Examining Patient Telehealth Adopter Categories and their Perceived Attribute Values during the COVID-19 Pandemic

Ronina R. Caoili-Tayuan[1,*] and Christine Diane Ramos[2]

[1]Department of Information Technology, University of Santo Tomas, Manila, Philippines
[2]Department of Information Technology, De La Salle University, Manila, Philippines
Email: rctayuan@ust.edu.ph (R.R.C.T.); christine.diane.ramos@dlsu.edu.ph (C.D.L.R.)
[*]Corresponding author
Manuscript received December 18, 2023; revised January 20, 2024; accepted February 23, 2024; published August 13, 2024

***Abstract*—The aim of this research is to determine the adopter category rate of patients utilizing telehealth channels, with their corresponding perceived attribute value or the factors that seek to explain how, why and at what rate the technology (in this case telehealth) can be adopted. It was conducted using mixed methods technique. A survey questionnaire anchored on the Diffusion of Innovations (DOI) Theory was deployed to obtain quantitative measures in identifying rate of adopters and the scales corresponding to their perceived attribute value. After which a Focus Group Discussion (FGD) was held to validate the descriptive statistical results and to further understand the link between perceived innovation attributes and the intention to adopt telehealth e-consultations, as proposed by the diffusion of innovations theory. Furthermore, results from the Focus Group Discussion (FGD) paved for interpretation and understanding of other factors influencing individuals to use telehealth e-consultations in the advent of the COVID-19 pandemic. It is interesting to note that early adopters to late majority have also adopted telehealth primarily due to the social circumstances (fear of acquiring the virus) but would still prefer traditional face to face consultations if permitted -which explains and validates compatibility/trialability as their resulting perceived attribute value. Telehealth innovation adoption (e-consultation) of numerous clinics have rendered significant efforts on their use and utilization of telemedicine since the coronavirus epidemic began last March 2020. A greater emphasis on patient experience, providing a relative benefit of healthcare, and conserving expenses, time, and energy has been ascribed to increase telehealth adoption and implementation.**

***Keywords*—telehealth, diffusion of innovations, COVID-19, adoption**

I. Introduction

An abrupt shift to utilize telehealth communication channels has been imposed upon the inhabitants given the circumstance brought by the global pandemic. Contrary to the preferred traditional methods of medical practitioners to diagnose through physical and face-to-face examinations, some treatments must be done remotely to minimize the risk of virus exposure. Remote consultations with specialists, targeted treatments, and the availability of perceptive mobile applications have all contributed to improving patient care and a higher overall healthcare occurrence. Furthermore, the availability of newer treatment technologies that are being tested for better outcomes has improved patients' quality of life [1]. Telehealth has recently grown in importance as a result of the increased deployment and development of digital technologies [2]. Telehealth innovations are thought to have a high potential for assisting in the resolution of critical issues in healthcare, particularly amidst the COVID-19 outbreak. Telehealth is typically defined as a combination of both technologies and devices capable of remotely obtaining information about a patient's health status to aid in determining whether or not there is a need or urgency to intervene [3]. During the first COVID-19 lockdown period, which took placed on March 15, 2020, and up to now (2021), primary care services were advised to use 'virtual' consultations whenever possible, which in practice meant that every patient was expected to have a telephone or video conferencing as a form of consultation to determine whether they needed to be seen in-person. Reduced in-person consultations were aimed to decrease the potential spread of COVID-19 through waiting rooms, particularly among patients at higher risk of infection, as well as to protect health professionals from the virus [4]. A mandatory social distancing and a lack of effective treatments made telehealth the most secure interactive system between infected and uninfected patients and clinicians. The use of electronic consultations is a hopeful way of solving the problem of improving primary care access. It provides a quick, direct, and documented communication channel between primary care and specialist doctors [5]. E-consultations are classified both as synchronous and asynchronous consultations and are commonly identified as the remote delivery of healthcare using information and communication technology [6] such as video conferencing, telephone, text, email, and an online patient portal (i.e., web-based and/or mobile application). E-consultations have been implemented in recent years but have not yet become extensive or standard practice in both public and private healthcare settings. Based on the COVID-19 studies and literature, resistance to change from health systems and health professionals (who are often more careful than patients) and technological constraints were identified as barriers to more widespread adoption of telehealth (i.e., e-consultations).

II. Statement of the Problem

During the COVID-19 disease outbreak, government-mandated social distancing and the lack of effective treatments have made telehealth the most secure interactive system between patients (those infected and uninfected), and clinicians. Telehealth technologies are now deemed to be the public eye for coronavirus care, and it is undeniably beneficial to both patients and doctors. The use of telehealth is one of the solutions to the need for social distancing. It has been recommended and is rapidly being implemented in many parts of the world. Telehealth can also allow staff who must be quarantined to continue working.

Despite the numerous advantages that individuals can get from using telehealth, there are still those who refuse to avail themselves and take the opportunity without realizing and understanding the benefits that can be attained from this healthcare delivery system. As of August 30, 2021, the nationwide COVID-19 cases data in the country are as follows:

Table 1. Nationwide COVID-19 cases data in the Philippines (as of August 30, 2021)

COVID-19 Cases	Number of Cases
Active Cases	148, 594
Recovered	1, 794, 278
Died	33, 330
Total Cases	1, 976, 202

**Source: https://doh.gov.ph/covid19tracker*

Table 1 illustrates that the COVID-19 cases in the country are consistently increasing, and there are still several cases with unreported dates of onset of illness and date of specimen collection. If this continues to increase, hospitals may no longer be able to accommodate patients with COVID-19 and other existing ailments. Another problem is that the number of health providers and other medical staff is insufficient to attend to these numbers of patients. The Philippines already had a severe shortage of medical personnel prior to the current outbreak. According to the Department of Health's most recent data, the country had 40,775 medical doctors (in the health sector) in 2017, resulting in a medical doctor-to-population ratio of 0.4:1000. With a population of 104 million people in 2017, the country lacked 63,710 doctors, according to the widely acknowledged norm of one doctor per 1000 people. In 2017, the Philippines had 90,308 professional nurses and 43,044 practicing midwives in public and private health facilities, equating to a nurse-to-population ratio of 1.3:1,000, according to the Department of Health. There is no clear suggested guideline for the number of nurses and midwives, although the World Health Organization estimates that the average for low medium income countries, including the Philippines, is 1.7:1,000. (WHO). In 2017, the country was short 44,273 nurses and midwives, even by this low threshold. According to the Department of Health (DoH), more than 252 healthcare workers in the Philippines — 152 doctors and 63 nurses — have been infected with the virus that causes COVID-19 as of April 8, while the Private Hospitals Association of the Philippines reported that the disease has already killed 21 doctors as of April 7. Despite the lack of an official figure for COVID-19-related nurse mortality, occasional reports imply it is also on the rise. Medical workers' deaths are especially heartbreaking because of their role in saving lives during the pandemic and because they are already in short supply in the country [7] (Table 2).

Table 2. Number of doctors, nurses, and midwives nationwide in the Philippines 2017

2017	Occupied
Doctors	40, 775
Nurses	90, 308
Midwives	43, 044

**Source: https://doh.gov.ph/covid19tracker*

Furthermore, when patients must be isolated, communication of all health needs is critical. During COVID-19, simple communication methods like email and text messaging should be used more comprehensively to exchange information about symptoms of burnout, depression, anxiety, and Post-Traumatic Stress Disorder (PTSD), and to even provide cognitive and/or stress relief to online self-help services. Telehealth can be used to monitor symptoms and provide support to people with COVID-19 and other ailments. With this gap, the purpose of the study is to focus on providing practical insights or useful guidelines by identifying and emphasizing context-specific issues such as facilitating factors to a telehealth innovation's transition from initial adoption to wider diffusion.

III. Research Problems and Objectives

This study aims to determine the adopter category rate with perceived attribute value of patients utilizing telehealth channels. In being more specific, the study aims to answer the following research questions:

1) What are the adopter categories of the patients utilizing telehealth channels in the private healthcare setting?
2) How does the perceived attribute rate vary among the adopter categories?

By deriving emergence from the five-model stage in the innovation-decision-making process and determining the measure of perceived innovation attributes, the objectives in this research were met. The scope of the study included only electronic consultations, which were referred to as 'telehealth' held in private healthcare settings and was limited to patients (of any age) with prior experience with telehealth (such as online or virtual consultation) systems prescribed by medical practitioners belonging to a private healthcare setting.

IV. Review of Related Literature

A. Role of Telehealth Innovations

Several key literatures have emphasized the role of telehealth innovations. One of which is a systematic review conducted by Monaghesh & Hajizadeh determined the role of telehealth services in disease prevention, diagnosis, treatment, and control during the COVID-19 outbreak [8]. From this study, it was concluded that the use of telehealth improves the provision of health service and therefore telehealth should be an important tool in providing care while keeping patients and health providers safe. This was supported by Kruse's research, which found that the use of telehealth has steadily increased as it has become a viable modality for patient care based on various factors related to effectiveness and efficiency that will deliver high-quality care and how well the telemedicine modality met the patients' expectations [9]. Bradford *et al*. [10] conducted another systematic review of peer-reviewed and grey literature to investigate whether telehealth would have the potential to increase the number of scaling up and replicating successful telehealth services. Furthermore, Doraiswamy *et al*. [11] also used a scoping review guided by the Joanna Briggs Institute Reviewer Manual to scope the existing telehealth-related literature during a defined period of the ongoing pandemic.

According to the researcher, during the first six months of the COVID-19 pandemic, there was significant emerging literature on telehealth, albeit mostly from high-income countries. There is conclusive evidence that telehealth may have a significant impact on healthcare advancement in the future. The demand for the use of telehealth has dramatically increased due to the COVID-19 outbreak. Given the ongoing concerns about the pandemic's unsustainable healthcare services, a shortage of professional healthcare providers, and an aging population, those with pre-existing illnesses, as well as those infected and uninfected with the virus, telehealth consultations play a significant role both in public and private healthcare settings as an "upstream solution". This telehealth consultation (i.e., e-consultation) lends itself well to both the primary care and specialists, allowing them to expand their reach, treating patients wherever there is an internet connection while implementing the social distancing and COVID quarantine amidst pandemic to continuously sustain their patients' good health. A study by Sugarhood *et al*. [12] sought to identify and investigate factors influencing the adoption, implementation, and continued use of telecare technologies by the use of a single qualitative study, such as a multi-level approach based on normalization process theory (NPT), which regarded not only individual acceptance and ease of use of the technology but also the implications for social relations between users. As a result, telecare is more than just a technology; it is a complex innovation that necessitates input from and coordination between people and organizations. On the other hand, a study by Imlach *et al*. [13], used a mixed-methods approach to investigate how patients accessed general practice during the lockdown, evaluate their telehealth experiences, and inform how telehealth could be used most effectively in the future. It was determined that telehealth worked best for routine and familiar health issues, as well as when rapport between patients and clinicians was established.

Another study on eConsulta, a teleconsultation service involving doctors and patients, was conducted with a retrospective cross-sectional analysis that aimed to analyze the sociodemographic factors that affect the likelihood of doctors using eConsulta [14]. While Vimalananda *et al.* [5] stated that e-consults were designed to improve access to healthcare expertise for patients and providers without the need for a face-to-face visit and have followed the Preferred Reporting Items for Systematic reviews and Meta-Analysis (PRISMA) statement, conducting a systematic search. Furthermore, telehealth technology explored care providers' existing experience using technology in various contexts and compared their familiarity with telehealth technology's relevant features with the use of quantitative and qualitative analyses, based on the study of Hah and Goldin [15]. As a result of this research, they believe that using unhealthy technology allows them to use health information technology to access health information, confirm diagnoses, and ensure patient safety.

Finally, Banks *et al.* [16] used a qualitative interview study in general practices (GP) to determine whether an e-consultation system improves practice staff's ability to manage workload and access. According to the researchers, this study highlights the challenges of remote consultations, which lack the ability for real-time interactions. Fortunately, as technology advances, innovators create more reasonable and efficient telehealth consultation, allowing many people to adopt and benefit from it during this period of community quarantine. Doubling the cost-effectiveness of e-consultations while helping to reduce their complexity can initially lead to a greater perceived relative advantage, while also endorsing trialability and observability, two innovation attributes that can increase adoption rates [17]. If these telehealth consultations are proven to be more reasonable today than in the past, there is little risk for potential adopters to try out the innovation, increasing its trialability, especially if it brings attention to a riskier and less user-friendly application. Largely increasing trialability and observability, aided by the product's perceived relative advantage, compatibility, and significantly reduced complexity (or simplicity), can all contribute to an increasing trend, resulting in a popularization effect or what [17] alluded to as the juncture of a "large population" when an innovation's adoption rate becomes independent.

B. Telehealth Channels

According to the study of Marin *et al.* [18], telehealth systems use online, telephone, and text messaging systems to provide healthcare services to patients. These methods are normally used for: (1) patient care and management, such as diagnosis, consultation, and instruction; (2) educational applications, such as physician education, health staff training, and patient education for disease management and preventive care; and (3) administration and communication, such as exchanging information with insurers, lab services, and scheduling. A critical step in pursuing a comprehensive telehealth strategy is determining which reimbursable services your organization will offer through which channels such as the following synchronous communication technology: (1) Video Visit – Apple FaceTime, Facebook Messenger video chat, Google Hangouts video, WhatsApp video chat, Zoom, or Skype (2) Telephone (including video visits with low bandwidth) – landline, wireless, or internet real-time voice options. (3) Webchat – Signal, Jabber, Facebook Messenger, Google Hangouts, WhatsApp, or 5 iMessage. End-to-end encryption is typically used on these platforms, allowing only the individual and the person with whom the individual is communicating to see what is transmitted. Asynchronous messaging technology can also be utilized to eliminate wait times and overcome language and cultural barriers. It has been particularly effective in specialties such as dermatology and even urology, where imaging is critical. Advanced providers use web AI to facilitate real-time chat, asynchronous texting, and online messaging [19].

C. Diffusion of Innovations Theory

The diffusion of Innovations theory was the selected theoretical lens for this as its approach seeks evolution or "reinvention" of products and behaviors to better meet the needs of individuals and groups as the primary goal. The innovations themselves, rather than people, are the units of analysis in the diffusion of innovations. Studies on telemedicine have shown success in reducing the

geographical and time barriers incurred in receiving care in traditional modalities with the same or greater effectiveness, according to the researchers [9]; However, a number of barriers were identified during their study that must be addressed in order for telemedicine technology to spread. Technically challenging staff was regarded as a problem, followed by opposition to change, cost, reimbursement, patient age, and level of knowledge. Some of the downsides of using telehealth, according to another study [20], are limits in doing full physical examinations, technical challenges, security breaches, and regulatory restrictions. Some telehealth detractors have expressed concerns that telehealth could jeopardize the continuity of care, claiming that online interactions are impersonal and unsafe because the virtual clinician lacks the benefit of a comprehensive history and physical examination to aid diagnosis and treatment. Given the barriers to telehealth adoption, this research would like to explore the current rate at which telehealth is being used at a local setting using diffusion of innovations theory as its theoretical lens. "Diffusion is the process by which an innovation is conveyed through certain channels over time among the members of a social system," according to the study of Everett *et al*. [21].

Diffusion of innovations, Roger's psychology, and sociological theory investigate the communication aspects of how innovations get adopted. Innovation diffusion study has several distinct characteristics, including a lack of prior knowledge about innovation and the relevance of attitude modification and decision-making. There is a "high degree of uncertainty in finding information about and deciding to adopt and implement an innovation" because it is a novel concept to the targeted audience. Finally, innovation is exploited as it is approved and adopted. The innovation process entails becoming aware of an idea, forming an attitude about it, deciding whether or not to accept it, putting the innovation into action, and assessing the decision. Interpersonal communication can also play a role in the acceptance of innovation at various stages. Bass' Model [22] identified mass media and word-of-mouth as the two most powerful factors in innovation adoption in 1969. Although mass media can play a significant role in the initial awareness stage of diffusion, interpersonal communication is frequently used during the decision-making process [21], "A person evaluates a new idea and decides whether or not to adopt it based on discussions with peers who have already adopted or rejected the innovation". The importance of opinion leaders in the invention diffusion process is demonstrated by this reliance on peers. Although the media can be utilized as a tool, more direct and personal communications can be used to reach opinion leaders, who then influence decision-makers. As Everett [23] demonstrated, how people react to new ideas follows a natural curve called a diffusion curve (see Fig. 1). This hypothesis attempts to explain how, why, and when new ideas and technology spread.

Adoption category traits were outlined by Rogers (1995):

1) Innovators: venturesome visionaries (2.5%). Innovators, according to the study of Everett [23], have a strong interest in new ideas, which causes them to leave their local peer group and join a more "cosmopolite" social group. They are crucial in the launch of a new innovative venture. Ability to comprehend difficult technical information, ability to manage ambiguity regarding innovations at the time of adoption, and ability to accept setbacks when an innovation proves unsuccessful.
2) Early Adopters. Respected opinion leaders who are viewed as technology evangelists (13.5%). Early Adopters are a member of the social systems of their communities. Early Adopters are "localities", while Innovators are "cosmopolites." They are the ones who should be consulted before using an innovation [23].
3) Early Majority. These are ahead of the curve and willing to make safe business investments (34%). The Early Majority is the group of people who adopt new ideas before the ordinary person. They connect with their peers constantly, but they are rarely opinion leaders that lead [23].
4) Late Majority. Skeptical but eventually adopt (34%). Because of organizational necessity or increased peer pressure, the late majority adopt new ideas after the average number of members is [23].
5) Laggards. Traditional, few opinion leaders, isolated in their group, suspicious of change agents, and resistant to innovations (16%). Laggards have the most "local" perspective on developments and are wary of innovations and change agents. It is worth noting that some individuals may be Laggards in one area and Innovators or Early Adopters in another [23].

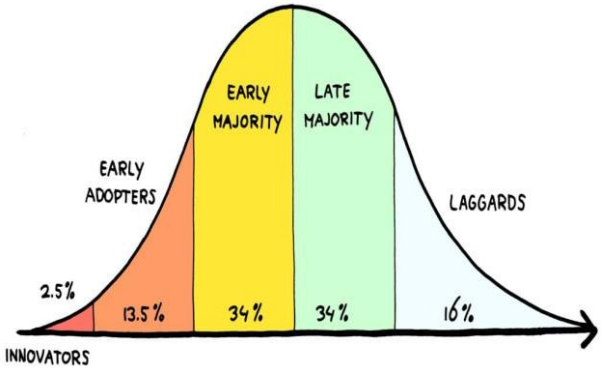

Fig 1. Diffusion curve [22].

Everett *et al*. [21] observe that only a few early adopters of the idea are willing to do so. When these innovators begin to tell their peers about the innovation, it leads to a higher rate of adoption. Diffusion slows down after this period of rapid expansion, leaving just a tiny number of late adopters.

D. Five Stages in the Innovation Decision Process

Everett [23] detailed the five stages of the innovation decision-making process, as well as the factors that impact the adoption of a new concept, product, or practice. These stages are linked to the new technologies that public relations professionals must embrace. Knowledge (exposure and understanding); persuasion (developing an attitude); decision (commitment to adoption); implementation (usage); and confirmation (reinforcement because of positive outcomes) are the five steps that innovation goes through on its road to being accepted.

There are characteristics of innovations that affect the rate at which they diffuse and are adopted based on these five

stages in the innovation-decision process (Fig. 2). These characteristics are used to describe innovation, and it shows how individuals' perceptions of these characteristics predict their rate of adoption and discusses adoption. The researcher concluded that these characteristics would result in the study's theoretical contributions.

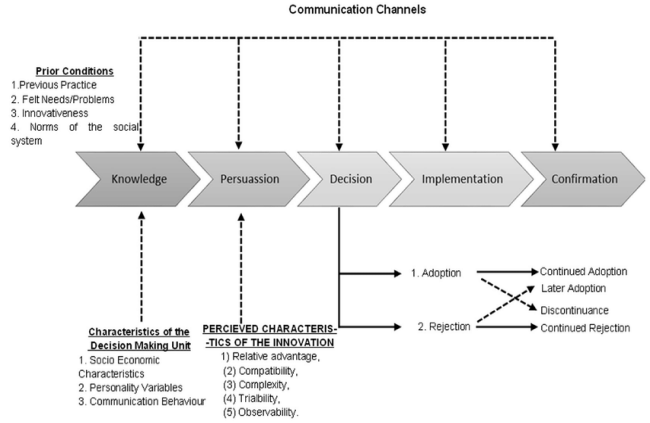

Fig. 2. A model of five stages in the innovation-decision process.

According to Rogers, the five attributes of innovations are the following:

1) Relative Advantage. This is the extent to which an innovation is perceived as superior to the idea it replaces by a specific group of users, as measured in terms that are important to those users, such as economic advantage, social prestige, convenience, or satisfaction. The greater an innovation's perceived relative advantage, the faster it is likely to be adopted.
2) Compatibility. This is the degree to which a potential adopter perceives an innovation to be consistent with their values, prior experiences, and needs. An idea that is incompatible with their values, norms, or practices will not be adopted as quickly as a compatible innovation.
3) Complexity. This is the degree to which an innovation is perceived as difficult to grasp and apply. Innovations that require the adopter to develop new skills and understandings are adopted more quickly than innovations that require the adopter to develop new skills and understandings.
4) Trialability. This is the extent to which an innovation can be tested on a small scale. A trialable innovation represents less uncertainty to the individual considering it.
5) Observability. Individuals are more likely to adopt an innovation if they can easily see the results of it. Visible outcomes reduce uncertainty and promote peer discussion of a new idea, as friends and neighbors of an adopter frequently inquire about it.

These five characteristics, according to [17], account for between 49 and 87 percent of the variation in new product adoption. These five qualities make an excellent checklist for framing project evaluations. They can help identify flaws in products or behaviors that must be addressed when improving them.

V. Methodology

The study used a mixed-methods approach, which included both quantitative (data from user surveys) and qualitative (data from focus groups). The qualitative design aspects were used to provide extensive data on telehealth innovation perspectives and experiences, while the quantitative data supplied factual information on telehealth (e-consultation) innovation usage and adoption.

A. Data Collection

Quantitative data was gathered through an online survey that ran from August 20 to August 26, 2021. Sampling was done via convenience sampling with an online survey questionnaire based on the research of Atkinson [24]. Similarly, this questionnaire was used to seek key perceived features of innovations to better understand why some ideas are swiftly conveyed and embraced while others fail to appeal to a large number of individuals. Question 1-10, utilizing a 5-point Likert scale ranging from strongly disagree (1) to strongly agree (5), were adapted from another survey questionnaire published by Nijland *et al.* [25] that was designed to identify the adopter categories as the descriptions in innovation characterization (e.g., venturesome, eager, suspicious, and resistant). This allowed the researchers to identify potential adopters, specifically those who plan to use e-consultations based on their predicted views of innovative qualities, as recommended by the diffusion of innovations theory. In addition, demographic data of the population participating in the study was obtained. Completion of the online survey was voluntary for all the users who have experienced and are inexperienced in using the telehealth (e-consultation) innovation. Meanwhile, semi-structured interviews were employed for extracting in-depth information about telehealth innovation experience and use, as well as thoughts on telehealth adoption in healthcare settings. The following guide questions centered on the following themes: (1) Perceptions of innovations, (2) Adoption of innovations, (3) Dissemination of the innovation information, and (4) Awareness of innovations. Moreover, 30 respondents were interviewed to provide more context to the quantitative responses.

B. Data Analysis and Validation

The data collected from the online survey questionnaire were analyzed using descriptive statistics. Meanwhile, interviews were recorded and then transcribed in order to facilitate a thematic analysis, with inductive reasoning as the resulting output [26]. To validate the results, consultations with statisticians and expert interviews were conducted.

C. Reflexibility in Qualitative Research

The exploration of discovering how researchers is shaped and formulated by the research process and outcome is an iterative and inspiring process [27]. Researchers that practice reflexivity recognize the changes they have undergone because of the research process and how these changes have influenced the research process.

VI. Results and Discussion

A collected response of a total of 181 patients, both experienced and novice in telehealth technologies were analyzed in the study. The findings of the 181 users are

described in this study using Rogers' adopter categories, which include innovators, early adopters, early majority, late majority, and laggards. Table 3 shows that most users were male (61%) and female (39%). The survey was completed by 110 males (60.8%) and 71 females (39.2%), according to the combined frequency of analysis of the participants' gender (n = 181).

Table 3. Gender of participants

Gender	Frequency	Percent	Valid Percent	Cumulative Percent
Male	110	60.78%	61%	61
Female	71	39.22%	39%	100
Total	181	100.00%	100%	

According to the combined frequency of analysis, the majority of the online survey participants (63.5%) were between the ages of 20 and 25, as shown in Table 4 below:

Table 4. Age group of participants

Age Grouped	Frequency	Percentage
20–25	115	63.54%
26–30	11	6.08%
31–36	9	4.97%
37–44	19	10.49%
45–50	12	6.63%
51–59	7	3.87%
60 or above	8	4.42%
Total	181	100%

RQ1. What are the adopter categories of the patients utilizing telehealth channels in the private healthcare setting?

Based on the results indicated in the table below, the following adopter categories were formed (from the findings of the online survey questionnaire):

A. Innovators

Table 5 depicts the innovation characteristics of the combined questions 1 and 6 (n=181). It shows that 79% of the respondents view themselves as innovators. The demographics of young adults (20-25) and adults (31-44) who lived during the 2nd and 3rd industrial revolutions, which promoted technology and adaptation to innovative technologies, were the driving force behind the results. These people lived at the dawn of the digital era or during the transition to digitalization.

B. Early Adopters

12.71% of the respondents view themselves as Early Adopters based on the innovative features of the combined questions 2 and 7 (n = 181). Early Adopters are like Innovators, these are individuals who leans more towards adopting newer technologies, they may be reluctant to dive in as the front runners in getting or trying these new technologies, but they are the positive ones to adopt it once Innovators provides their insight in these products, the age bracket within this group is also consist of younger people which may largely influenced by the digital revolution.

C. Late Majority

The frequency analysis of the combined questions 4 and 9 (n = 181) shows that 8.29 percent of the respondents consider themselves to be in the Late Majority, with a total of 15 respondents aged 51 to 60 or older, the majority of which are college graduates. Apart from that they are aware of the aim of telehealth developments, they were primarily motivated to utilize telehealth due to peer pressure, evolving standards, or economic needs drive these people to adapt. A majority of the group of early adopters still prefer to have their consultations done in the traditional method, where they may speak with medical experts about their conditions in person.

D. Early Majority and Laggards

The results for the category of Early Majority and Laggards were 0% based on the combined innovation characteristics of questions 5 and 10 (n = 181). This was a probable result due to the respondents being mostly from a young-aged bracket and having high educational attainment. Patients belonging to the older age bracket were also technologically averse, hence the results favored Innovators and Early Adopters.

For figure axis labels, use words rather than symbols. Do not label axes only with units. Do not label axes with a ratio of quantities and units.

Table 5. Rate of adopter categories

Age	No. of Resp	Total%	Innovators	Early Adopters	Early Majority	Late Majority	Laggards
20–25	115	63.54%	**4.13**	3.98	3.83	3.77	2.87
26–30	11	6.08%	4.14	**4.18**	3.91	3.41	2.36
31–36	9	4.97%	**4.50**	4.22	3.72	3.83	2.61
37–44	19	10.49%	**4.08**	4.05	3.74	3.58	2.50
45–50	12	6.63%	4.25	**4.29**	3.79	3.58	2.58
51–59	7	3.87%	3.50	3.71	3.43	**3.71**	2.93
60 ^	8	4.42%	2.88	3.25	3.25	**3.69**	2.56
Total%			**79.00**	**12.71**	0.00	**8.29**	0.00

RQ2: How does the perceived attribute rate vary among the adopter categories?

E. Innovators with Perceived Relative Advantage

Innovators had perceived relative advantage as the highest mean average of 4.265. One of the factors would be how they are able to save time driving to hospitals or specialized clinics. Most of the respondents are very satisfied with the use and purpose of the telehealth innovations as they expressed that difference is not significant as when consultations are done via in person. The respondents felt that using e-consultation is highly timely and valuable because essentially as it saves time, money, and energy. During the COVID-19 outbreak, the results was supported by the article of [8] from which they determined that the role of telehealth services is to prevent, diagnose, treat, and control diseases (chronic and non-chronic), as well as a tool that provides care while keeping patients and health providers safe.

F. Early Adopters with Perceived Compatibility

Early adopters had perceived compatibility as the highest perceived attribute value. The variable on "the innovations are an acceptable way to receive healthcare services" got the highest mean average of 4.088 which made the respondents satisfied with the features that the innovations have and the lowest of 3.873 refers to "I find it easy to get the innovations to do what I want it to do." While the FGD results are consistent with the quantitative results, most respondents agreed that using telehealth innovation (e-consultation) during the pandemic is very timely because it eliminates the need to travel to hospitals or clinics, reduces exposure to the coronavirus threat, and provides the same services as in-person visits. A total of 5 out of 30 respondents have used e-consultation and have openly expressed their experiences with it, including how easy it was to use and implement, as well as the benefits they received while doing so. According to the study of Hurt *et al*. [28], e-consultations were created to increase patients' and health professionals' access to healthcare knowledge without the necessity for a face-to-face encounter.

G. Early Majority with Perceived Trialability

The highest mean average for early majority was 3.464 for "technology often behaves in unexpected ways," which received a satisfaction rating from the respondents, while the lowest variable was 2.564 (unsatisfied) for "I don't feel sure about my abilities to exploit the advancements." Those in their 50s, 60s, and older agreed that adopting telehealth innovation is acceptable, but they are confident enough to use it for an extended period since they are not technologically averse. The FGD results show that out of the 30 respondents, 6 (2-Male & 4-Female, in particular) are in their 20s, while the females are 20 and between 44 and 54 years old. The males stated that they do not have the resources, that they do not want to influence others to use it, and that they still believe in traditional doctor consultations; and the females stated that telehealth innovation is difficult, that they need to ask for assistance in navigating the application, but they all agreed that e-consultation is somewhat creative but challenging, especially for people like them. Other respondents, on the other hand, were enthusiastic about accepting and adopting the telehealth innovation, particularly in the face of pandemics. Sugarhood *et al*. [12] found that one of the factors influencing the adoption, implementation, and continued use of telecare technologies was the use of a single qualitative study that looked at not only individual acceptance and ease of use of the technology but also the implications for social relationships between users.

H. Late Majority with Perceived Trialability

This category is oriented on perceived trialability as its highest perceived attribute. This refers to "being able to try out the innovations is important in my deciding factor whether or not to use it" got the highest mean average of 4.144 that gives a satisfaction rating, and the variable "I often become confused when I use the innovations" got the lowest mean average of 3.028. According to the qualitative data, the majority of respondents stated that they wanted to explore telehealth innovation and learn more about the features and benefits it may provide to users. One of the responders stated that he is still attempting to adopt the innovation and is still learning it. They also stated that they intended to share and educate others about the benefits of e-consultation both during the pandemic and after things have returned to normal.

I. Laggards with Perceived Observability

The variable perceived observability of the quantitative data analysis results received the highest mean score of 4.138, indicating that "other users seemed interested in innovations when they saw other individuals using it," which is a satisfaction rating from the respondents; while the variable with the lowest mean score of 3.138 indicates that "using innovations is difficult and complex to learn." Respondents in their 50s, 60s, and older intended to try the telehealth innovation just during the pandemic outbreak, similar to perceived complexity, but still preferred a face-to-face meeting with their healthcare practitioner. While the others were worried about the accuracy of the results of the online consultation. It was supported and agreed upon byGajarawala and Pelkowski [20] as one of the disadvantages of telehealth innovations in terms of its limitations in performing full physical examinations, technical challenges, security breaches, and some expressed their concerns that telehealth could impede the continuity of care and could provide inaccurate diagnosis and treatment results. On the other hand, the qualitative results, from the FGD, showed that information and advertisements illustrated in social media about different e-consultation applications and awareness from communication channels like TV news added a piece of information and realization and the benefits that it can give to users. Another finding made by the respondents is that individuals are more likely to accept the technology because of their friends and relatives who have used and tried the telehealth technology.

VII. Conclusion and Future Works

This research gives an understanding on how various stakeholders can help improve the scale and spread up on telehealth use especially in the time of the COVID-19 pandemic. Private health care providers and other stakeholders may craft telehealth procedures and policies customized to the patient adopter category such as implementing governance mechanisms, capacity building (technical and clinical quality, accountability), financing health (accreditations, insurance, and payments systems), laws and policies (data privacy), and improving the national ICT infrastructure (safety and modality). Given the situation, all respondents were inclined to the use of telehealth innovations. Telehealth would have a relative advantage over traditional or face-to-face consultations; telehealth innovations are consistent with their existing values and needs; and telehealth innovations are visible, with others showing interest when they saw others using them, according to the findings of this study. While a few participants disagreed that innovations are difficult and complex to learn, they did agree that more time is needed to discuss, study, or instruct others about the innovations to make them aware of the benefits that they can provide to individuals. Future

researchers may want to do a more in-depth investigation of the perceptions and expertise of a different group of users, such as medical specialists, in terms of telehealth adoption during and after a pandemic outbreak. A greater and equal distribution of headcount amongst the different age brackets in order to construct a Bell-curve representation for the rate of adoption categories may be used. Improving focus group interview questions to gain a better grasp of the framework. The author developed a self-report innovativeness scale to assess an individual's willingness to change. The use of this 20-item scale to classify those who are keen to change could aid in the prediction of innovation adoption. Future research could benefit from adopting this scale to broaden the adopter categories' innovation characteristics.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

AUTHOR CONTRIBUTIONS

The authors have made important and complex contributions to the project's achievements in this research endeavor. To begin, the authors were instrumental in developing and framing the research questions, identifying gaps in the existing literature, and establishing the study's main objectives. Furthermore, the author RT conducted a comprehensive evaluation of important academic sources, integrating the existing knowledge base and establishing a solid foundation for the theoretical framework of the research. Furthermore, the authors RT and DR actively participated in the data collection process, methodically obtaining, categorizing, and evaluating primary data using diverse approaches. The skills and insights of the authors were critical in interpreting the findings and making significant conclusions. Finally, the author RT wrote and revised the research article, and reviewed by the author DR ensuring clarity and coherence in the presentation of data and their consequences. The authors' collective efforts have been essential in advancing the field and deepening understanding of the research issue.

ACKNOWLEDGMENT

The author is eternally grateful to her colleagues, educators, and mentors for their encouragement and support during my research. Her batchmates were crucial in creating a collaborative and interesting academic environment in which ideas were freely discussed and constructive feedback was provided. Their various points of view and participation in conversations considerably enriched the study process. Her educators' depth of knowledge and skill provided invaluable insights and guidance at every stage of her study, ensuring that she maintained a rigorous and scholarly approach. The author also wants to thank her mentor, whose unrelenting dedication and guidance have been a constant source of inspiration for her. Their advice, patience, and breadth of knowledge were important in determining the direction and quality of the research. These individuals have collectively contributed greatly to the depth and range of her study, and she is extremely grateful to have had such a supportive academic community on which to rely.

REFERENCES

[1] M. Jones, *HealthCare: How Technology Impacts the Healthcare Industry*, pp. 2–7, 2018.
[2] R. Galiero *et al*., "The importance of telemedicine during COVID-19 pandemic: A focus on diabetic retinopathy," *Journal of Diabetes Research*, 2020. https://doi.org/10.1155/2020/9036847
[3] M. Colucci, "Communication technologies through an etymological lens: looking for a classification, reflections about health, medicine, and care," *Medicine, Health Care and Philosophy*, 2015. https://doi.org/10.1007/s11019-015-9657-2
[4] *GPs Move to Digital RST*, March 2020.
[5] V. G. Vimalananda *et al*., "Electronic consultations (e-consults) to improve access to specialty care: A systematic review and narrative synthesis," *Journal of Telemedicine and Telecare*, 2015. https://doi.org/10.1177/1357633X15582108
[6] L. R. Kalankesh, F. Pourasghar, L. Nicholson, S. Ahmadi, and M. Hosseini, "Effect of telehealth interventions on hospitalization indicators: A systematic review," *Perspectives in Health Information Management*, 2016.
[7] G. Ducanes and S. L. Daway-Ducanes, "Need to increase supply of medical workers and build telemedicine infrastructure to prepare for future public health crises," *BusinessWorld*, 2020.
[8] E. Monaghesh and A. Hajizadeh, "The role of telehealth during COVID-19 outbreak: A systematic review based on current evidence," *BMC Public Health*, 2020. https://doi.org/10.1186/s12889-020-09301-4
[9] C. S. Krus *et al*., "Telehealth and patient satisfaction: A systematic review and narrative analysis," *BMJ Open*, 2017.
[10] N. K. Bradford *et al.*, "Correction: Telehealth services in rural and remote Australia: A systematic review of models of care and factors influencing success and sustainability, *Rural and Remote Health*, 2016.
[11] S. Doraiswamy *et al*., "Use of telehealth during the COVID-19 pandemic: Scoping review," *Journal of Medical Internet Research*, vol. 22, no. 12, pp. 1–15, 2020. https://doi.org/10.2196/24087
[12] P. Sugarhood, J. Wherton, R. Procter, S. Hinder, and T. Greenhalgh, "Technology as system innovation: A key informant interview study of the application of the diffusion of innovation model to telecare," *Disability and Rehabilitation: Assistive Technology*, 2014. https://doi.org/10.3109/17483107.2013.823573
[13] F. Imlach *et al*., "Telehealth consultations in general practice during a pandemic lockdown: survey and interviews on patient experiences and preferences," *BMC Family Practice*, vol. 21, no. 1, pp. 1–14, 2020. https://doi.org/10.1186/s12875-020-01336-1
[14] O. S. Fernandez *et al*., "Primary care doctor characteristics that determine the use of teleconsultations in the catalan public health system: Retrospective descriptive cross-sectional study," *JMIR Medical Informatics*, vol. 8, no. 1, 2020.
[15] H. Hah and D. Goldin, "Exploring care providers' perceptions and current use of telehealth technology at work, in daily life, and in education: Qualitative and quantitative study," *JMIR Medical Education*, vol. 5, no. 1, pp. 1–18, 2019. https://doi.org/10.2196/13350
[16] J. Banks *et al*., "Use of an electronic consultation system in primary care: A qualitative interview study," *British Journal of General Practice*, 2018. https://doi.org/10.3399/bjgp17X693509
[17] E. M. Rogers, "Diffusion of innovations," *BT-Diffusion of Innovations*, 5th Edition, 2003.
[18] H. Marin *et al*., "Global health informatics: How information technology can change our lives in a globalized world," *Global Health Informatics: How Information Technology Can*, 2016.
[19] W. I. S. Telehealth, *The Ultimate Guide to Improving Access, Revenues, and Outcomes with Telehealth*, pp. 1–20.
[20] S. N. Gajarawala and J. N. Pelkowski, "Telehealth benefits and barriers," *Journal for Nurse Practitioners*, 2021. https://doi.org/10.1016/j.nurpra.2020.09.013
[21] M. Everett *et al*., "Diffusion of innovations," *An Integrated Approach to Communication Theory and Research*, Third Edition, 2019.
[22] V. Mahajan, E. Muller, and F. M. Bass, "New product diffusion models in marketing: A review and directions for research," *Journal of Marketing*, 1990. https://doi.org/10.2307/1252170
[23] M. Everett, *Diffusion of Innovations*, Fourth Edition, 1995.
[24] N. L. Atkinson, "Developing a questionnaire to measure perceived attributes of eHealth innovations," *American Journal of Health*, 2007.
[25] N. Nijland *et al*., "Increasing the use of e-consultation in primary care: Results of an online survey among non-users of e-consultation," *International Journal of Medical Informatics*, 2009. https://doi.org/10.1016/j.ijmedinf.2009.06.002

[26] J. Richie and L. Spencer, "Qualitative data analysis for applied policy research," in: A. Bryman & R.G. Burgess (Eds), *Analyzing qualitative data*, pp. 173–194, 1994.
[27] E. C. Palaganas *et al*., "Reflexivity in qualitative research: A journey of learning," Qualitative Report, 2017.
[28] H. T. Hurt, K. Joseph, and C. D. Cook, "Scales for the measurement of innovativeness," *Human Communication Research*, 1977. https://doi.org/10.1111/j.1468-2958.1977.tb00597.x