2.9. Extended TAM/TAM 2

The extended TAM or TAM 2 was developed by Venkatesh and Davis (2000) to explicate the intention of users to adopt technological inventions. According to Rout (2020) TAM 2 is considered to be the most appropriate and robust theory to examine behavioral intention and actual behavior as regards to use of IT. In TAM 2 the independent constructs strongly determine the variance of usage intention by assessing the actual behavior and behavioral intention of users towards a technology by not considering the mediating variable "Attitude" as explored in the original TAM theory.

2.2.10. Extended Unified Theory of Acceptance and Usage of Technology/UTAUT2

The extended version of UTAUT or UTAUT2, is a tailor-made framework to examine the acceptance and adoption of technology. UTAUT2 was adapted from the original UTAUT to achieve a more user-oriented model. Thus, three new variables were introduced (hedonic motivation, habit, and price value), with moderators of age, experience, and gender (Salgado et al., 2020). The price value and hedonic motivation explains behavior intention whereas "habit" explains both use behavior and behavior intention. UTAUT2 provides a remarkable improvement in the variance explained in technology adoption as compared to the original UTAUT model in terms of behavioral intention (Sadoughi et al., 2019).

3. Methodology

An integrative review methodology was employed to present evidence similar to prior COVID-19 studies (dos Santos Puga et al., 2020; Golinelli et al., 2020; Grimes et al., 2020; Neubeck et al., 2020). An integrative literature review aims to expediently assess prior studies that are

appropriate to the specific research topic in order to present a fair assessment of an investigated topic using a rigorous and trustworthy approach (Anthony Jnr and Abbas Petersen, 2020). Therefore, the research flow for this study comprises of five phases which includes the description of inclusion and exclusion criteria, description of search strategies and data sources, quality assessment criteria, data coding and analysis, and lastly the findings and discussion.

3.1. Inclusion and Exclusion Criteria

The inclusion and exclusion criteria are the sampling methods employed to select articles to provide answers to the research questions presented in the introduction section. The inclusion and exclusion criteria are presented in Table 1. Thus, an article is included if it meets up to the criteria in the inclusion column and is excluded if it satisfies any of the exclusion criteria.

Table 1 Inclusion and exclusion criteria (source: designed by the author)

Inclusion	Exclusion
• Should involve background of telehealth/telemedicine adoption and factors that influence telehealth/telemedicine adoption directly or indirectly related to COVID-19.	• Studies that do not present background of telehealth/telemedicine adoption and factors that influence telehealth/telemedicine adoption.
• Should be based on an approach, model, theory, framework for exploring telehealth/telemedicine adoption.	• Studies that present models, approach, frameworks, or theories used in contexts that is partly connected to telehealth/telemedicine adoption.
• Should be written in English and published between 2019 to 2022 as this is the duration of the COVID-19 pandemic (except for studies that provides theoretical background for this study).	• Studies not written in English.
• Empirical, research, and theoretical studies on IT theories/frameworks that have been employed to explore adoption of telehealth/telemedicine and COVID-19 pandemic.	• Empirical, research, and theoretical COVID-19 pandemic studies that do not involve any IT theories/frameworks related to adoption of telehealth/telemedicine.
• Studies linked to technological, organizational, and environmental factors of telehealth.	• Studies not linked to technological, organizational, and environmental factors of telehealth.
• Studies that employ case studies, literature review, survey questionnaires, clinical studies, experiments, modelling, simulations, or other scientific methods.	• Studies that do not report on any scientific methods.

3.2. Search Strategies and Data Sources

The sources employed in this study were retrieved through a comprehensive search of prior telehealth/telemedicine adoption research through online databases which comprise of PubMed, Google Scholar, Wiley, Taylor & Francis, IGI Global, ScienceDirect, Sage, Emerald, IEEE, ACM, Inderscience, and Springer (Bokolo, 2020; Jnr, 2020). The search was undertaken within March 2020 and later in February 2022 to finalize the search. The search terms include the keywords ((“telehealth adoption” OR “telemedicine adoption” OR “digital care” OR “public health emergencies” OR “digitalized health care” OR “e-health”) AND (“hospital-at-home treatment” OR “COVID-19” OR “corona virus 2019” OR “pandemic” OR “model” OR “framework” OR “theories”) AND (“factors” OR “variables”) AND (“review” OR “case

study") AND ("survey" OR "experiment")). These keywords were employed to retrieve appropriate articles to provide empirical evidence regarding the research questions being investigated in this study.

Figure 1 shows the Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) flowchart which was used for screening of articles as previously utilized by Anthony Jnr (2020a); Jnr et al. (2020). The final search resulted to 127 articles using the keywords above. 14 articles were established as duplicates and were removed. Thus, resulted to 133 articles. The articles were checked against the inclusion and exclusion criteria and 46 sources were removed since they were not related to telehealth/telemedicine adoption and factors that influence telehealth/telemedicine adoption during the COVID-19 resulting to 67 articles. The remaining articles were checked for quality assessment.

3.3.Quality Assessment

One of the important benchmarks that is required to be checked with the inclusion and exclusion criteria is the quality assessment check as recommended by Anthony Jnr (2020b). Therefore, check was employed for all selected papers to confirm if the papers are indexed in Scopus or/and Web of Science database as previously stated. This criterion helped to evaluate the quality of the selected studies. Respectively, more than half of the articles included are indexed in Scopus or/and Web of Science database. Finally, 9 additional studies were included via cross referencing and another 6 studies indexed in Scopus and Web of Science database published in 2020 and 2022 were included later in the review stage of this manuscript resulting to 82 sources as seen in Figure 1. All included sources are presented in the reference section of this paper. A check was carried out to verify if the articles were indexed in Scopus or/and Web of Science databases. The findings as discussed in the quality assessment section suggest that the selected studies meet the inclusion and quality assessment criteria as most studies were indexed in Scopus or/and Web of Science databases.

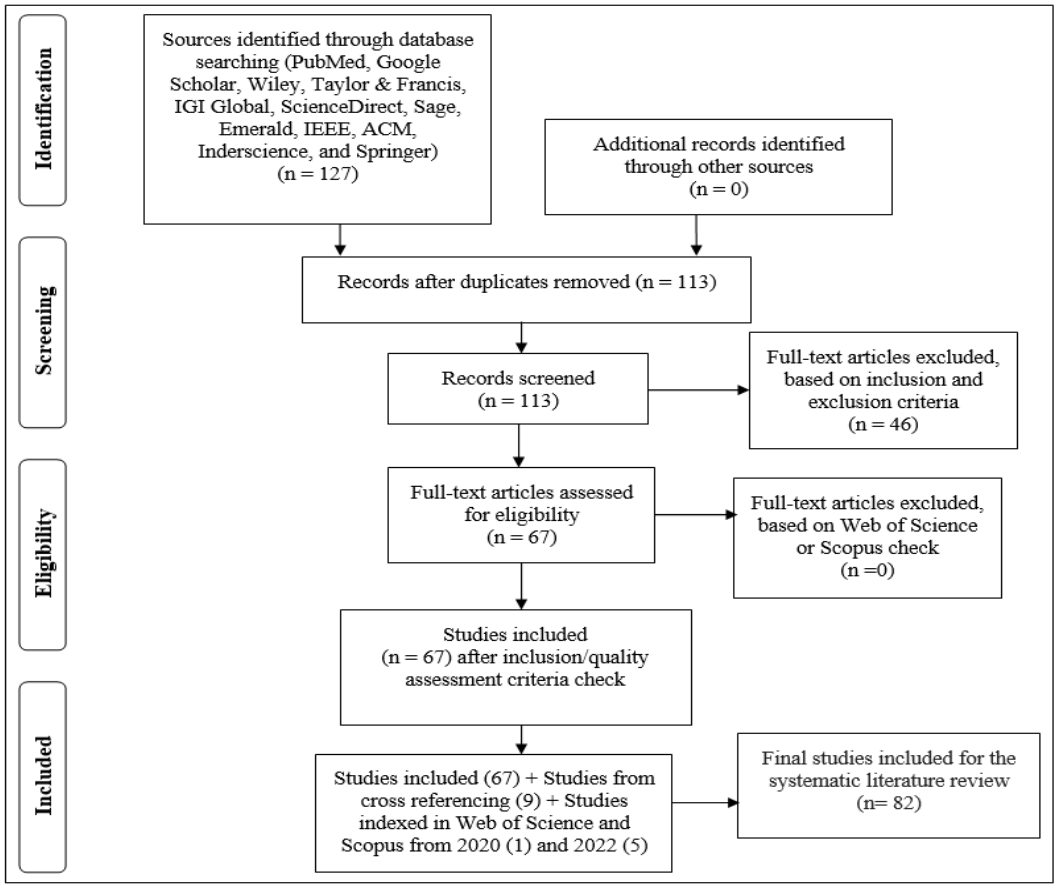

Figure 1 PRISMA flowchart for the selected articles (source: designed by the author)

3.4.Data Coding and Analysis

The final 82 studies are utilized to provide evidence in response to the research questions being explored. This helps to provide information on the adoption of telehealth hospital-at-home treatment for public health emergencies. Thus, secondary data is extracted, synthesized, coded, and examined in detail and evidence from these sources as related to the research questions are presented in the subsequent sections.

4. Findings

Based on the selected 82 sources related to adoption of telehealth for public health emergencies such as COVID-19 pandemic. This section reports the findings of this integrative review. Thus, providing findings as regards to the theoretical underpinning concept of telehealth adoption as related to the COVID-19 pandemic. In relation to the selected 82 sources, findings shown in Figure 2 reveal that most studies are published in 2020. Out of the 82 studies (N = 61, 74%), where published in 2020, (N = 8, 10%) was published in 2021, (N = 8, 10%) was published before and in 2019, and (N = 5, 6%) was published in 2022. Overall, this finding indicates that there are fewer studies in 2022 that studied telehealth research related to the pandemic. But such studies are still needed to investigate the intention to use and adoption of telehealth even during and after the pandemic as suggested in the literature (Bokolo, 2020).

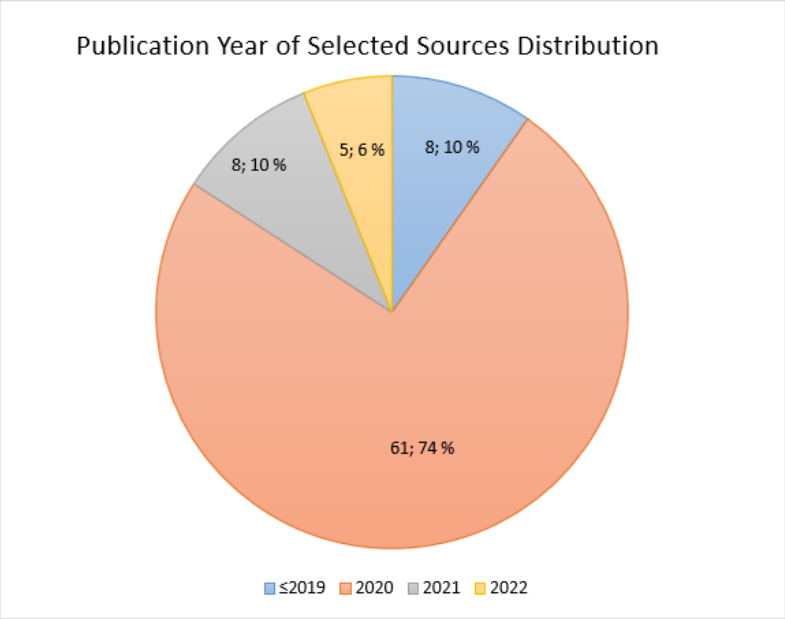

Figure 2 Distribution of selected sources in terms of years (source: designed by the author)

Considering the selected sources research themes distribution findings from Figure 3 indicate that (N = 8) studies mainly explored general telehealth to manage COVID-19 pandemic. Additionally, findings from Figure 6 reveal that (N = 4) studies mainly investigated digital transformation, telemedicine during the COVID-19 pandemic and governance, privacy, and interoperability respectively. Besides, the findings suggest that (N = 3) studies mainly examined social media adoption by hospitals and user acceptance of information technology. Also, the findings show that (N = 2) explored healthcare information systems, disruptive technologies for COVID-19, COVID-19 pandemic on information management, using telemedicine for mental health, contact tracing mobile health application, acceptance of telemedicine services, telehealth for home dialysis, rebooting mental health care delivery, and smart healthcare monitoring devices. Lastly, the remaining studies examined other areas related to telemedicine/telehealth adoption as reported in Figure 6. This finding suggests that there are fewer studies that examined use of telehealth for either public health emergencies. Thus, there is need for research in this research domain.

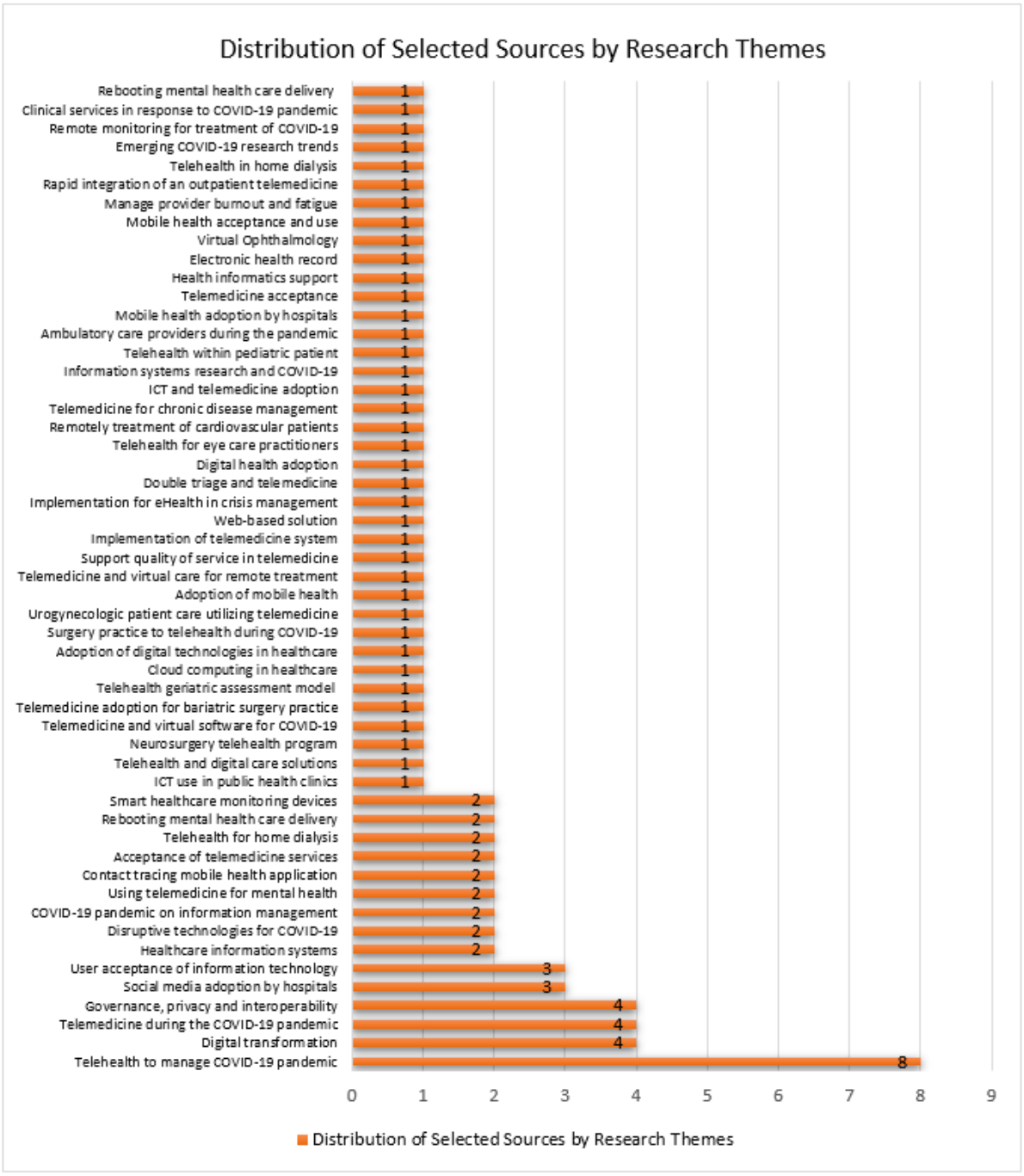

Figure 3 Distribution of selected sources by research themes (source: designed by the author)

4.1.Adoption of Telehealth for Treatment During COVID-19 Pandemic

Public health emergencies and pandemics often lead to a surge in demand for medical care, which overwhelms medical centers capabilities (Hong et al., 2020; Pan and Zhang, 2020). According to the CDC, COVID-19 is thought to spread mostly through person-to-person contact from respiratory droplets (Saleem et al., 2020). Thus, to decrease infections in highly vulnerable populations, such as older adults or patients with other health issues such as cancer, the CDC recommended that individuals should stay at home and self-quarantine, regularly wash their hands, and avoid all non-essential mobility except if needed (Nouri et al., 2020; Saleem et al., 2020; Srivatana et al., 2020). Thus, medical-care systems have been encouraged

to lessen in-person hospital visits as appointments in clinics and hospitals may increase potential exposure and infection (DiGiovanni et al., 2020; Jnr et al., 2020). In an effort to abide by these aforementioned guidelines while continuing to provide the essential medical-care to outpatients in need at home, telehealth treatment can be adopted to deliver treatment in a hospital-at-home method (Keshvardoost et al., 2020; Bokolo, 2021). Telehealth is proposed to be employed as an effective tool to help manage the COVID-19 pandemic. Telehealth as previously stated is defined as the use of telecommunications technologies to deliver medical services and information (Hong et al., 2020; Nyame-Asiamah, 2020).

Additionally, telehealth can be described as a technology that supports patients and physicians to share information digitally about the health of outpatients can be adopted as a potential solution to support provision of healthcare due to shortage of medical resources in time of pandemic and disaster (Khan, 2020; Krausz et al., 2020). Adoption of telehealth care solutions has already shown to be useful and feasible in other areas of healthcare (DiGiovanni et al., 2020; Saleem et al., 2020). Additionally, telehealth can facilitate long-distance hospital-at-home medical care digitally and its adoption has dramatically increased over the years (Jnr, 2020; Verma and Gustafsson, 2020). It improves access to health-related information, offers provision of medical-care remotely, enhances access to care delivery and increases services, improved professional health education, and reduces medical-care costs while fostering quality control of screening health programs (Hong et al., 2020; Li et al., 2020). In managing COVID-19, telehealth can be adopted to assess and triage in the following;

- Observe temperature with a household thermometer.
- Observe the general appearance in noticing if the patient appears ill or is exhibiting any symptoms.
- Calculate respiratory rate of the patient.
- Observe deep breath and respirations of patients by using accessory such as labored breathing, respiratory muscles, or interrupted speech.
- Observe the absence or presence of cough; productive or dry.
- Observe the oropharynx by assessing the oropharyngeal erythema, exudate for enlarged or absent lesions or tonsils.
- In conducting patient-directed palpation of posterior and anterior cervical chains to assess for absence or presence of prominent lymphadenopathy (Portnoy et al., 2020).

A typical adoption of telehealth during COVID-19 pandemic as seen in Figure 4 may include scheduling, history assessment, visual acuity, ancillary testing, main examination, and treatment and recommendations.

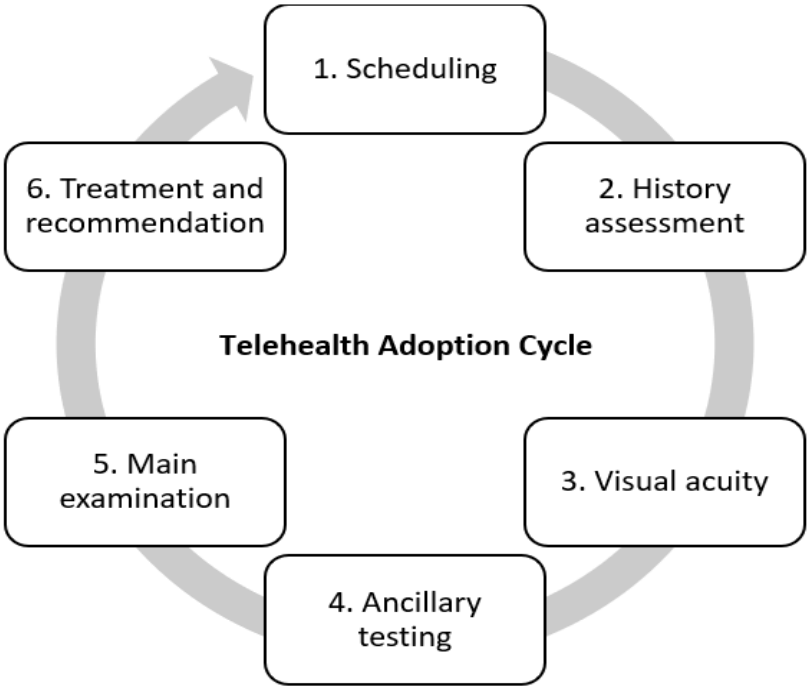

Figure 4. A typical telehealth adoption cycle during COVID-19 pandemic and beyond (source: designed by the author)

Figure 4 depicts a typical telehealth adoption cycle during COVID-19 pandemic and beyond. Each of which are discussed below;

4.1.1. Scheduling

In this phase the medical center attending staff contact patients to book appointment. Also, patients can call the medical staff directly to schedule either a call or video consultation with their physician, or the physician can decide which type of visit is suitable based on the patients' health condition. However, emergent calls are handled immediately. Thus, telehealth can be suggested to either prior or new patients. Although new patient may face a few limitations due to them being first time users of telehealth (Saleem et al., 2020).

4.1.2. History Assessment

Once the call or video consultation has been booked and stated this phase provides a medium for the attending physician to listen to the patient. This phase is important as it helps the physician to take a detailed history of the patient's health. The physician can gather, and document required information to support the assessment and treatment of the patient (Saleem et al., 2020). Some telehealth provides a dynamic customize questionnaires for the patient to fill out prior consultations (Smith et al., 2020b).

4.1.3. Visual Acuity

Before beginning assessment of the patient, the physician can guide the use of visual measurement aids provided digitally via printed chart, mobile app, and online refraction applications which can also be incorporated. The information from printed charts can be used by the physician while the patient reads the information (Saleem et al., 2020).

4.1.4. Ancillary Testing

In this phase prior medical test results can be reviewed for existing patients. Also, software such as smart phone retinal imaging may be installed and used by the physician. Results from these ancillary tests can be used for the physician for main examination (Saleem et al., 2020).

4.1.5. Main Examination

In this stage the physician may ask the patient to be situated in a well-lit area so he/she can properly examine the patient virtually. Although hand-held devices are often the mostly used mainly by patient the use of larger devices with higher-resolution screens can be used by the physician to have an improved quality of video and image for viewing and diagnosis (Saleem et al., 2020).

4.1.6. Treatment and Recommendation

Based on the examinations from the physician in regard to the health state of the patient, a care plan, recommended and referrals, are prescribed to the patient (Smith et al., 2020b). Also, the patient will be informed of upcoming follow-up tele-health consultation or if needed physical testing at the medical center is recommended to the patient (Saleem et al., 2020).

4.2.Medical Applications Adopted for Telehealth During COVID-19 Pandemic

This section aims to identify medical applications that are adopted for telehealth hospital-at-home treatment during the public health emergencies. Evidently, telehealth can help with illness diagnosis through video consultations with medical practitioners. Various applications exist that are being adopted in providing ongoing medical care to outpatients at home during the pandemic (Smith et al., 2020a). Figure 5 shows a few of telehealth applications and system adopted during the COVID-19 pandemic.

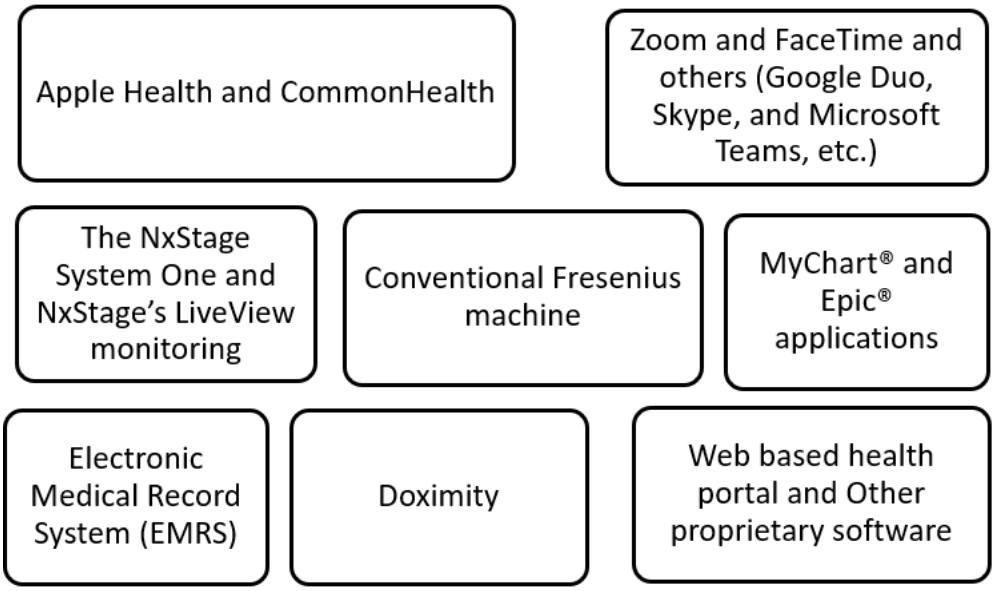

Figure 5. Medical applications adopted for telehealth during COVID-19 pandemic (source: designed by the author)

Among application currently adopted by physicians to provide care for COVID-19 patients remotely is the Apple Health application and CommonHealth for android users which provides a powerful modality to collect valuable medical and other background data to support both assessment and monitoring (Bokolo, 2020). Using Apple Health and CommonHealth could provide a more comprehensive data during telehealth consultation. Patients can also include their own customized peripherals to provide additional data into the monitoring telehealth web portal. Thus, COVID-19 bio-peripherals such as a digital thermometer and a pulse oximeter can be included for virtual examination (Watson et al., 2020).

Medical centers such as The Rogosin Institute in US are adopting tools like Zoom Video Communications, Inc. for medical-care as their official telehealth platform because it adheres to Health Insurance Portability and Accountability Act (HIPAA) compliant with 256-bit Advanced Encryption Standard (AES) encryption and meets visual and audio requirements set by CMS (Nouri et al., 2020; Saleem et al., 2020; Srivatana et al., 2020). Accordingly, findings from Srivatana et al. (2020) suggest that in their medical-center 78 patients utilized Zoom for telehealth visit while 3 other patients used FaceTime. Also, Srivatana et al. (2020) reported that no patients refuse to adopt telehealth for health consultation, however 6 patients opted for physical visit in addition to the telehealth visit. In using Zoom and FaceTime each patient received a phone call to help navigate the use of the applications. The administrative or staff physicians use a secure online scheduler to make reservation for telehealth consult. The web portal then sends an email to the patient with links and instructions to download Zoom application for their device in advance of their synchronous appointment (Srivatana et al., 2020).

As mentioned by Srivatana et al. (2020) The NxStage System One with real-time remote monitoring via NxStage's LiveView monitoring is another software platform used in the US for remote patient management and monitoring to record the daily vital signs, symptoms, and treatment data which can be accessed by the medical practitioners/team via a secure web portal for review. The system provides patients and physicians with treatment information in real-time (Saleem et al., 2020). The system can be used with conventional Fresenius machine deployed at home which can also be monitored in real-time by medical staff through a proprietary software (Srivatana et al., 2020).

Furthermore, another widely adopted application is the MyChart® and Epic® applications which are HIPAA compliance application that provides a protected patient access portal included in Epic®. Epic is one of the most preferred Electronic Medical Record System (EMRS) adopted by more than 250 medical-care organizations in the US. To date, 45 % of the US residents have their health records in an Epic based system. Thus, MyChart® and Epic® applications allows patients to get digital access and view their medical charts records, imaging, and lab results. Patients can also share their medical records with other physicians, update their health conditions, schedule medical appointments, and message physicians for synchronous consultations. Patients can freely access the MyChart® and Epic® applications with their personal Android or Apple tablets, devices, laptop, or desktop computer with no added charge. The MyChart® and Epic® applications are essential for both online-visits and video consultation (Smith et al., 2020b).

Presently, a few medical centers are storing patients' health information digitally, however patients' adoption of this virtual service required access to either an email account or to the medical centers online patient web portal (MyChart) (DiGiovanni et al., 2020; Smith et al., 2020b; Sullivan et al., 2020). Moreover, this method excluded patients who did not have computer or internet access. As stated by DiGiovanni et al. (2020) the medical centers use a phone-based assessment. The attending nurse navigator verbally communicates with the patients one day prior to their scheduled appointments (pre-visit evaluation) (DiGiovanni et al., 2020). The telephone-based consultation was employed for elderly patients to lessen the complexity and technology required for adopting telehealth services (DiGiovanni et al., 2020; Saleem et al., 2020).

Additionally, Doximity, is another online networking application used by for medical practitioners as it enables substitution of contact via telephone number enabling physician's general hospital and telephone information to appear on the patient's device (Smith et al., 2020b). It is free to use and is available for Doximity users and supports communication between Android and Apple devices. By using this application text messages are sent to another smartphone device containing a video link that supports easy video connectivity. As mentioned by Smith et al. (2020b) Doximity provides an easy way for patients to connect with health portals and is particularly useful if patients are registered in application such as MyChart enabling patients to receive printed after-consultation instructions (Smith et al., 2020b).

4.3.Developed Model and Propositions

Findings from the literature (see section 2.2), presents different theories that have employed to investigate the use of telehealth and COVID-19 pandemic related studies. As discussed, the UTAUT was employed to examine user attitudes toward adoption online psychotherapy during the COVID-19 pandemic (Békés and Aafjes-van Doorn, 2020), thereby offering a model of attitudes and subsequent use of IT in healthcare. Likewise, the UTAUT model was used by Walrave et al. (2020) to explore the factors that influence citizens' willingness to utilize a contact tracing app amidst the COVID-19 pandemic. Additionally, the extended TAM was utilized by Rout (2020) to explain the intention to use of a m-health application. Evidently, researchers have employed several models to investigate the factors that may influence technology acceptance and adoption among users within the heath sector.

Although, during the COVID-19 pandemic there is lack of a study that explores the adoption of telehealth/telemedicine from a new perspective grounded on TOE framework as an emerging paradigm. TOE framework may help to expedite the adoption of telehealth within health centers amidst the pandemic. Therefore, this study applies the TOE theory to determine the technology-readiness of health institutions to adopt telehealth and the potential implementation of IT during public health emergencies such as the COVID-19 pandemic and beyond. The TOE was selected as it provides a suitable theory to comprehensively examine the factors that influence organizational adoption of innovation in numerous types of environments. Each of the main constructs are described below:

4.3.1. Technological

Several technological factors have been shown to affect institutional adoption of telehealth amidst public health emergencies (Bokolo, 2020). Thus, novel technologies are more likely to be adopted when the institutions perceive it to provide more benefits than current systems (Ahmad et al., 2020; Ramdani et al., 2020). The technological factors and propositions are discussed below;

a. Security of Information

Presently, there have been valid concern that patients and physicians are using commercially available video conferencing software can create lead to cybersecurity attack which could compromise sensitive information of patients (Anthony Jnr, 2022a). Also, amidst the pandemic there has been security issues reported with video chat platforms such as Zoom, etc. which has been affected by security hacking attempts which interrupts online video services (Smith et al., 2020b; Rocha and Almeida, 2021). Thus, researchers such as Smith et al. (2020b) advocated for the use of a secure health patient platform such as MyChart, to conduct telehealth consultations which is more secured and less vulnerable to cyber-attacks, since sensitive patient information are stored on a secure server. Moreover, some medical systems are employing Secured Messaging Platform (SMP) within the Electronic Health Record (EHR) to support rapid treatment while promoting the sharing of protected medical information (Reeves et al., 2020). Based on the proceeding discussion, the following proposition is made:

P1. *The security of information initiated will positively influence the adoption of telehealth during public health emergencies.*

b. Non-integration and Lack of Interoperable Solutions

First, the heterogeneity of available software and infrastructures, often led to different system being unable to exchange common patients' data, thus hindering the integration and alignment of available medical systems with the national electronic health record system (Bokolo et al., 2022). This results to redundancy of patient's data and the lack of a shared repository for all patients' data has led to poor efficiency of care and increase in health care costs, which makes telehealth adoption unaffordable (Omboni, 2020). Additionally, there are poor interconnection between telehealth solutions operating at higher levels (tertiary or secondary care facilities) and those implemented in community pharmacies or primary care clinics (Anthony Jnr, 2020). Thus, the lack of seamless connection prevents obtaining the maximum gain from these digital health solutions (Omboni, 2020). Based on the above, the following proposition is stated:

P2. *Non-integration and lack of interoperable solutions will negatively influence the adoption of telehealth during public health emergencies.*

c. Availability of Physical Infrastructures

Adoption of telehealth practice requires availability of hardware infrastructure (Smith et al., 2020b). Investment in infrastructure resources supports physicians to connect to telehealth

platforms and engage with patients (Grenda, 2020). Thus, the availability of network connectivity and IT hardware such as the use of large screens to readily visualize patient instead of mobile phones and tablet for conducting telehealth will improve telehealth adoption (Saleem et al., 2020). Based on the aforementioned discussion the following proposition is stated:

P3. *The availability of physical infrastructures will positively influence the adoption of telehealth during public health emergencies.*

d. Lack of Broadband Access

Lack of broadband access is a barrier that reduce patients adopting video consultations, as availability of broadband often provides better video quality and improved download/upload functionalities as compared to using mobile phone data (Xu, 2019). Findings from prior study Nouri et al. (2020) suggest that broadband access has been shown to be a vital factor in adoption of digital health systems such as patient portals. Likewise, findings from Rajasekaran (2020) revealed that within four weeks into telehealth adoption only 30% patients were not able to participate in video communication due to inadequate broadband as such some physicians employed telephone conversation. This is because patients did not have access to broadband or smartphone. Rajasekaran (2020) further mentioned that only 81% of US adults possess a smartphone and 73% have home broadband. Hence, it is necessary to have adequate bandwidth and a secure connection to allow for proper adoption of telehealth (Smith et al., 2020b; Anthony Jnr, 2022b). Based on these arguments, the following proposition is made:

P4*. The lack of broadband access will negatively influence the adoption of telehealth during public health emergencies.*

4.3.2. Organizational

The organizational context refers to the institutions' internal processes and structures that may constrain or facilitate the adoption of telehealth amidst public health emergencies (Beier and Früh, 2020; Ramdani et al., 2020). The organizational factors and propositions include;

a. Rapid Transition and Workflow Balance

Telehealth adoption requires change in the whole medical system operations. Thus, integrating telehealth into daily routine health service may be challenging (Nouri et al., 2020). Telehealth is a disruptive procedure as it affects the face-to-face interactions which requires a shift from the current conventional medical care (Grenda, 2020). In adopting telehealth, there are challenges linked with rapid transition to telehealth model for outpatients as telehealth requires effective change management in existing strategies adoption to support medical practitioners (Grenda, 2020). Furthermore, there is need for virtual testing of telehealth services for emergency situations in ensuring that workflow processes are effective (Smith et al., 2020a).

Another issue during COVID-19 is balancing the pandemic need while providing high-quality medical-care and managing other unrelated issues (Reeves et al., 2020). Also, physicians must decide which patients are ideal candidates for online consultations and which

are not, since there are no clear guidelines for which patients require online or in-person assessment (Gadzinski et al., 2020). Similarly, another issue is arranging the vast number of live video visits to medical practitioners who are also attending to physical patients (Watson et al., 2020). Although, as mentioned by Smith et al. (2020b) the rapid adoption of telehealth caused change which disrupted normal medical-care workflow. It has been very well accepted by patients and physicians. Hence, based on the above the following proposition is stated:

P5. *The rapid transition and workflow balance will positively influence the adoption of telehealth during public health emergencies.*

b. Funding and Availability of Remuneration

Appropriate remuneration and funding are required for proper adoption of telehealth services. Traditionally, the inadequate funding has been a barrier for the slow adoption of telehealth (Neubeck et al., 2020; Smith et al., 2020a). Presently, due to the COVID-19 pandemic temporary funding is being provided by governments and World Health Organization (WHO) to deal with ad-hoc emergencies (Srivatana et al., 2020). Thus, there has been provision of telehealth funding authorized by government at short notice (Smith et al., 2020a). Thus, this study proposes that:

P6. *The availability of funding and remuneration will positively influence the adoption of telehealth during the COVID-19 pandemic and beyond.*

c. Health Regulations and Reimbursement

The adoption of telehealth solutions is often hindered by rigid privacy regulations and the absence of data security recommendations (Omboni, 2020). On March 17th, 2020, CMS announced several changes and waivers regarding policies to extend telehealth services for Medicare recipients during the COVID-19 crisis (Saleem et al., 2020; Srivatana et al., 2020). This was an important shift in policy as a means to reduce the spread of the virus, keeping residents at home, while also being able to provide proper medical-care services to patients (Fryer et al., 2020). Medicare paying for medical-care provided through telehealth allowed medical providers to offer vital health services for patients who are arguably in remote locations, most susceptible, either home or facility bound due to COVID-19. Currently, other private payers are now following CMS's lead and are approving telehealth services for their clients during the COVID-19 crisis (Nouri et al., 2020; Saleem et al., 2020).

Likewise, the Department of Health and Human Services in US has issued recommendation on use of audio and video platforms adhering to HIPAA compliance to provide timely care to patients (Sullivan et al., 2020). Furthermore, there are issues regarding reimbursement and existing regulations limiting access that may prevent some patients within a certain geographical area from engaging in telehealth. Although, COVID-19 has resulted to change in these laws, such as those recently initiated by CMS (Nouri et al., 2020; Saleem et al., 2020; Srivatana et al., 2020), which temporarily allow broader reimbursement and provision to telehealth services for patients during the pandemic. Moreover, medical practitioners are required to observe state laws regarding adoption of telehealth services. But there have also been recent changes in these laws such as those in Pennsylvania, in US which

are now providing access for patients to telehealth services by permitting out-of-state licensed medical practitioners to provide medical-care to in-state citizens (Gadzinski et al., 2020; Grenda, 2020). Thus, this study proposes that:

P7. *The current health regulations and reimbursement will significantly influence the adoption of telehealth during public health emergencies.*

4.3.3. Environmental

The environmental context refers to factors outside the institution that may support or impede the adoption of telehealth amidst public health emergencies (Gao and Sunyaev, 2019; Beier and Früh, 2020; Ramdani et al., 2020). The environmental factors and propositions include;

a. Acceptance to Use Telehealth

Involves a particular community's willingness to participate in telehealth is based on perceived need for change and capacity towards change (Basil et al., 2020). Likewise, findings from a recent study (Smith et al., 2020b) indicated that even if patients are willing to adopt telehealth, they are mostly influenced by reverting to what they are used to in times of need and the way in which they previously access medical care. Additionally, patients may be unaware that they can adopt telehealth as an option and do not necessarily know how to access it (Bunnell et al., 2020). Hence, there is need to educate patients on the effectiveness of telehealth as a safe and alternative option during public health emergencies (Smith et al., 2020b; Ganji and Parimi, 2021). Another way of increasing acceptance of telehealth is by extending medical reimbursement coverage for patients to see their physicians via telehealth and lessen the cost barriers of accessing telehealth (Portnoy et al., 2020). Thus, this study proposes that:

P8. *The acceptance of patients to use telehealth will positively influence the adoption of telehealth during public health emergencies.*

b. Awareness and Training

Although majority of adults in the US own data-enabled handheld devices they may not have the digital skills required to operate a video application such as Zoom, Skype, etc. required to conduct virtual consultation (Nouri et al., 2020). Most medical systems do not provide instruction or training to their patients on how to use these applications (Reeves et al., 2020), however studies have shown this to be effective for ensuring adoption of telehealth tools (Nouri et al., 2020). Conversely, findings from the literature suggest that some medical practitioners are expanded access to their outpatient by providing an online self-guided learning videos conducted digitally to create awareness. Likewise, findings from Reeves et al. (2020) mentioned that after the CDC approved adoption of telehealth for treatment, over 300 medical practitioners were trained in telehealth and nearly 1000 video visits were arranged for outpatients at home (Reeves et al., 2020). Other health institution provides learning modules detailing complete digital physical examination skills for adopting telehealth (Grenda, 2020). But unfamiliarity with communication technology and lack of knowledge are well-known causes for low adoption to telehealth (Smith et al., 2020b). Thus, disseminating educational

materials for telehealth can reduce patients' anxiety and increase their experience with telehealth adoption (Rajasekaran, 2020). Thus, this study proposes that:

P9. *Awareness and training will significantly influence the adoption of telehealth during public health emergencies.*

Based on TOE framework a model is proposed as seen in Figure 6 to provide factors influence adoption of telehealth for hospital-at-home treatment during public health emergencies such as the COVID-19 pandemic.

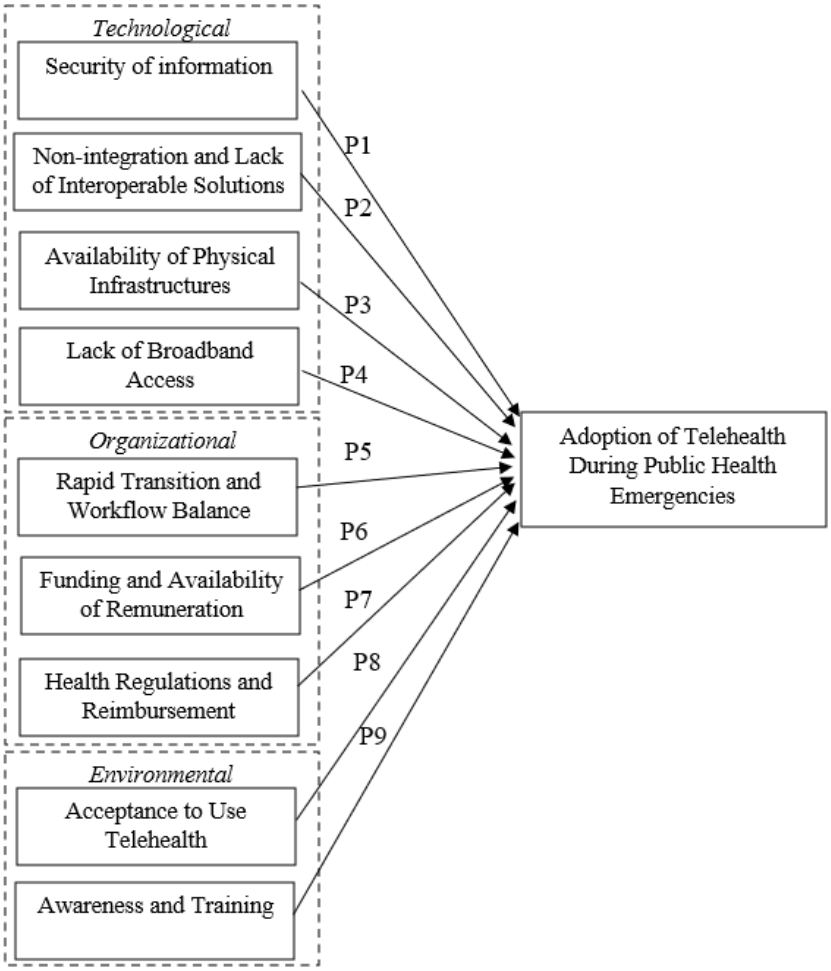

Figure 6. Developed conceptual model (source: designed by the author)

5. Discussion and Implications

5.1.Discussion

The adoption of telehealth in general medical sector has been fragmented and slow. Although, considerable efforts have gone into scaling up the routine adoption of telehealth in hospitals mainly in US, China, Australia, etc., often with limited success (Smith et al., 2020a). The reasons for the low adoption of telehealth are diverse and multifaceted, but factors such as physician willingness, financial compensation and re-organization of the entire medical system may be the reason (Smith et al., 2020a). This rapid transition is faced with challenges that acts

as factors or barriers impending successfully adoption of telehealth amidst public health emergencies such as the pandemic. Presently, prior studies have focused on telehealth adoption in general. Nevertheless, the factors that influence health care providers decision to adopt telehealth during public health emergencies have not yet to be systematically explored. Accordingly, this study attempts to narrow this gap by employing an integrative review of selected studies. Therefore, this current study reviewed empirical studies related to both telehealth and telemedicine to investigate the determinant factors of the telehealth adoption decision in healthcare institutions amidst public health emergencies.

Based on the results of the integrative review, a model and propositions were developed in this study grounded on the theoretical lens of technology organization environment to provide recommendations for related future research. Findings from this study provides recommendations to guide medical practitioners, medical systems, and policy leaders on the potential of digital and telehealth services in managing public health emergencies. The findings reveal that specific policy changes to improve integration of interoperable solutions, data security, better physical infrastructures, broadband access, better transition and workflow balance, availability of funding and remuneration, regulations and reimbursement, awareness and training will improve telehealth adoption as a more powerful tool during public emergencies.

Similarly, findings from this article suggest that by addressing technological, organizational, and environmental factors (see Figure 3), the benefits of adopting telehealth can be better positioned to ensure more equitable telehealth during public health emergencies. The limited adoption of telehealth solution is mostly attributable to physicians' unwillingness to accept telehealth. This is because telehealth is complex, disruptive, and requires physicians to learn new approach of remote consulting. Thus, patients and physician's acceptance of telehealth depends on patients perceiving telehealth as normal, effective, and safe (Nouri et al., 2020; Smith et al., 2020a). But, notwithstanding results from DiGiovanni et al. (2020) suggest that medical care providers are rapidly adapting their treatment mode of providing care by adopting telehealth services.

Therefore, this study advocates for the provision of training and education on telehealth to be included in current workflow of hospitals for medical practitioners to telehealth-ready (Nouri et al., 2020). Therefore, it is important to include telehealth in health curricula highlighting that telehealth is a legitimate care. This will definitely increase the medical practitioners' acceptance to adopt telehealth alongside everyday practice (Smith et al., 2020a). Findings also provide information on medical applications that are being adopted for telehealth during the public health emergencies to suit the needs of patients, physicians, medical service providers, and all stakeholders. This study also discusses the opportunities of adopting telehealth during the COVID-19 pandemic and beyond. This finding can be employed by medical organizations to increase awareness of telehealth, provide detailed recommendations on effectiveness of telehealth use in validating telehealth's role in medical-care sector (Smith et al., 2020a).

As suggested by Smith et al. (2020a) it is imperative that development of a telehealth policies to deal with national and global emergency responses is developed on the premise that telehealth will be an important component for the medical-care system during COVID-19 and beyond. Findings from this study discuss how to adopt telehealth for hospital-at-home treatment during public health emergencies, and what medical applications are adopted for telehealth hospital-at-home treatment. Additionally, the findings present current theories have been employed to explore use of telehealth and COVID-19 pandemic related studies and prior studies that contributed to adoption of telehealth amidst public health emergencies. More importantly, the finding highlights the challenges and recommendations on how telehealth can be adopted for medical-care delivery. Also, the technological, organizational, and environmental factors that influence telehealth adoption, and opportunities of adopting telehealth during public health emergencies. Additionally, this study contributes to existing body of knowledge by providing implications for integration of telehealth for treatment of patients during public health emergencies.

5.2. Implications to Theory

This current study employs the technology organization environment framework to propose a model as seen in Figure 6 that presents the factors that influence adoption of telehealth for hospital-at-home treatment during public health emergencies. This research contributes to the theory by specifying how to adopt telehealth for hospital-at-home treatment during public health emergencies and provides an extensive list of factors that influence telehealth adoption in healthcare and explains their specificities for the healthcare industry. Besides, the findings present prior studies that investigated adoption of telehealth or telemedicine in different health sectors during the pandemic and further discuss theories have been employed to explore telehealth adoption in the context of public health emergencies such as the pandemic.

For health practitioners, this study presents medical applications that are adopted for telehealth hospital-at-home treatment and identified factors can be employed as a checklist that informs healthcare institutions' decision-making regarding telehealth adoption. The finding highlights technological, organizational, and environmental factors that influence telehealth adoption, and opportunities of adopting telehealth during public health emergencies. Findings from this study will enrich the recent IT for development literature in health care sector and improve heath practitioners' and policy makers decision-making in leveraging maximum value from the adoption of digitalized telehealth. Findings from this study support rapid adoption of standardized telehealth hospital-at-home treatment processes. This study contributes by reviewing theories' applicability in telehealth adoption context. From a social perspective, this research gives a useful baseline to define health policies that support telehealth adoption in the context of public health emergencies.

5.3.Implications for Practice

This study conducts an integrative review of existing evidence to provide the necessary guide for medical practitioners and patients to successfully adopt a telehealth service. Practically, findings from this study can be employed to guide as checklist for health institutions as to what

they need to consider in improving the adoption of telehealth within the hospitals, clinics, and medical centers. More importantly, a model is proposed to explain the factors that influence adoption of telehealth amidst the pandemic and to provide specific recommendations for future research. The proposed model serves as a foundation for practical development with respect to telehealth in healthcare sector.

The factors presented in this study can be employed by health providers as a practical guide in making better public health policies. In addition, telehealth presents a feasible solution for high-risk patients such as pregnant, elderly patients with exiting health conditions to protect them from possible infections. Practically, this study provides evidence on the potential of telehealth amidst the pandemic in saving patients time and cost as patients do not have to drive to and from the clinic (Brown et al., 2020). Similarly, findings from Lin et al. (2020) suggest that telehealth can reduced costs, improved outcomes, and increase access to care with high patient satisfaction (Lin et al., 2020).

5.4.Implications for Policy

This study develops propositions that can provide foundation for future research in the domain of telehealth adoption amidst public health emergencies. This is the one of the first work that propose a model and set of propositions for further research work. This study could benefit policy makers and decision makers interested in adopting telehealth or telemedicine within and beyond public health emergencies to understand which changes needs to be employed to achieve a digitalized health care practice. The propositions developed in this study suggest that amidst the crisis, policy makers and decision-makers in the health sector need to consider the factors presented in the proposed model. The propositions offer practical insights into the issues posed by public health emergencies on the heath sector and initiatives that should be considered at the technological, organizational, and environmental levels.

The findings could help ministry of health to respond effectively to future crises by specifying potential changes to policy in addressing medical and economic issues faced within health crises. Considering the potential of IT for the socioeconomic transformation amidst the pandemic the adoption of telehealth is important to reduce health inequalities in rural areas if properly implemented in accordance with the technological, organizational, and environmental context. The proposed model can be used as a tool to aid countries in improving their provision of health care and ultimately enhance regional economic stability. The findings of this study indicate that telehealth is not only an IT based tool for delivering better health care but can also be an efficient medium for improving IT usage in healthcare sector. Thus, governments should initiate and promote policies that foster easy adoption of IT especially during health emergencies.

6. Limitations and Future works

This study has a few limitations that offers grounds for future research. First, only secondary data from the literature was used in this study, primary data was not collected to validate the

model propositions. Secondly, this study explored an emerging research area telehealth adoption for hospital-at-home treatment during public health emergencies and beyond as such the evidence provided are limited and no practical evidence was provided in form of a case study or survey. Also, there may be other factors that were not included in the model such as culture, norms, habit, belief etc. Further studies can involve conducting a longitudinal study over a period to examine the impact of the identified factors on telehealth adoption for hospital-at-home treatment during public health emergencies. Data will be collected from patients and medical practitioners using semi-structured interviews or survey questionnaires to validate the proposed model. Besides, other factors such as culture, norms, habit, belief, etc. that are relevant for telehealth adoption will be explored in future research. The ease of applying telehealth may vary with the attributes of medical services (e.g, psychotherapy is often talk-based, while physical therapy often requires manual therapy or the use of rehabilitation equipment), but this is not addressed in this study. Hence will be considered in future research. Lastly, this research included only English language sources published in PubMed, Google Scholar, Wiley, Taylor & Francis, IGI Global, ScienceDirect, Sage, Emerald, IEEE, ACM, Inderscience, and Springer databases to select articles data, other databases, like EBSCO, and ProQuest, were not used and may have influenced the retrieved articles. Thus, future studies will amply cover these online databases in other languages to get more relevant sources and avoid potential bias.

7. Conclusion

The review of the literature concerning telehealth adoption amidst public emergencies such as the pandemic suggests that there are a wide range of well-functioning products or applications being adopted as discussed. Based on the first research question, this study identified theories previously adopted to investigate use of telehealth in pandemic related scenario. Moreover, in relation to the second research question, the findings conclude that technology is not only the barrier impending telehealth adoption, but other related organizational, economic, and environmental factors impact telehealth adoption as well. In this study a model is further developed using existing TOE theory and based on the criteria in that model this study conclude that the limited adoption of telehealth is due to providers' unwillingness to adopt telehealth, integration of interoperable solutions, data security, better physical infrastructures, broadband access, better transition and workflow balance, availability of funding and remuneration, regulations and reimbursement, awareness, and training. This study therefore advocates educational programs for health providers and stakeholders on the potential of telehealth during public health emergencies. Evidence from this study suggest that adoption of telehealth depends on factors for success which include adequate social influence, financial resources, technological infrastructure, and overall organizational procedure of policymakers. This study provides recommendations to help provide guidelines on how health practitioners can rapidly integrate telehealth into practice during public emergencies.

References

Abdel-Basset, M., Chang, V., & Nabeeh, N. A. (2020). An intelligent framework using disruptive technologies for COVID-19 analysis. *Technological Forecasting and Social Change*, 120431.

Agarwal, P., Swami, S., & Malhotra, S. K. (2022). Artificial Intelligence Adoption in the Post COVID-19 New-Normal and Role of Smart Technologies in Transforming Business: a Review. *Journal of Science and Technology Policy Management*.

Ahmad, S., Miskon, S., Alkanhal, T. A., & Tlili, I. (2020). Modeling of business intelligence systems using the potential determinants and theories with the lens of individual, technological, organizational, and environmental contexts-a systematic literature review. *Applied Sciences*, *10*(9), 3208.

Ahmadi, H., Sadoughi, F., Gholamhosseini, L., Azadi, T., Sheikhtaheri, A., Nilashi, M., & Dehnad, A. (2019). Organizational Factors Affecting the Adoption of a Technological Innovation: A Study of the Hospital Information System (HIS). In *2019 5th International Conference on Web Research (ICWR)* (pp. 240-245). IEEE.

Anthony Jnr, B. (2020a). Implications of telehealth and digital care solutions during COVID-19 pandemic: a qualitative literature review. *Informatics for Health and Social Care*, 1-16.

Anthony Jnr, B. (2020b). Managing digital transformation of smart cities through enterprise architecture–a review and research agenda. *Enterprise Information Systems*, 1-33.

Anthony Jnr, B. (2020c). Applying Enterprise Architecture for Digital Transformation of Electro Mobility towards Sustainable Transportation. In *Proceedings of the 2020 on Computers and People Research Conference* (pp. 38-46).

Anthony Jnr, B. (2021). Integrating telemedicine to support digital health care for the management of COVID-19 pandemic. *International Journal of Healthcare Management*, 14(1), 280-289.

Anthony Jnr, B. (2022a). Investigating the Decentralized Governance of Distributed Ledger Infrastructure Implementation in Extended Enterprises. *Journal of the Knowledge Economy*, 1-30.

Anthony Jnr, B. (2022b). Toward a collaborative governance model for distributed ledger technology adoption in organizations. *Environment Systems and Decisions*, 42(2), 276-294.

Anthony Jnr, B., & Abbas Petersen, S. (2020). Examining the digitalisation of virtual enterprises amidst the COVID-19 pandemic: a systematic and meta-analysis. *Enterprise Information Systems*, 1-34.

Anthony Jr, B. (2020). Green information systems refraction for corporate ecological responsibility reflection in ICT based firms: explicating technology organization environment framework. *Journal of Cases on Information Technology (JCIT)*, 22(1), 14-37.

Anthony, B., Petersen, S. A., & Helfert, M. (2020). Digital Transformation of Virtual Enterprises for Providing Collaborative Services in Smart Cities. In *Working Conference on Virtual Enterprises* (pp. 249-260). Springer, Cham.

Basil, G. W., Eichberg, D. G., Perez-Dickens, M., Menendez, I., Ivan, M. E., Urakov, T., ... & Levi, A. D. (2020). Implementation of a Neurosurgery Telehealth Program Amid the COVID-19 Crisis—Challenges, Lessons Learned, and a Way Forward. *Neurosurgery*.

Beier, M., & Früh, S. (2020). Technological, Organizational, and Environmental Factors Influencing Social Media Adoption by Hospitals in Switzerland: Cross-Sectional Study. *Journal of Medical Internet Research*, *22*(3), e16995.

Békés, V., & Aafjes-van Doorn, K. (2020). Psychotherapists' attitudes toward online therapy during the COVID-19 pandemic. *Journal of Psychotherapy Integration*, *30*(2), 238.

Bell, J. (2020). Telehealth Visits during the COVID-19 Pandemic. *Journal of Orthopaedic Experience & Innovation*, *1*(1), 12610.

Bokolo, A. J. (2020). Exploring the adoption of telemedicine and virtual software for care of outpatients during and after COVID-19 pandemic. *Irish Journal of Medical Science (1971-)*, 1-10.

Bokolo, A. J. (2021). Application of telemedicine and eHealth technology for clinical services in response to COVID-19 pandemic. *Health and Technology*, *11*(2), 359-366.

Bokolo, A. J. (2022). Exploring interoperability of distributed Ledger and Decentralized Technology adoption in virtual enterprises. *Information Systems and e-Business Management*, 1-34.

Brown, A. M., Ardila-Gatas, J., Yuan, V., Devas, N., Docimo, S., Spaniolas, K., & Pryor, A. D. (2020). The Impact of Telemedicine Adoption on a Multidisciplinary Bariatric Surgery Practice During the COVID-19 Pandemic. *Annals of surgery*, *272*(6), e306.

Bunnell, B. E., Barrera, J. F., Paige, S. R., Turner, D., & Welch, B. M. (2020). Acceptability of Telemedicine Features to Promote Its Uptake in Practice: A Survey of Community Telemental Health Providers. *International journal of environmental research and public health*, *17*(22), 8525.

Comer, J. S. (2021). Rebooting mental health care delivery for the COVID-19 pandemic (and beyond): Guiding cautions as telehealth enters the clinical mainstream. *Cognitive and Behavioral Practice*, *28*(4), 743-748.

Davis, F. D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS quarterly*, 319-340.

DiGiovanni, G., Mousaw, K., Lloyd, T., Dukelow, N., Fitzgerald, B., D'Aurizio, H., ... & Zittel, J. (2020). Development of a telehealth geriatric assessment model in response to the COVID-19 pandemic. *Journal of geriatric oncology*, *11*(5), 761.

dos Santos Puga, M. E., de Assis Reis, F. S., Milby, K. M., Pinto, A. C. P. N., Rocha-Filho, C. R., da Rocha, A. P., ... & Trevisani, G. F. M. (2020). Telehealth interventions in the context of the COVID-19 pandemic: Protocol for a scoping review.

Fryer, K., Delgado, A., Foti, T., Reid, C. N., & Marshall, J. (2020). Implementation of obstetric telehealth during COVID-19 and beyond. *Maternal and child health journal*, *24*(9), 1104-1110.

Gadzinski, A. J., Andino, J. J., Odisho, A. Y., Watts, K. L., Gore, J. L., & Ellimoottil, C. (2020). Telemedicine and eConsults for hospitalized patients during COVID-19. *Urology*.

Ganji, K., & Parimi, S. (2021). ANN model for users' perception on IOT based smart healthcare monitoring devices and its impact with the effect of COVID 19. *Journal of Science and Technology Policy Management*. 13(1), 6-21.

Gao, F., & Sunyaev, A. (2019). Context matters: A review of the determinant factors in the decision to adopt cloud computing in healthcare. *International Journal of Information Management*, *48*, 120-138.

Garfan, S., Alamoodi, A. H., Zaidan, B. B., Al-Zobbi, M., Hamid, R. A., Alwan, J. K., ... & Momani, F. (2021). Telehealth utilization during the Covid-19 pandemic: A systematic review. *Computers in biology and medicine*, *138*, 104878.

Golinelli, D., Boetto, E., Carullo, G., Landini, M. P., & Fantini, M. P. (2020). How the COVID-19 pandemic is favoring the adoption of digital technologies in healthcare: a rapid literature review. *medRxiv*.

Grenda, T. R. (2020) Transitioning a Surgery Practice to Telehealth During COVID-19. *annals of surgery*

Grimes, C. L., Balk, E. M., Crisp, C. C., Antosh, D. D., Murphy, M., Halder, G. E., ... & Iglesia, C. (2020). A guide for urogynecologic patient care utilizing telemedicine during the COVID-19 pandemic: review of existing evidence. *International Urogynecology Journal*, 1.

Hong, Z., Li, N., Li, D., Li, J., Li, B., Xiong, W., ... & Zhou, D. (2020). Telemedicine During the COVID-19 Pandemic: Experiences From Western China. *Journal of Medical Internet Research*, *22*(5), e19577.

Jacob, C., Sanchez-Vazquez, A., & Ivory, C. (2020). Understanding Clinicians' Adoption of Mobile Health: A Qualitative Review of the Most Used Frameworks. *JMIR mHealth uHealth*.

Jnr, B. A. (2020). Use of telemedicine and virtual care for remote treatment in response to COVID-19 pandemic. *Journal of Medical Systems*, *44*(7), 1-9.

Jnr, B. A., Nweke, L. O., & Al-Sharafi, M. A. (2020). Applying software-defined networking to support telemedicine health consultation during and post Covid-19 era. *Health and technology*, 1-9.

Kamal, S. A., Shafiq, M., & Kakria, P. (2020). Investigating acceptance of telemedicine services through an extended technology acceptance model (TAM). *Technology in Society*, *60*, 101212.

Keshvardoost, S., Bahaadinbeigy, K., & Fatehi, F. (2020). Role of Telehealth in the Management of COVID-19: Lessons Learned from Previous SARS, MERS, and Ebola Outbreaks. *Telemedicine and e-Health*.

Khan, M. A. (2020). Implementation of Telemedicine System to Improve And Expand Covid-19 Screening And Evaluation: A Reflection On Action Research Approach And The Management Of The Possible Spread Of The Pandemic. *American Journal of Health, Medicine and Nursing Practice*, *5*(1), 12-24.

Kojima, N., & Klausner, J. D. (2020). Virtual House Calls: Telemedicine and Reforming the Health Care Delivery Model with Strategies Implemented in a Novel Coronavirus Pandemic. *Journal of General Internal Medicine*, 1-1.

Krausz, M., Westenberg, J. N., Vigo, D., Spence, R. T., & Ramsey, D. (2020). Emergency Response to COVID-19 in Canada: Platform Development and Implementation for eHealth in Crisis Management. *JMIR Public Health and Surveillance*, *6*(2), e18995.

Lee, I., Kovarik, C., Tejasvi, T., Pizarro, M., & Lipoff, J. B. (2020). Telehealth: Helping your patients and practice survive and thrive during the COVID-19 crisis with rapid quality implementation. *Journal of the American Academy of Dermatology*.

Lew, S. Q., Wallace, E. L., Srivatana, V., Warady, B. A., Watnick, S., Hood, J., ... & Schreiber, M. J. (2021). Telehealth for home dialysis in COVID-19 and beyond: a perspective from the American Society of Nephrology COVID-19 Home Dialysis Subcommittee. *American Journal of Kidney Diseases*, *77*(1), 142-148.

Li, Y., Thomas, M. A., Stoner, D., & Rana, S. S. (2020). Citizen-centric capacity development for ICT4D: the case of continuing medical education on a stick. *Information Technology for Development*, 1-19.

Lin, C. H., Tseng, W. P., Wu, J. L., Tay, J., Cheng, M. T., Ong, H. N., ... & Chen, S. Y. (2020). A double triage and telemedicine protocol to optimize infection control in an emergency department in Taiwan during the COVID-19 pandemic: retrospective feasibility study. *Journal of Medical Internet Research*, *22*(6), e20586.

Maleka, N. H., & Matli, W. (2022). A review of telehealth during the COVID-19 emergency situation in the public health sector: challenges and opportunities. *Journal of Science and Technology Policy Management*.

Mardani, A., Saraji, M. K., Mishra, A. R., & Rani, P. (2020). A novel extended approach under hesitant fuzzy sets to design a framework for assessing the key challenges of digital health interventions adoption during the COVID-19 outbreak. *Applied Soft Computing*, *96*, 106613.

Nagra, M., Vianya-Estopa, M., & Wolffsohn, J. S. (2020). Could telehealth help eye care practitioners adapt contact lens services during the COVID-19 pandemic?. *Contact Lens and Anterior Eye*.

Neubeck, L., Hansen, T., Jaarsma, T., Klompstra, L., & Gallagher, R. (2020). Delivering healthcare remotely to cardiovascular patients during COVID-19: A rapid review of the evidence. *European Journal of Cardiovascular Nursing*, 1474515120924530.

Nouri, S., Khoong, E. C., Lyles, C. R., & Karliner, L. (2020). Addressing Equity in Telemedicine for Chronic Disease Management During the Covid-19 Pandemic. *NEJM Catalyst Innovations in Care Delivery*, *1*(3).

Nyame-Asiamah, F. (2020). Improving the 'manager-clinician'collaboration for effective healthcare ICT and telemedicine adoption processes–a cohered emergent perspective. *Information Technology for Development*, *26*(3), 525-550.

Omboni, S. (2020). Telemedicine During The COVID-19 in Italy: A Missed Opportunity?. *Telemedicine and e-Health*.

Pan, S. L., & Zhang, S. (2020). From fighting COVID-19 pandemic to tackling sustainable development goals: An opportunity for responsible information systems research. *International Journal of Information Management*, *55*, 102196.

Patel, P. D., Cobb, J., Wright, D., Turer, R., Jordan, T., Humphrey, A., ... & Rosenbloom, S. T. (2020). Rapid Development of Telehealth Capabilities within Pediatric Patient Portal Infrastructure for COVID-19 Care: Barriers, Solutions, Results. *Journal of the American Medical Informatics Association*.

Pendergrass, J. C., & Chandrasekaran, R. (2019). Key Factors Affecting Ambulatory Care Providers' Electronic Exchange of Health Information With Affiliated and Unaffiliated Partners: Web-Based Survey Study. *JMIR medical informatics*, *7*(4), e12000.

Portnoy, J., Waller, M., & Elliott, T. (2020). Telemedicine in the Era of COVID-19. *The Journal of Allergy and Clinical Immunology: In Practice*.

Rajasekaran, K. (2020). Access to Telemedicine—Are We Doing All That We Can during the COVID-19 Pandemic?. *Otolaryngology–Head and Neck Surgery*, 0194599820925049.

Ramdani, B., Duan, B., & Berrou, I. (2020). Exploring the Determinants of Mobile Health Adoption by Hospitals in China: Empirical Study. *JMIR medical informatics*, *8*(7), e14795.

Ramírez-Correa, P., Ramírez-Rivas, C., Alfaro-Pérez, J., & Melo-Mariano, A. (2020). Telemedicine Acceptance during the COVID-19 Pandemic: An Empirical Example of Robust Consistent Partial Least Squares Path Modeling. *Symmetry*, *12*(10), 1593.

Rana, R. H., Alam, K., & Gow, J. (2019). Health outcome and expenditure in low-income countries: does increasing diffusion of information and communication technology matter?. *Information Technology for Development*, 1-19.

Reeves, J. J., Hollandsworth, H. M., Torriani, F. J., Taplitz, R., Abeles, S., Tai-Seale, M., ... & Longhurst, C. A. (2020). Rapid response to COVID-19: health informatics support for outbreak management in an academic health system. *Journal of the American Medical Informatics Association*.

Rocha, A., & Almeida, F. (2021). Mental health innovative solutions in the context of the COVID-19 pandemic. *Journal of Science and Technology Policy Management*.

Rout, K. (2020). Exploring Factors Influencing the Users' Intention to Use Aarogya Setu Contact Tracing Mobile Health Application during COVID-19 Pandemic. *Horizon J. Hum. & Soc. Sci*. *2*, 29-36.

Sadoughi, F., Khodaveisi, T., & Ahmadi, H. (2019). The used theories for the adoption of electronic health record: a systematic literature review. *Health and Technology*, *9*(4), 383-400.

Saleem, S. M., Pasquale, L. R., Sidoti, P. A., & Tsai, J. C. (2020). Virtual Ophthalmology: Telemedicine in a Covid-19 Era. *American Journal of Ophthalmology*.

Salgado, T., Tavares, J., & Oliveira, T. (2020). Drivers of Mobile Health Acceptance and Use From the Patient Perspective: Survey Study and Quantitative Model Development. *JMIR mHealth and uHealth*, *8*(7), e17588.

Sasangohar, F., Jones, S. L., Masud, F. N., Vahidy, F. S., & Kash, B. A. (2020). Provider burnout and fatigue during the COVID-19 pandemic: lessons learned from a high-volume intensive care unit. *Anesthesia and analgesia*.

Smith, A. C., Thomas, E., Snoswell, C. L., Haydon, H., Mehrotra, A., Clemensen, J., & Caffery, L. J. (2020a). Telehealth for global emergencies: Implications for coronavirus disease 2019 (COVID-19). *Journal of telemedicine and telecare*, 1357633X20916567.

Smith, W. R., Atala, A. J., Terlecki, R. P., Kelly, E. E., & Matthews, C. A. (2020b). Implementation Guide for Rapid Integration of an Outpatient Telemedicine Program during the COVID-19 Pandemic. *Journal of the American College of Surgeons*.

Srivatana, V., Liu, F., Levine, D. M., & Kalloo, S. D. (2020). Early Use of Telehealth in Home Dialysis During the COVID-19 Pandemic in New York City. *Kidney360*, 10-34067.

Sullivan, A. B., Kane, A., Roth, A. J., Davis, B. E., Drerup, M. L., & Heinberg, L. J. (2020). The COVID-19 Crisis: A Mental Health Perspective and Response Using Telemedicine. *Journal of Patient Experience*. https://doi.org/10.1177/2374373520922747

Tanhan, A., Yavuz, K. F., Young, J. S., Nalbant, A., Arslan, G., Yıldırım, M., ... & Çiçek, İ. (2020). A proposed framework based on literature review of online contextual mental health services to enhance wellbeing and address psychopathology during COVID-19. *Electronic Journal of General Medicine*, 17(6), 1-11.

Tornatzky, L. G., Fleischer, M., & Chakrabarti, A. K. (1990). *Processes of technological innovation*. Lexington books.

Touson, J. C., Azad, N., Depue, C., Crimmins, T., & Long, R. (2020). An application of Harrison's system theory model to spark a rapid telehealth expansion in the time of COVID-19. *Learning Health Systems*, e10239.

Verma, S., & Gustafsson, A. (2020). Investigating the emerging COVID-19 research trends in the field of business and management: A bibliometric analysis approach. *Journal of Business Research*, *118*, 253-261.

Walrave, M., Waeterloos, C., & Ponnet, K. (2020). Ready or Not for Contact Tracing? Investigating the Adoption Intention of COVID-19 Contact-Tracing Technology Using an

Extended Unified Theory of Acceptance and Use of Technology Model. *Cyberpsychology, Behavior, and Social Networking*.

Watson, A. R., Wah, R., & Thamman, R. (2020). The Value of Remote Monitoring for the COVID-19 Pandemic. *Telemedicine and e-Health*.

Xu, Z. (2019). An empirical study of patients' privacy concerns for health informatics as a service. *Technological Forecasting and Social Change*, *143*, 297-306.

Zhong, B., Huang, Y., & Liu, Q. (2020). Mental health toll from the coronavirus: Social media usage reveals Wuhan residents' depression and secondary trauma in the COVID-19 outbreak. *Computers in human behavior*, *114*, 106524.

Zimmerman, M., Benjamin, I., Tirpak, J. W., & D'Avanzato, C. (2021). Patient satisfaction with partial hospital telehealth treatment during the COVID-19 pandemic: Comparison to in-person treatment. *Psychiatry Research*, *301*, 113966.