

**TO STUDY THE KNOWLEDGE, ATTITUDE AND PERCEPTION OF OLDER
ADULTS TOWARDS DIGITAL HEALTH**

Dissertation Submitted to



The IIHMR University, Jaipur

for the partial fulfilment for the award of the degree of

Master of Business Administration (MBA)

in

Hospital and Health Management

by

Dr Aishwarya Satija

Under the Supervision and Guidance of

Dr. Vinod Kumar SV

2022

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DECLARATION BY STUDENT

I hereby declare that this dissertation titled **A Study on Knowledge, Attitude and Perception of Older Adults towards Digital Health** is the bonafide record of my original research work. I declare that it has not been submitted to any other university or institution for the award of any degree or diploma. Information derived from the published or unpublished work of others has been duly acknowledged in the text.

Dr Aishwarya Satija

Date

CERTIFICATE

This is to certify that Dr Aishwarya Satija in partial fulfilment of the requirements for the award of the degree of MBA (Hospital and Health Management from the IIHMR University, Jaipur) has successfully completed her internship at IPE Global, Delhi from March 21, 2022 to June 30, 2022.

Place: Delhi

Preceptor/Head of the Organization

Date:

Name of the organization

CERTIFICATE

This is to certify that dissertation titled **A Study on Knowledge, Attitude and Perception of Older Adults towards Digital Health** is a record of the research work undertaken **Dr Aishwarya Satija** in partial fulfilment of the requirements for the award of the degree of MBA (Hospital and Health Management) from the IIHMR University, Jaipur under my guidance and supervision and his/her approach to the research study has been sincere, scientific, and analytical.

Faculty Guide

IIHMR University, Jaipur
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Date

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IIHMR University,

Date

ABSTRACT

Introduction: Age, a key factor in digital exclusion, is one of the biggest obstacles to adopting online health services. The use of online patient portals and the adoption of new information technology are less common among older persons than among younger ones. They also tend to have poor computer abilities, adding to their aversion to using internet services. It is crucial to comprehend the end-users' levels of knowledge, attitude, and perception before implementing digital health techniques to improve access to healthcare

Study Objectives:

1. To assess the current level of knowledge and awareness of various digital health services and platforms (teleconsultations, e-pharmacy, health tracking apps, e-diagnostic services) among older adults
2. To evaluate the attitude regarding the usage of digital health technology in older adults
3. To assess the perception of older adults towards digital health services (teleconsultations, e-pharmacy, health tracking apps, e-diagnostic services)
4. To assess the challenges faced by the older adults in adoption of digital health

Methodology: A cross-sectional study was carried out between March 2022 and June 2022. The Snowball sampling method was used and around 113 responses were received who had successfully completed the questionnaire made via Google Form and had fulfilled the inclusion criteria. The responses were then analysed across age, gender and qualification.

Results: The study revealed that while the access to digital health services has increased tremendously post-pandemic, a significant percentage of the older adults still do not access these services and prefer the traditional way of using health services. The majority of the respondents did however have some idea about digital health services. The major challenges faced by the r adults are the lack of understanding of these services and some privacy concerns. Along with this, a much greater problem is the perception of the older adults about the price of these services.

Conclusion: The study concluded that the knowledge of older adults is high in several aspects. The general attitude and perception about these services are good. However, However, there is still a long way to go in increasing the accessibility of the digital health

services by older adults since certain apprehensions regarding the cost, privacy and credibility of these services are still present. Therefore, increased attention must be paid on growing awareness among older adults through targeted campaigns, workshops, self-help groups and NGOs to increase the adoption of digital health services.

Key Words: Digital Health, mHealth, e-Health, Knowledge, Perception

ACKNOWLEDGEMENT

I am highly grateful to acknowledge everyone who has supported me to put this project together beyond simplicity and into something meaningful.

The experience I gained while working in IPE Global, New Delhi in these three months helped me obtain the practical exposure that I missed due to the online classes.

I would want to express my gratitude to **Ms Deepika Joshi** (Senior Manager in the Health, Nutrition and Wash Department at IPE Global) for giving me the golden opportunity to intern at this esteemed organization and for making it such an enriching experience. I am ready to take all her guidance to wherever I go in my career.

I would like to give a special mention to the entire team of Health, Nutrition and WaSH Department who have cooperated with me during my entire internship period till the completion of this project.

Any attempt at any level would not have mattered had it not been for **Dr. Vinod Kumar SV Sir** for being the major guiding force in making this project reach its last stage.

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Abbreviations

1.	CF	Community Forum
2.	e-Health	Electronic Health
3.	EHR	Electronic Health Record
4.	e-pharmacy	Electronic Pharmacy
5.	ICT	Information and Communications Technology
6.	IT	Information Technology
7.	mHealth	Mobile Health
8.	mHAs	Mobile Health Application
9.	NGOs	Non-Governmental Organisation
10.	OPD	Out Patient Department
11.	w.r.t	With Respect to
12.	WHO	World Health Organisation

A STUDY ON THE KNOWLEDGE, ATTITUDE AND PERCEPTION OF OLDER ADULTS TOWARD DIGITAL HEALTH SERVICES

1. INTRODUCTION

Digital health refers to the use of information and communications technologies in medicine and other health professions to manage illnesses and health risks and to promote wellness.

Digital health technology is now a vital part of how healthcare is delivered. Mobile health (mHealth), health information technology (IT), wearable technologies, telehealth and telemedicine, and personalised medicine are all included in the broad definition of digital health.[1] The primary subcategories of digital health include Telemedicine, Remote sensing and wearables, Data analytics and artificial intelligence, Electronic Health Records (EHRs), Patient -physician-patient portals, Diagnostics and health information. [2]

The world has witnessed a massive boom in the health tech market for the products such as mHealth apps, telemedicine, wearables, etc., post-pandemic. Not only this, enormous research and development have gone into integrating these technologies with pharmaceuticals and healthcare. The adoption and expansion of digital health solutions have revolutionised how individuals all over the world receive healthcare services to advance and safeguard their health and wellbeing.

WHO predicts that by 2050, there will be twice as many persons over 60 as there were in 2015, reaching over two billion.[3] By 2050, India is anticipated to have 315 million people over the age of 60, more than three times the number that was recorded in 2011.[4] The ageing population can prove to cause economic as well as social consequences on the society and health system in India.

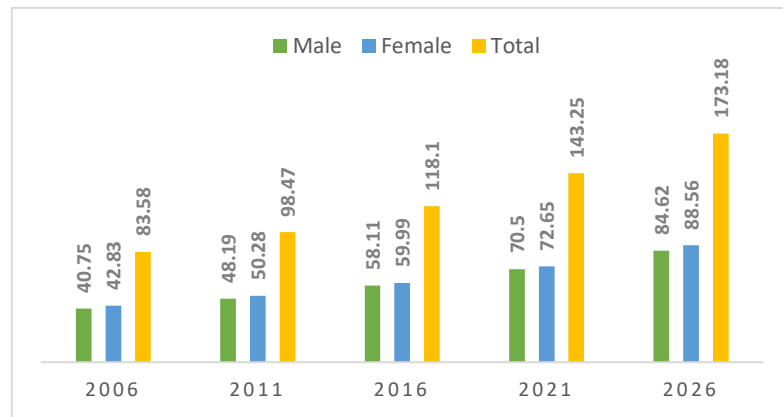


Figure 1.1: Ageing population projection in India
Source: SRS Report, Census of India 2010

Chronic diseases are more common as people get older. These conditions affect older people's independence and quality of life, putting more pressure on individuals, communities, and healthcare systems. [5] Patients with chronic illnesses, such as diabetes, adopted digital channels for disease management and control during the pandemic.

India has around 560 million internet users. This makes it the second largest online market. However, there are significant differences in usage based on age, socioeconomic position, gender, and geographic location. Smartphone adoption is roughly 54% but only around 6% among 50 and above. [6] As more and more services migrate to digital platforms, internet connection and digital literacy are becoming increasingly crucial for participation and access to healthcare, social, and economic services. Greater familiarity with digital tools among India's rapidly rising elderly population will reduce dependency, promote autonomy, and boost self-worth.

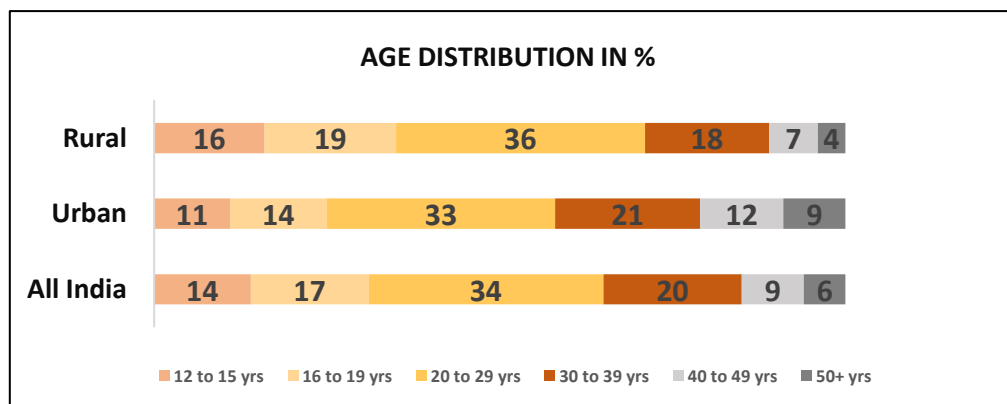


Figure 1.2: Distribution of Internet users by Age in India
Source: IAMAI Round 2 Report (2019)

Older adults are thought to be regular users of the e-Health service since they are more prone to have a variety of health conditions. However, it can be observed that the millennial generation is the most common internet user in India and that many older adults consider technology too costly and prefer to accomplish things the "old-fashioned" way.

Age, a key factor in digital exclusion, is one of the biggest obstacles to adopting online health services. The use of online patient portals and the adoption of new information technology are less common among older persons than among younger ones. They also tend to have poor computer abilities, adding to their aversion to using internet services.

Telemedicine, became more popular as a result of the dramatic rise in the demand for internet-based services during the COVID-19 pandemic. Due to the vulnerability and high rate of comorbidities, older persons have shown to be particularly important to serve. They are highly likely to suffer from mental and physical problems, making timely access to healthcare facilities difficult.

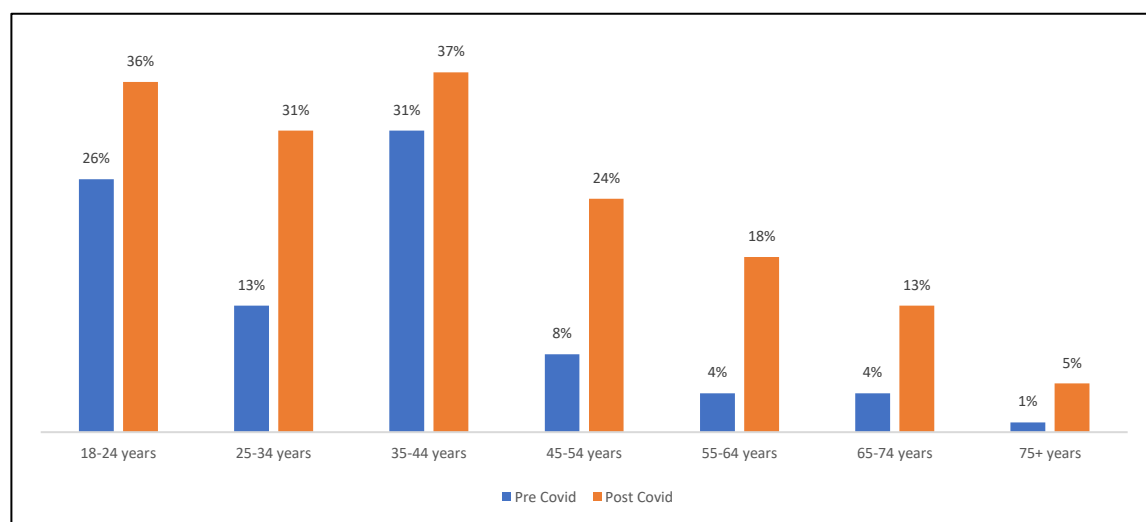


Figure 1.3: Age wise Comparison of pre and post-pandemic utilisation of telemedicine in India, 2020
Source: Statista

The majority of the elderly are weak, and are likely to only live with their spouses. In such cases, the arrangements for their health-care visits can prove to be highly exhausting and stressful for children and family living far away from their elderly parents. These factors lead to older persons seeking emergency care more frequently than routine outpatient care (OPD). As a result, home-based care has long been a convenient and popular way to serve this population. There are now devices for self-monitoring at home and therefore, emergency visits can be avoided and OPD visits can be maximised by integrating the self-monitoring performed at home and teleconsultations.

Such knowledge is necessary to develop initiatives that are simple and easy to use so that they could eliminate disparities in access to healthcare services. It is highly important for the initiatives directed towards digital health to be able to cater to the needs and demands of its target audience so that all people irrespective of the age or gender have the required knowledge and attitude towards its use. It is crucial to comprehend the end-users' levels of knowledge, attitude, and perception before implementing digital health techniques to improve access to healthcare.

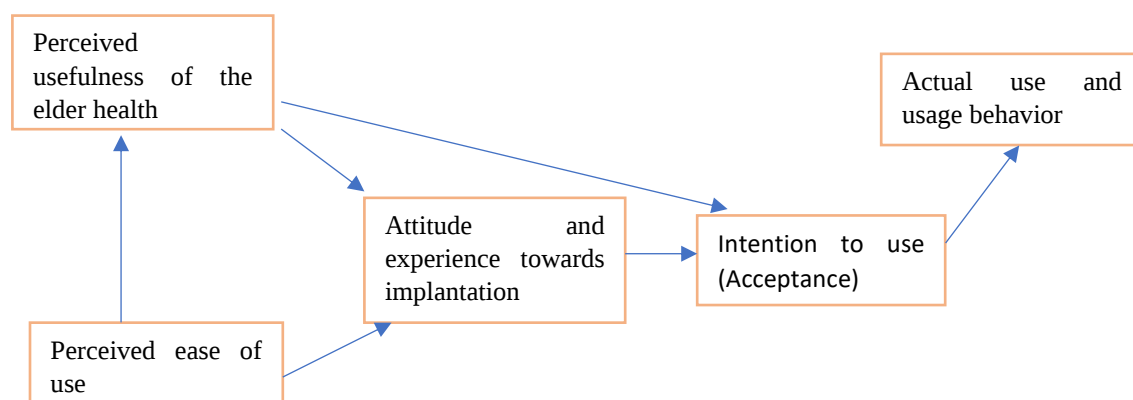


Figure 1.4: The acceptance of technology and mHealth by older adults, adapted from Naeini, 2012

India has a vast potential for growth in geriatric care. In India, geriatric care has enormous growth potential. The government is increasingly guiding policies for this group of population. This industry has experienced significant expansion, but it is expected to consolidate over the next five years. Technology, in my opinion, will play a critical role in the future, especially with the deep prevalence of the internet and the ease with which elders in India utilise mobile phones changing the landscape of healthcare.

1.1 Objectives

1. To assess the current level of knowledge and awareness of various digital health services and platforms (teleconsultations, e-pharmacy, health tracking apps, e-diagnostic services) among older adults
2. To evaluate the attitude regarding the usage of digital health technology in older adults
3. To assess the perception of older adults towards digital health services (teleconsultations, e-pharmacy, health tracking apps, e-diagnostic services)
4. To assess the challenges faced by the older adults in adoption of digital health

2. REVIEW OF LITERATURE

Table 2.1 Literature Review

Title	Name of Author	Objectives	Salient Features
Exploring Telehealth Readiness in a Resource-Limited Setting: Digital and Health Literacy among Older adults in Rural India (DAHLIA) Year: 2022	Tshepo Mokuedi Rasekaba, Pratibha Pereira, Vinaya Rani. G, Riya Johnson, Rebecca McKechnie and Irene Blackberry	To find out how well-literate older people are in the areas of eHealth, digital health, and health, as well as how prepared they are for the world of digital health in rural India	Study Design: Mixed method cross-sectional study on participants above 65 years of age. Sample Size: Focus groups having 8, 9 and 8 participants respectively along with a CF with 33 participants. Study Location: Rural areas of Karnataka, India Key Findings: • Less than 4% of the participants had adequate reading-related health literacy. • Men and educated participants showed significantly higher levels of digital literacy • The median score for e-Health literacy was 24. (males at 79.72 and females at 68.42; secondary education and higher at 90.64, primary education and less at 68.15

The role of age and digital competence on the use of online health and social care services: A cross-sectional population-based survey Year: 2022	T Heponiemi, A-M Kaihlanen, A Kouvonen, L Leemann, S Taipale, K Gluschkoff	To examine whether age is related to online service use To examine whether digital competence might have the capacity to buffer against the possible negative effects of age on online service use.	Study Design: Cross Sectional population based survey Sample Size: 4495 Study Location: Finland Key Findings: The respondents above 60 years were rarely using online health services like receiving laboratory test results, prescriptions renewing and scheduling appointments.
Perception and Initial Adoption of Mobile Health Services of Older Adults in London Year: 2021	Jing Pan, Hua Dong, Nick Bryan-Kinns	To learn the challenges older individuals encounter while adopting mHealth apps for the first time and to comprehend how they perceive mHealth services.	Study Design: Systematic Review of two studies. Study 1 consisted of questionnaires with follow up interviews and a workshop for the trial of mHealth apps was conducted for helping adults aged 50 in Study 2. Sample Size: The first study had 30 participants. The second study has 12 participants. Study Location: London, UK Key Findings: 13% participants used health mobile applications 90% of the respondents use online health services. - The primary benefits related to health were seeking health information, scheduling appointments and the follow up with physicians. - Embedded health platforms were easier to use for the participants - The major barriers in adoption of online health services were low reliability, and risk of privacy leakage.

Attitude and Perceptions towards Healthcare Technology adoption among older adults in Singapore: A qualitative study Year: 2021	Sarah T. H. Low, P. Govind Sakhardande, Yi Feng Lai, Andrew D. S. Long, and Satveer Kaur-Gill	To ascertain older individuals' attitudes and perceptions about healthcare-related technology in Singapore	Study Design: Qualitative exploratory research design. Sample included elderly in the age group of 50 to 65 years. Sample Size: 20 Study Location: Singapore Key Findings: • Among older persons in Singapore, technology is not the primary motivator of health-seeking behaviour. • In Singapore, older persons still prefer traditional way of interactions with medical personnel. They also lack enough facilities and the knowledge on how to benefit from them. • There is a need to provide solutions specifically for the elderly, who have varied knowledge on how to use technology.
Attitudes Towards Digital Health Technology: Introducing the Digital Health Scale Year: 2021	Ridley Cassidy	To determine if age, gender, and frequency of use of digital health technology are possible obstacles to accessing future healthcare in the UK. To study the association between attitude toward digital health technology and age, gender, and frequency of usage.	Study Design: Cross sectional study Sample Size: 247 Location: United Kingdom Key Findings: • There was found to be no relation between age and the attitude toward digital health technologies. • No major difference was observed in the perspective towards digital health with respect to gender • There were also significant variations in frequency of usage, with regular and occasional users reporting more a better outlook than those who had never used

			digital health technology.
Elderly's Attitude towards the Selected types of e Health Year: 2020	Blanka Klimova, Petra Maresova, and Sunwoo Lee	To give empirical information on the ICT usage and attitudes of older individuals in the Czech Republic concerning the chosen eHealth services	Study Design: Non-experimental cross-sectional on adults above 60 years Sample Size: 224 Study Location: Hradec Kralove, Czech Republic Key Findings: • 44% of elders supported eHealth services • Females were more accepting of health-providing ICT devices than males • Younger and highly educated elderly showed more positive attitudes towards eHealth services • Telephonic consultations and receiving reminders for doctor's visits were more preferred eHealth services.
Internet use and need for digital health technology among the elderly: a cross-sectional survey in China Year:2020	Xinran Sun, Wenxin Yan, Hao Zhou, Zhaoqing Wang, Xueying Zhang, Shuang Huang & Li Li	To investigate the present situation of older Internet usage and the physical, psychological, and social aspects that affect it, as well as the demand for smart services among the elderly.	Study Design: Cross-Sectional study on adults aged 60 years and above Sample Size: 669 Study Location: Heilongjiang province of China (Around 13 cities) Key Findings: • The information consumed from Internet was primarily focused on exercise and diet • Increased demand of bracelets and emergency callers • Several socio-demographic characteristics like Gender, age, education, income impacted the Internet use.

The difference in knowledge and attitudes of using mobile health applications between actual user and non-user among adults aged 50 years or older Year: 2020	Mangyeong Lee, Danbee Kang Junghee Yoon, Sungkeun Shim, Dongryul Oh, Soo-Yong Shin Bradford W. Hesse and Juhee Cho	To assess the awareness, perceived advantages, and obstacles of utilising mobile health apps among persons aged 50 and older based on experience with mHAs.	Study Design: A cross-sectional study Sample Size: 323 Study Location: A tertiary hospital in Seoul, Korea Key findings: • 64.1% of the participants were experienced in using mHAs • Participants with more college education and higher income were more experienced • Half of the study participants including those who were experienced didn't have appropriate knowledge of technology
Older Adults' Perspectives on Using Digital Technology to Maintain Good Mental Health: Interactive Group Study Year: 2020	Gunther Eysenbach	To investigate the views of senior citizens on the using technology for promoting mental health.	Study Design: Cross-sectional study on adults above 50 years age Sample Size: 15 Study Location: China Key findings: • The main motivation for older adults to access technology was to improve mood by distraction, normalization.. • The obstacles included fear of consequences and a lack of proper knowledge of digital technologies. • The awareness of websites for mental health was good among the participants. However, awareness alone did not motivate use.

Attitudes towards the use and acceptance of eHealth technologies: a case study of older adults living with chronic pain and implications of rural healthcare Year: 2015	Margaret Currie, Lorna J Philip and Anne Roberts	To determine how persons with chronic pain feel about the current usage and acceptance of technology (such as eHealth and the Internet) in rural health care .	Study Design: The research design had two stages. A postal survey was used in stage 1 to obtain attitudes, opinions, and experiences. The second stage included discussion with seniors with chronic pain of age 60 to 75. Sample Size: 425 Study Location: Pain Association, Scotland, UK Key findings: • Males showed more acceptance towards eHealth technology than females • Higher levels of acceptance was shown by respondents living with no other family member than those who did.
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3. METHODOLOGY

Table 3.1: Research Methodology

<i>Research Question</i>	<i>What is the knowledge, attitude and perception of older adults towards various digital health services?</i>
<i>Study Design</i>	Cross Sectional Study
<i>Study Setting</i>	Urban and Rural Areas of India through an online survey form
<i>Study Duration</i>	21/03/2022 to 17/06/2022
<i>Inclusion Criteria</i>	Older adults aged 60 and above
<i>Exclusion Criteria</i>	• Elderly below 60 years • Older adults with any mental or physical condition unfit for filling the form
<i>Sample Size (n)</i>	113
<i>Sampling Technique</i>	Snowball Sampling
<i>Data Type</i>	Primary Data
<i>Study Tool</i>	Online survey form designed on Google form
<i>Data Collection Method</i>	A semi structured questionnaire was sent through Whatsapp to 150 friends and peers and they were then requested to send it to at least 5 of their known who fall into the criteria of this study. After regular follow ups, the desired sample size was obtained.
<i>Data Analysis Tool</i>	Microsoft Excel
<i>Ethical Considerations (Prior Consent)</i>	Hello! I am Dr. Aishwarya Satija, a student of MBA Hospital and Health Management. My academic program requires me to conduct a study titled “Assessing the Knowledge, Attitude, and Perception of Older Adults towards Digital Health services.” It

will be really helpful if you could take out some time to take part in this study. You may, however, leave it at any time. The information provided by you will be kept completely private for the entire research period and afterwards.

4. RESULTS

The total number of responses received are 113. A descriptive analysis of the socio demographic characteristics was performed as shown below:

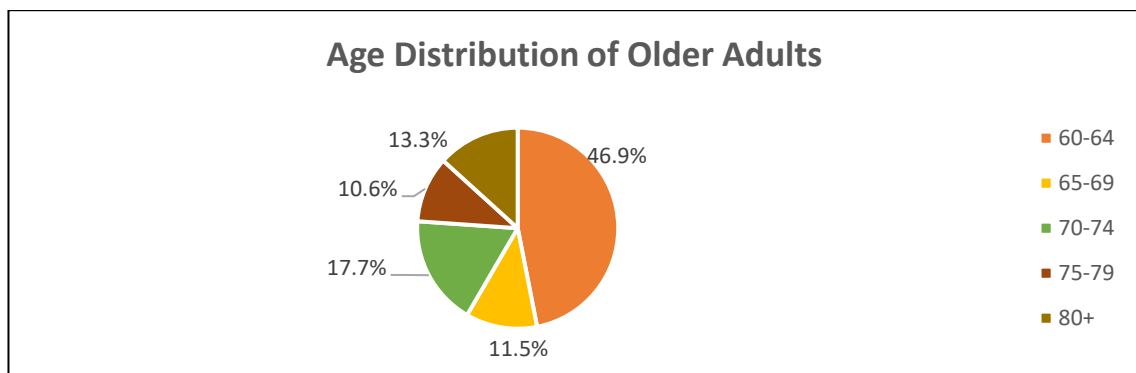


Figure 4.1: Age Distribution of Older adults

It is observed that the **major portion of the respondents** (46.7%) were in the age range of 60 to 64, followed by 11.9 percent in the 65 to 69 age range, 17.7 percent in the 70 to 74 age range, 10.6 percent in the 75 to 79 age range, and 13.3 percent in the 80+ age range.

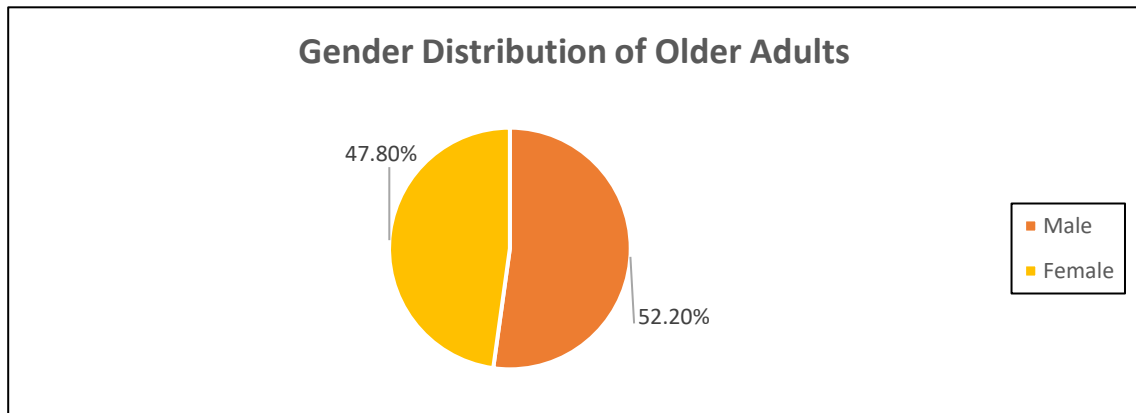


Figure 4.2: Distribution of respondents w.r.t Gender

The research showed around an **almost equal distribution of males and females** where there were 52.2% male respondents and 47.8% female respondents.

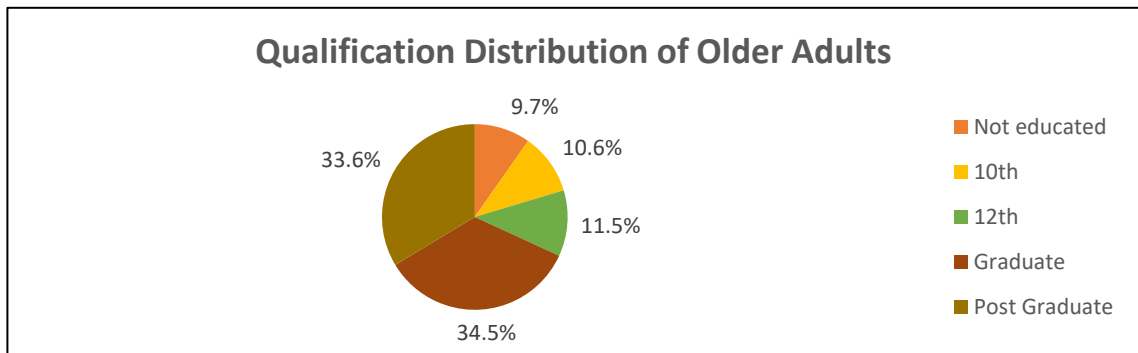


Figure 4.3: Qualification Distribution of Older

With regards to the educational qualification, 34.5% and 33.8% were post graduates and graduates respectively while about 11.5% and 10.6% were 10th and 12th pass outs. Among these, 9.7% weren't at all educated. **This shows that majority of the respondents educated enough to be able to access digital health services.**

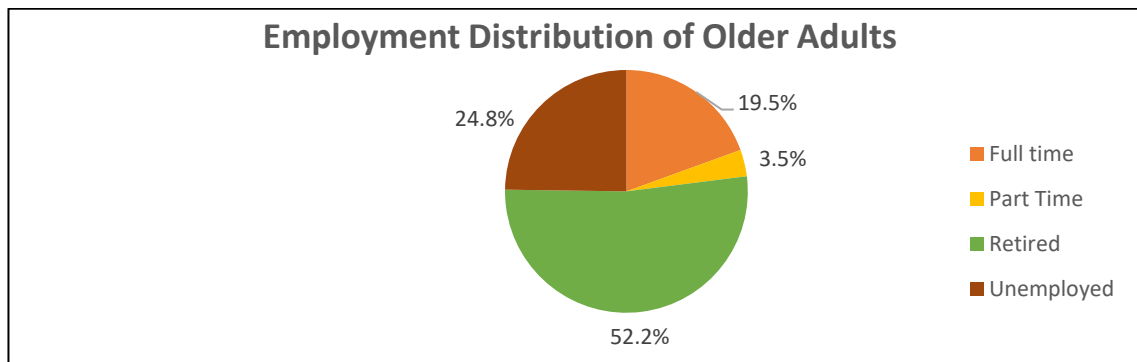


Figure 4.4: Employment Distribution of Older Adults

More than half of the respondents (52.2%) were retired professionals, while 19.5% and 3.5% are still working full time and part-time respectively. Around 24.8% of the respondents were unemployed.

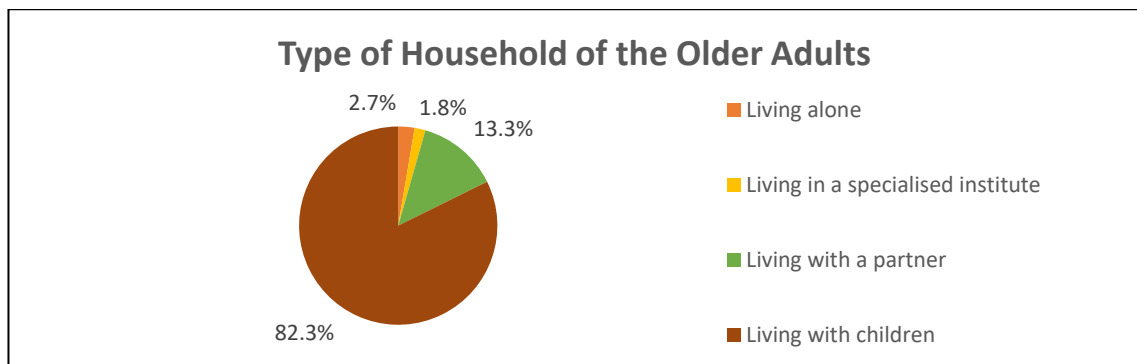


Figure 4.5: Type of Household of Older Adult

At the time of study, 82.3% were living with their children, 13.3% were living with their partners, 2.7% were living alone while 1.8% were living in a specialized institute like old age homes, etc.

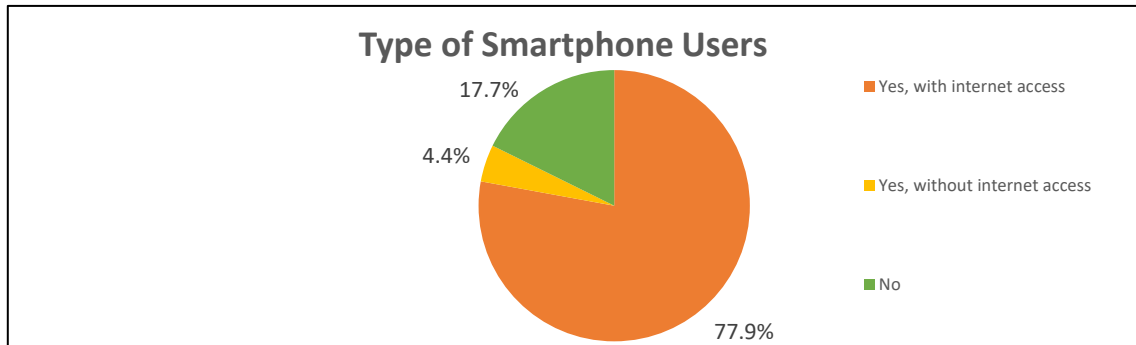


Figure 4.6: Types of Smartphone users

It was also observed that **77.9% of the participants had an access to internet on their smartphones** whereas the 17.7% had no access to smartphones at all. However, 4.4% of the participants uses smartphones but do not have an access to the internet. This information is crucial as a larger percentage of participants can have access to digital health services.

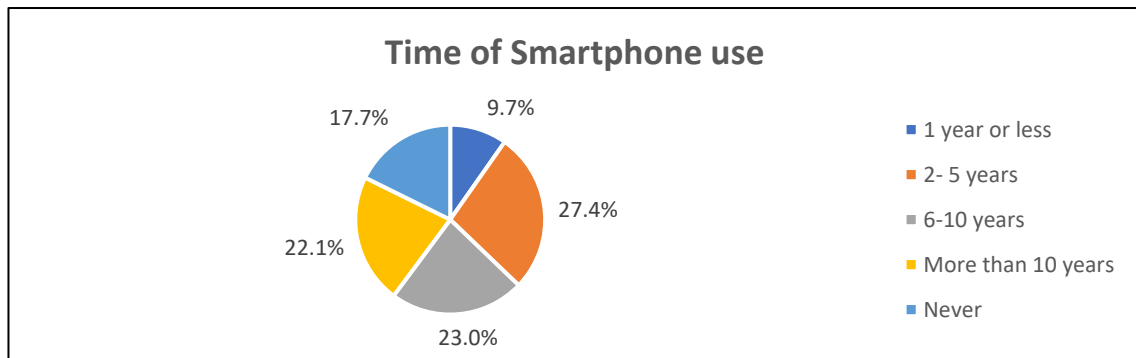


Figure 4.7: Time of Smartphone Use

Majority of the participants (45.1%) have been using a smartphone for more than 6 years. However, 27.4% of the participants have been using a smartphone for 2-5 years and 9.7% have started to use the smartphones since just a year mainly post pandemic.

Effect of Pandemic on the use of Digital health services by Older Adults

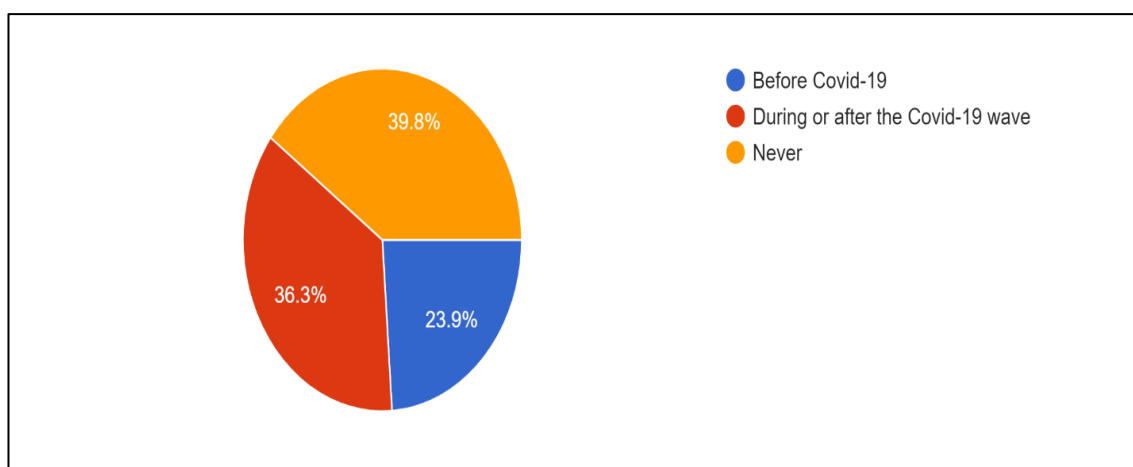


Figure 4.8: Impact of the Pandemic on Older Adults' Use of Digital Health Services

To evaluate how Covid-19 affects older individuals' attitudes regarding using digital health services, it was observed that 23.9% of the participants were using the internet for health related services even before Covid-19 while **there were more participants (36.3%) who started availing the digital health services during or after the pandemic.** However, majority of the participants (39.8%) still do not rely on the internet/mobile phone for availing any kind of health service.

A. Knowledge of Older Adults about Digital Health Services

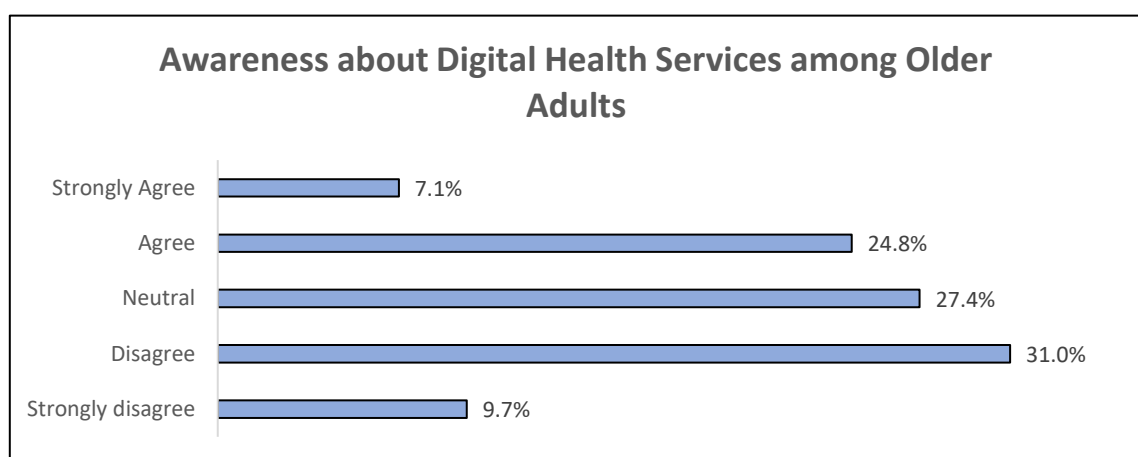


Figure 4.9: Awareness about Digital Health Services among Older Adults

The participants were asked whether they have any idea that the health services can be accessed online. Thereby, Figure 4.9 represents the awareness of the older adults about the digital health services. It is observed that about 40.7% (31% disagreed and 9.7% strongly disagreed that they had no idea about online health services) of the participants believed that they had some idea about the use of digital health services while 31.9% (24.8% agreed and 7.1% strongly agreed) did not have any idea about the use of health related services online.

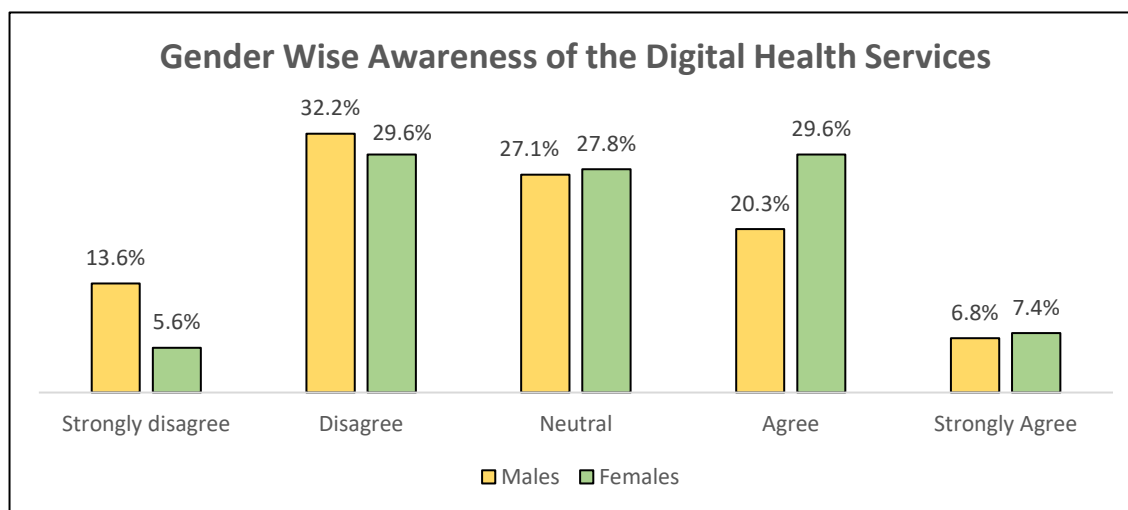


Figure 4.10: Gender Wise Awareness w.r.t the Digital Health Services

The graph shown depicts the awareness about digital health services among males and females. The awareness about the online health related services was **higher among the males** (45.6%) than the females (35.2%). Around 27.1% of the males and 37% of the females had no idea that the health services can be accessed online.

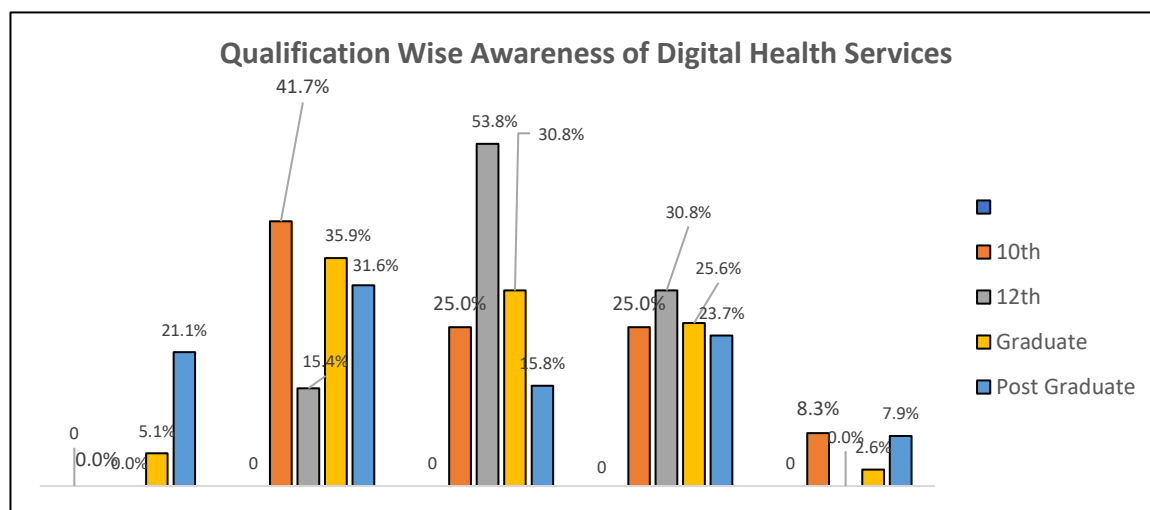


Figure 4.11: Qualification Wise Awareness of Digital Health Services

A similar analysis of awareness w.r.t qualification was done. The results in Figure 4.11 reveals that the respondents with **higher qualification (Post Graduates (52.7%), Graduates (41%))** had more knowledge about the digital health services whereas a higher percentage of respondents having lower education believe to have lesser or no idea about the use of digital health services (10th (33.3%)%, 12th (30.8%) or no education at all (45.5%)).

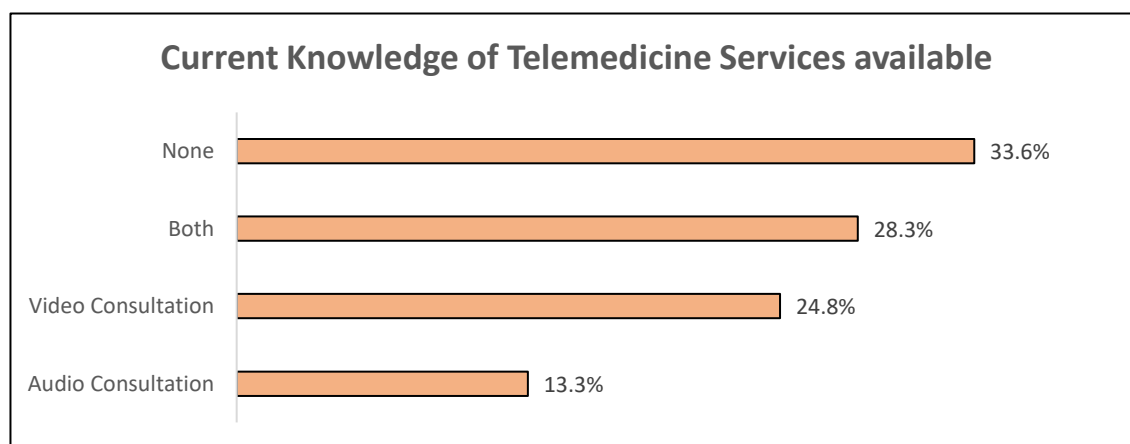


Figure 4.12: Current Knowledge of Telemedicine Services available

The knowledge on the type of telemedicine services available was recorded (Figure 4.12). It was observed that **majority of the older adults (33.6%) are still unaware of the any of the telemedicine services like audio or video consultations.** Only 28.3% of the adults had knowledge about both the services while 24.8% and 13.3% had knowledge about video consultations and audio consultations alone respectively.

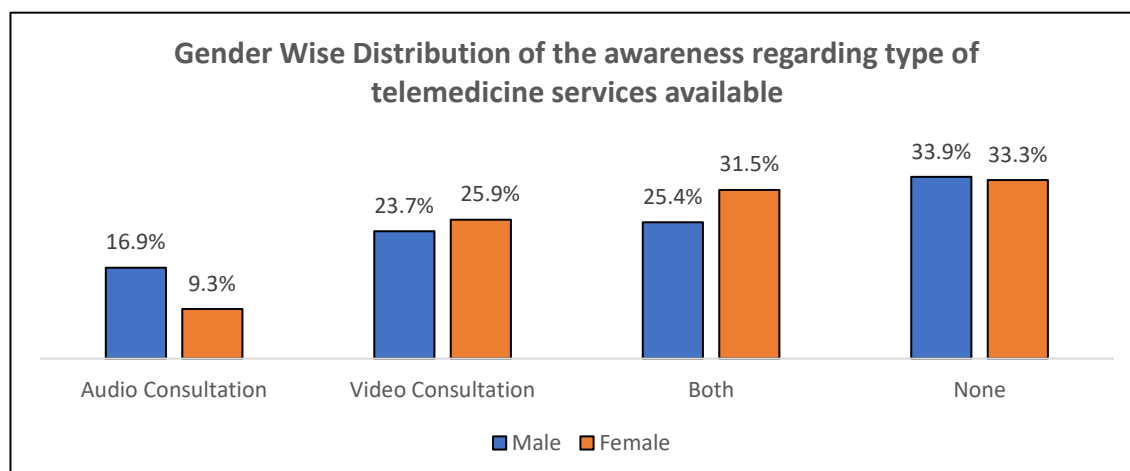


Figure 4.13: Gender Wise Distribution of the awareness regarding type of telemedicine services available

Figure 4.13 reveals that while **majority of the participants had no knowledge** about the type of telemedicine services, **females still had higher knowledge (31.5%) of both the type of telemedicine services** i.e. audio and video consultations as compared to males (25.4%). It also reflects that the males have higher knowledge of audio consultation alone (16.9%) as a telemedicine service while females have higher knowledge of video consultation alone (25.9%).

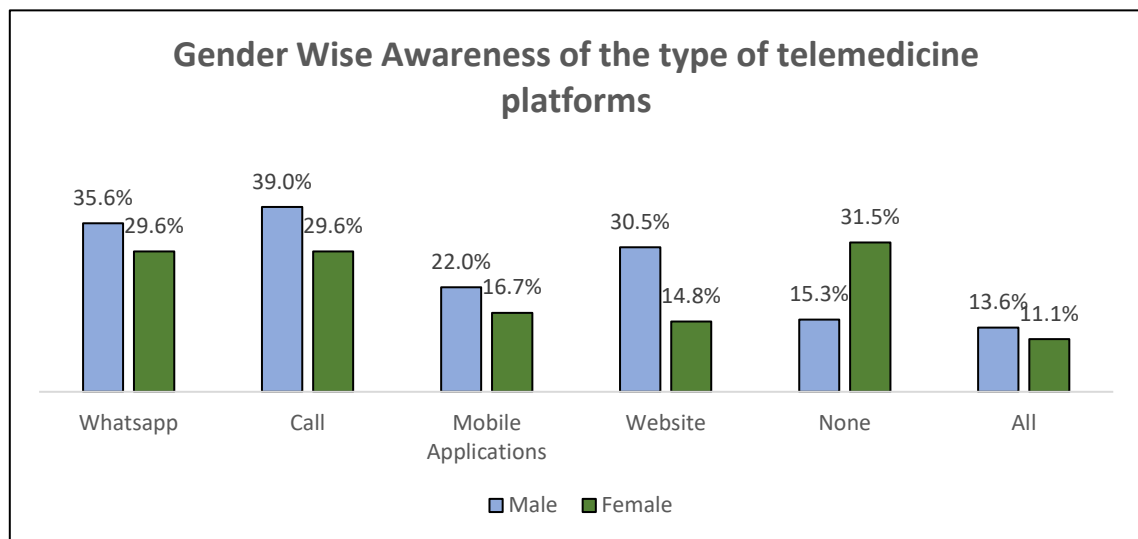


Figure 4.14: Gender Wise Awareness of the type of telemedicine platforms

While assessing the awareness of older adults about the telemedicine platforms available, it was observed that **males have a higher knowledge of the telemedicine platforms than females**. Around 13.6% of males and 11.1% of females have a knowledge of all the telemedicine services. Males also show a higher level of knowledge than females even with respect to a particular platform i.e. Whatsapp (35.6%), call (39%), mobile applications (22%) and website (30.5%).

Current knowledge about online apps available

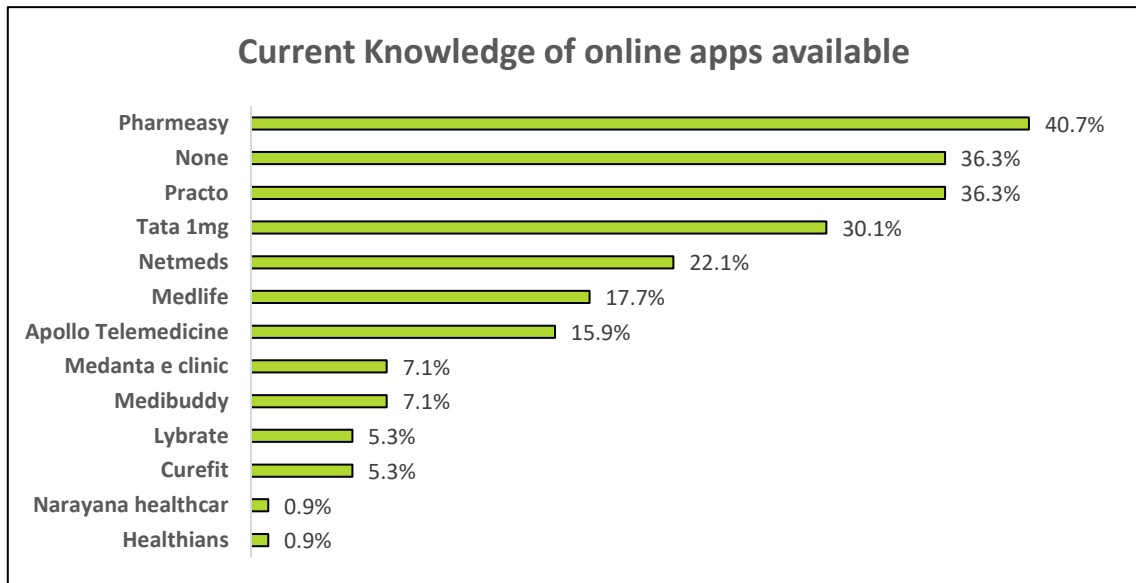


Figure 4.15: Current Knowledge of apps available

The current knowledge of the mHealth applications is quite high. More than 40% of the participants have heard about Pharmeasay. The awareness about Practo (36.3%), Tata1mg (30.1%), Netmeds (22.1%), Medlife (17.7%) is also shown to be quite high among others. The results invariably reflect that the awareness about online pharmacy applications is higher than teleconsultation and health information mobile applications.

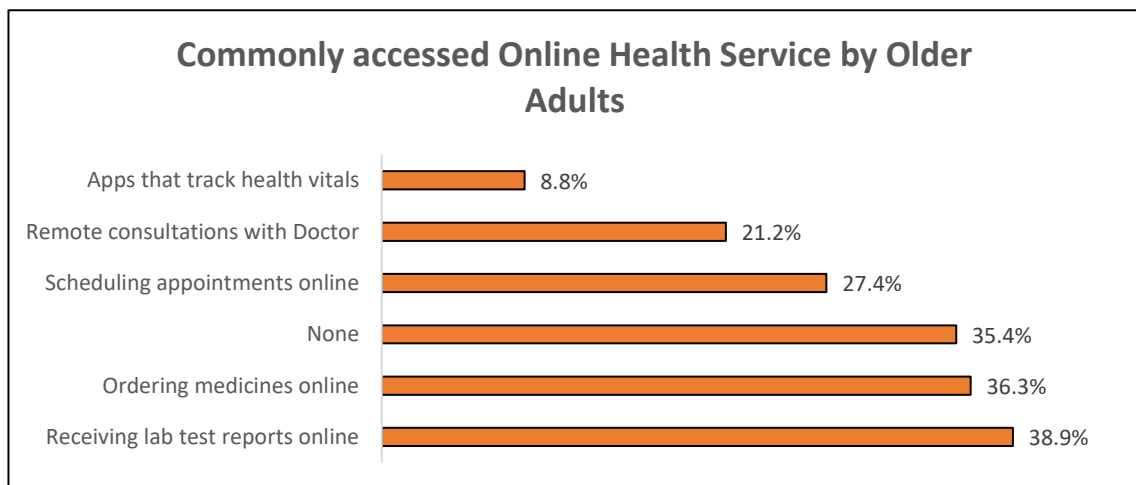


Figure 4.16: Commonly accessed online health service by older adults

The most commonly accessed online health service by older adults is the use of remote laboratory services i.e. receiving lab test reports on their mobile phones (38.9%) followed by ordering medicine through e-pharmacy applications (36.3%). However, a significant percentage of respondents still do not opt for any of the mentioned online health service (35.4%). Remaining participants show an increased preference for scheduling online appointments with doctor (27.4%) and remote consultation with the doctor (21.2%) and the least accessed service by the older adults are the mobile application that track their health vitals (8.8%).

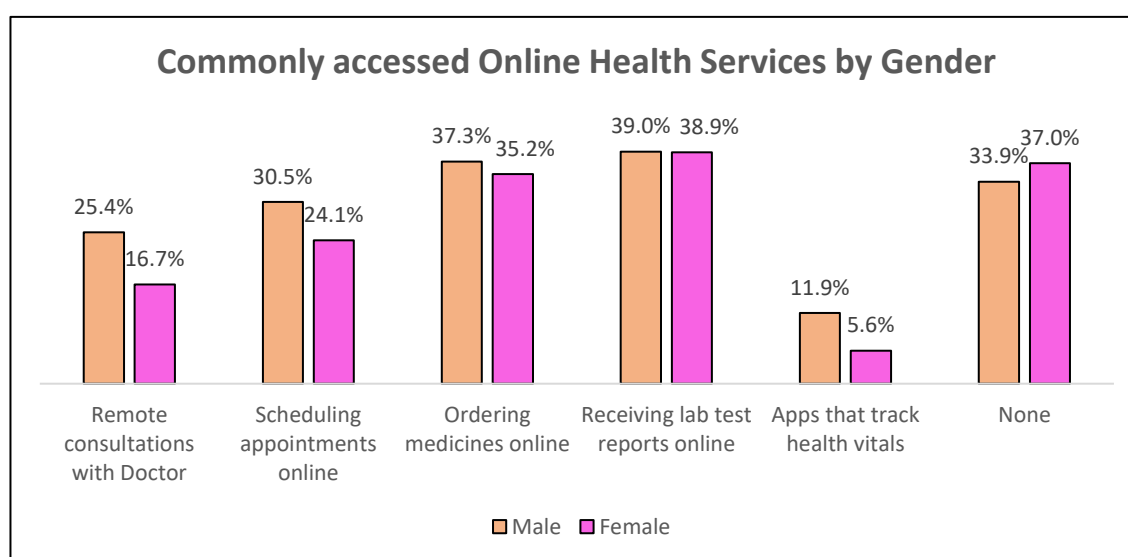


Figure 4.17: Commonly accessed online health service by Gender

Males show a higher preference towards using these digital health services than females. With respect to the remote laboratory services, males and females show an almost equal preference for it (39% for males and 38.9% for females). The graph also reflects that while males show higher preference towards ordering online medicines (37.3%) followed by scheduling online appointments (30.5%) and remote consultations with doctor (25.4%), a higher percentage of females (37%) on the other hand still do not access the digital health services.

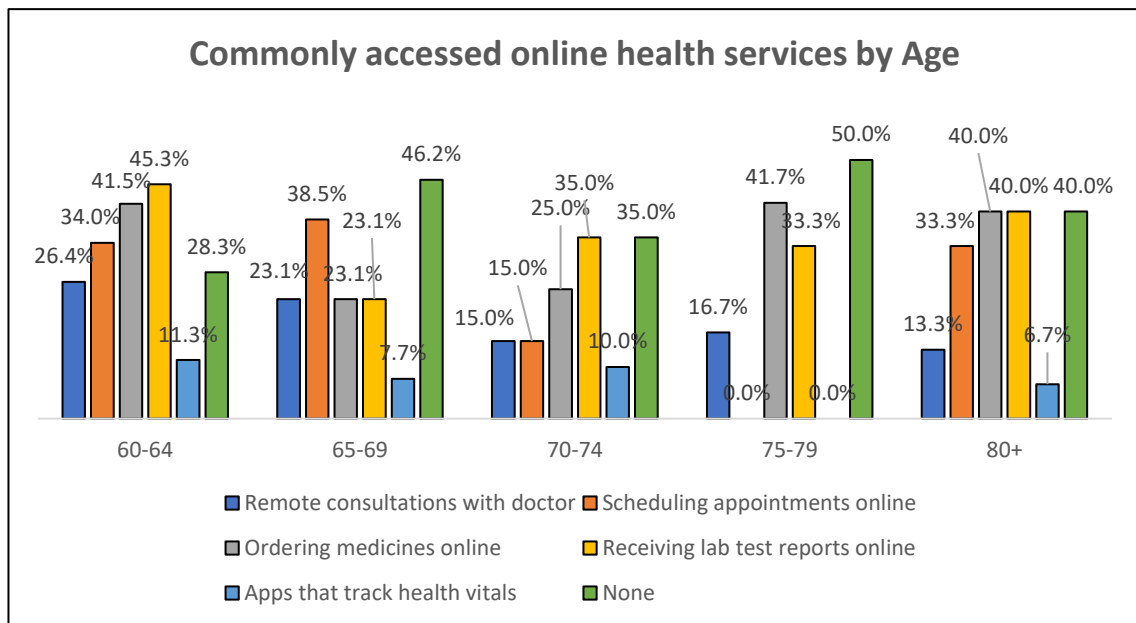


Figure 4.18: Commonly accessed online health services by Age

The respondents in the age group 60-64 years show higher preference toward the remote laboratory services (45.3%) followed by the purchasing of medicines from e-pharmacy (41.5%). The majority of respondents in the age group 65-69 years (46.2%) still do not access any of the mentioned online health services. However, a significant percentage (38.5%) prefer to schedule online appointments with doctor among others. An equal percentage of respondents (35%) in the age group 70-74 years either have no preference towards any of these services or show preference towards the remote laboratory services. The participants above 75 years show greater preference towards ordering online medicines through the pharmacy mobile applications among other services.

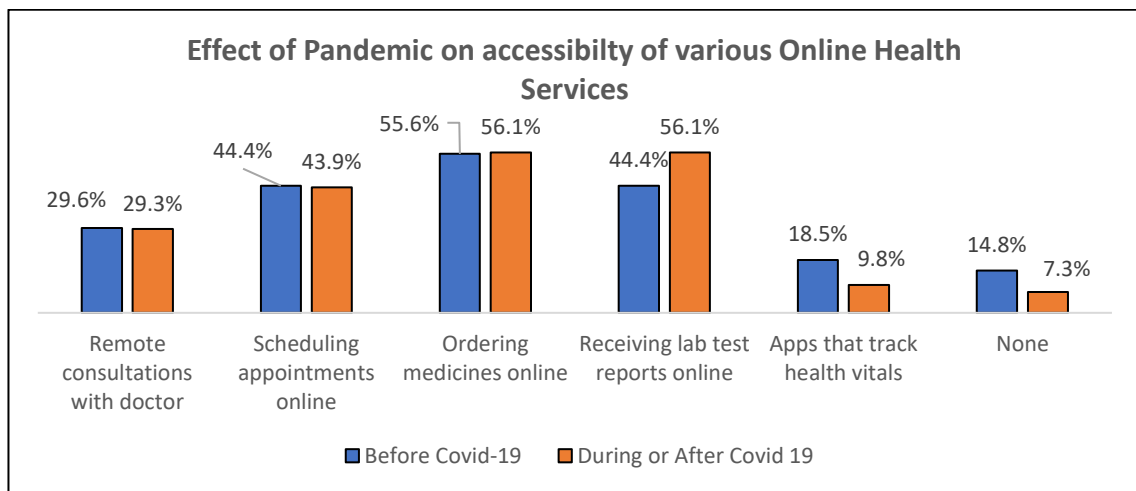


Figure 4.19: Effect of Pandemic on accessibility of various online health services

To assess the behavioral shift in accessing the various online health services post pandemic, a bivariate analysis was done which concluded that before and after the pandemic, an almost equal percentage (55.6%) of people preferred the online ordering and purchasing of the medicines. However, the use of e-pharmacy before the pandemic was higher if compared to the other services available. **After the pandemic, participants showed an equal preference to accessing e-pharmacy apps as well as remote laboratory services (56.1%)** though a significant increase in accessing the remote laboratory services is seen before (44.1%) and after the pandemic (56.1%).

B. Attitude of Older Adults Towards Digital Health Services

a) Opinion on Credibility of online information and diagnosis related to health

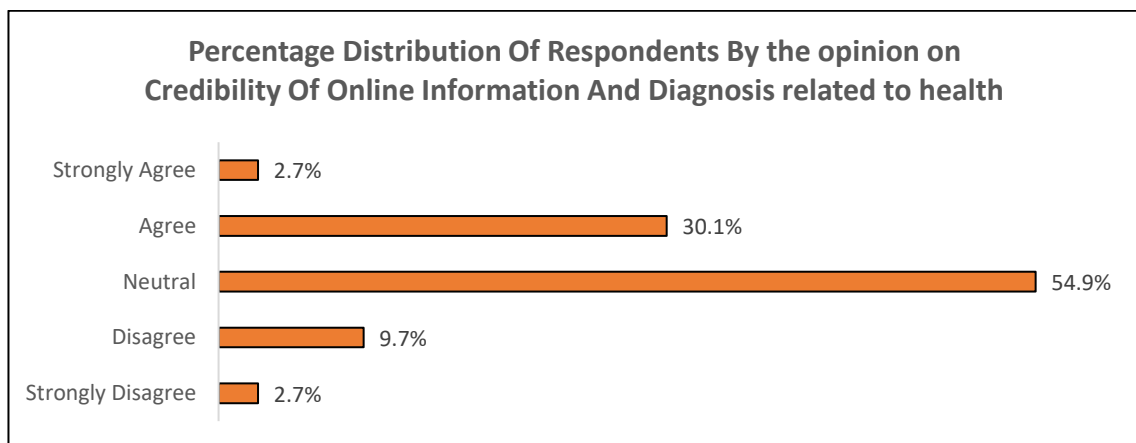


Figure 4.20: Percentage Distribution of responses by the opinion on credibility of online health related information and diagnosis

The respondents were asked about whether they feel that the digital health services were credible or not. It can be observed that **majority of the respondents show a neutral attitude towards their faith in digital health services which shows that most of the older adults aren't currently acceptable of these services.** Around 32.8% of the respondents believe in the credibility of the health related information and diagnosis available online.

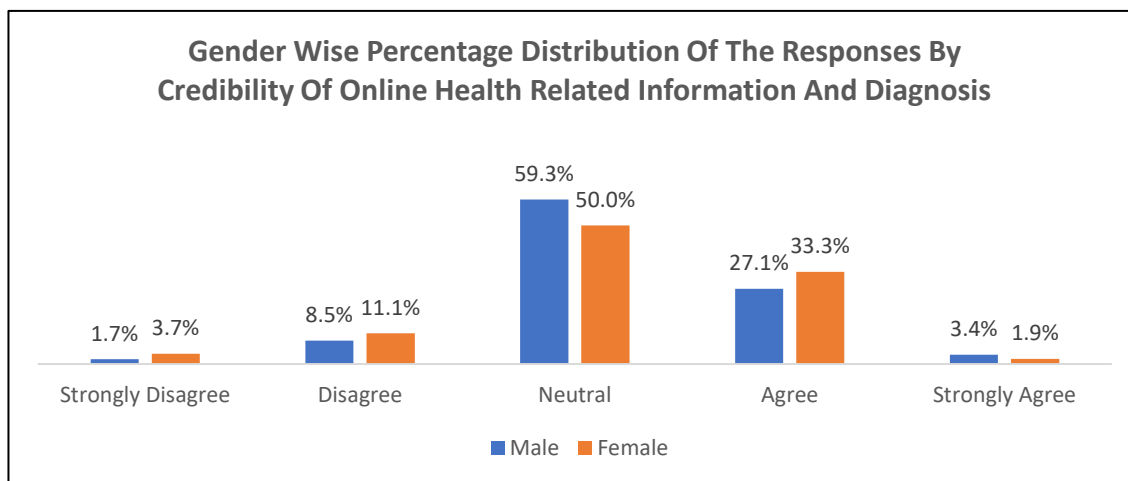


Figure 4.21: Gender-wise percentage Distribution of the responses by credibility of online health-related information and diagnosis

To evaluate the participants attitude towards the credibility of online health related information and diagnosis, a bivariate analysis of the patient's responses with gender is done. It is observed that though more than half of males (59.3%) and females (50%) show a neutral attitude towards the credibility of the online health information and hence are still unaccepting of these services, there are still **more females (35.2%) than males (30.5%) who have faith in online health services but the percentage difference is less** (around 4%). This shows that both males and females are concerned about the credibility of the information provided to them and hence do not show the desired enthusiasm to opt for digital health services.

Table 4.1: Age Wise Distribution of respondents opinion on credibility of online health related information and diagnosis

Parameter		Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Age	60-64	0.0%	7.5%	49.1%	39.6%	3.8%
	65-69	0.0%	23.1%	61.5%	15.4%	0.0%
	70-74	10.0%	5.0%	50.0%	35.0%	0.0%
	75-80	0.0%	8.3%	83.3%	8.3%	0.0%
	80+	6.7%	13.3%	53.3%	20.0%	6.7%

When a similar analysis w.r.t age was conducted, it was observed that the participants aged 60-64 years (43.4%) believed that the health information available online is credible. With the increase in age majority of the participants are seen to either show a neutral attitude or disagree with the fact that health information available online is in fact credible.

b) Convenience in using Digital Health Services

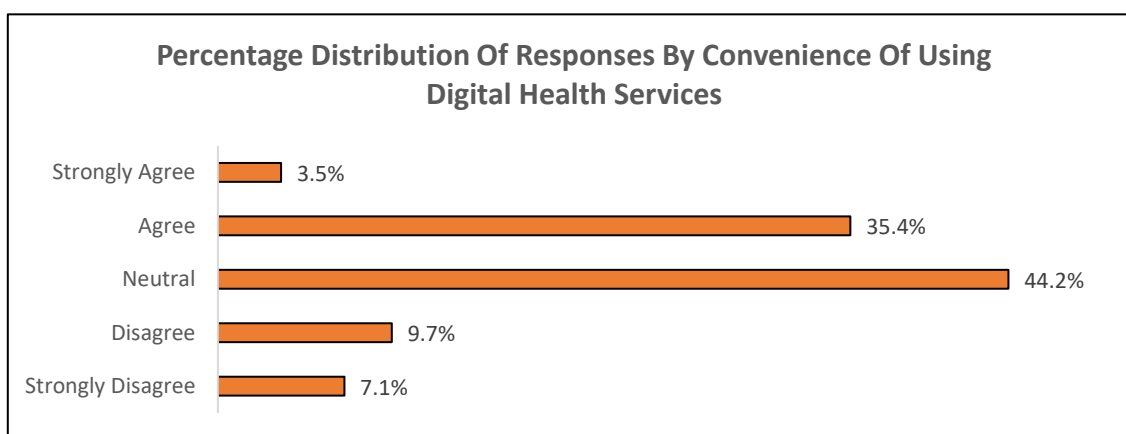


Figure 4.22: Percentage Distribution Of Responses By Convenience Of Using Digital Health Services

The graph represents the convenience of respondents in using the telemedicine and mHealth services. Around 39% of the respondents find it convenient to use the digital health services while around 16.8% of the respondents still prefer in person health services over digital health services.

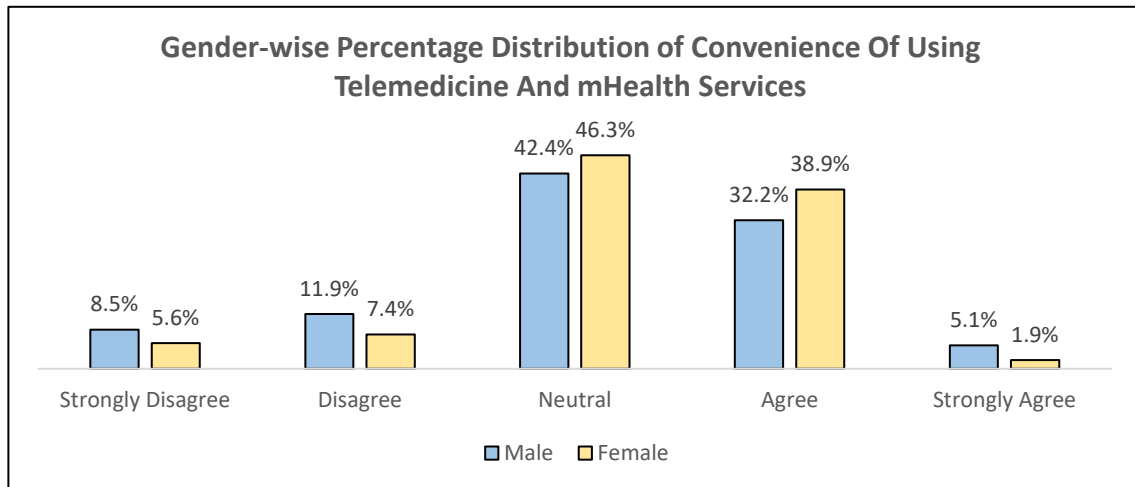


Figure 4.23: Gender-wise Percentage Distribution of Convenience Of Using Telemedicine And mHealth Services

The attitude of the participants towards the convenience of the use of telemedicine and mHealth services was assessed. Around 40.8% of the **females find the use of online health services more convenient than males** (37.3%) however, the difference is marginal. About 20.4% males and 13% females do not find the use of digital health services convenient. However, majority of males and female were neutral which clearly depicts those participants are mostly indifferent towards digital health services.

Table 4.2: Qualification wise distribution of responses as per convenience of using digital health services

Parameter		Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Qualification	10 th	8.3%	16.7%	25.0%	50.0%	0.0%
	12 th	0.0%	7.7%	46.2%	46.2%	0.0%
	Graduate	7.7%	15.4%	46.2%	30.8%	0.0%
	Post Graduate	5.3%	2.6%	39.5%	42.1%	10.5%
	Not educated	18.2%	9.1%	72.7%	0.0%	0.0%

Along with this, the **educated participants find the use of digital health services more convenient** while the uneducated participants have either no opinion (72.7%) or do not at all find the use of digital health services convenient (27.3%).

c) Attitude towards online health services w.r.t time

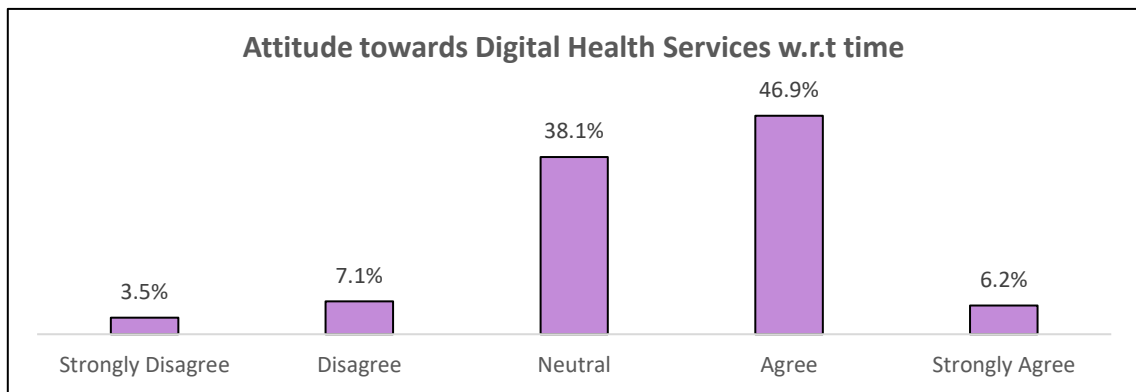


Figure 4.24: Attitude towards online health services w.r.t time

The respondents were asked whether they believe that the digital health services saves time. When the responses were analysed, it was observed that **significant percentage of the participants (46.9%) agreed that the use of online health services is time-saving** and 6.2% strongly agreed to the same. There were only 10.6% respondents who did not agree that using online health related services saves time.

C. Perception of Older Adults Towards Digital Health Services

a) Perceived Ease of Understanding of Digital Health Services by Older Adults

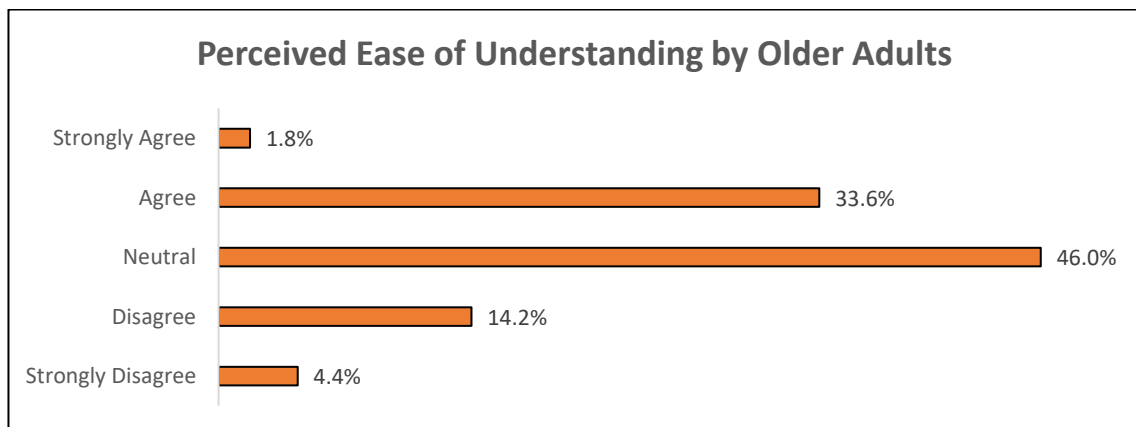


Figure 4.25: Perceived ease of understanding by Older Adults

One of the concerns regarding the use of Digital health services w.r.t older adults is the ease of understanding of these services. It can be noticed that while **a major portion of the respondents gave a neutral response, there were around 35.4% of the respondents who finds the online use of health services easy to understand** and around 18.6% feel that these services are difficult to understand and hence avoid their use.

Table 4.3: Perceived ease of understanding by qualification and time of smartphone use

Variable		Percentage Distribution				
<i>“I find online health services easy to understand”</i>		Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
<i>Qualification</i>	10 th	8.3%	16.7%	41.7%	33.3%	0.0%
	12 th	0.0%	7.7%	61.5%	30.8%	0.0%
	Graduate	2.6%	20.5%	46.2%	30.8%	0.0%
	Post Graduate	2.6%	7.9%	44.7%	39.5%	5.3%
	Not educated	18.2%	18.2%	36.4%	27.3%	0.0%
<i>Time of smartphone use</i>	1 year or less	18.2%	9.1%	45.5%	27.3%	0.0%
	2-5 years	0.0%	19.4%	54.8%	25.8%	0.0%
	6-10 years	3.8%	3.8%	46.2%	38.5%	7.7%
	More than 10 years	4.0%	8.0%	40.0%	48.0%	0.0%

When a similar analysis was done between educated and uneducated respondents, it was observed that the **educated respondents find it easier to understand these services** (Post Graduates:44.3%, Graduates and 12th Pass outs: 30.8% and 10th Pass outs: 33.3%) while the respondents who aren't qualified either gave a neutral response or found these services too difficult to understand (36.4%).

Table also depicts that the **respondents who have been using a smartphone for 6-10 years or more than 10 years tend to show a greater ease in understanding of the digital health services** (48% and 46.2% respectively) than the respondents who have been using the smartphones for less than 5 years. It is clearly visible that the lesser the time of smartphone use, lesser is the ease in understanding of the digital health services.

b) Perceived usefulness of mobile health applications for long term health monitoring

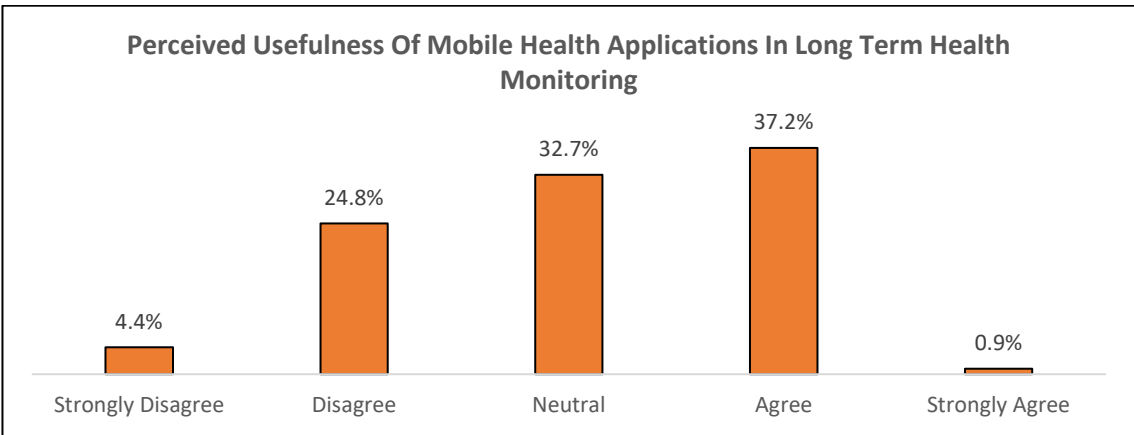


Figure 4.26: Perceived usefulness of mobile health applications in health monitoring in long term

Figure 4.27 demonstrates how the respondent feels about the use of mobile health applications for long-term health monitoring. The above shown graph clearly depicts that the **majority of the respondents (38.1%) perceive these apps to be useful in long-term health monitoring** while 29.2% of the respondents do not perceive these apps to be useful. However, a significant percentage of respondents (32.7%) gave a neutral response i.e. they neither believe nor disbelieve these apps that track their health vitals.

c) *Perceived ease of purchasing online medicines*

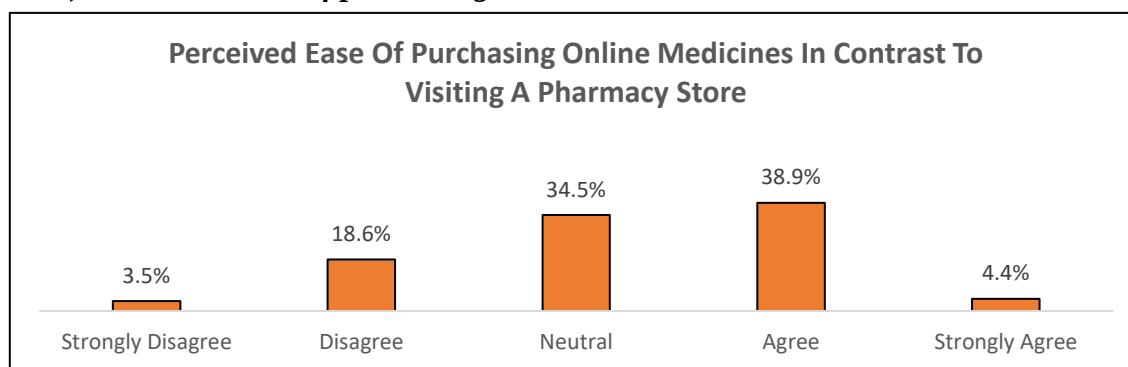


Figure 4.27: Perceived ease of purchasing online medicines in contrast to visiting a pharmacy store

The graph shows the perception of the respondents towards buying medicines from e pharmacy instead of a pharmacy store. It is observed **that majority of the respondents (43.3%) agree that it is easier to purchase drugs online** than to visit a pharmacy while 22.1% of the respondents still find going to the pharmacy store for purchasing drugs more convenient than from an e-pharmacy.

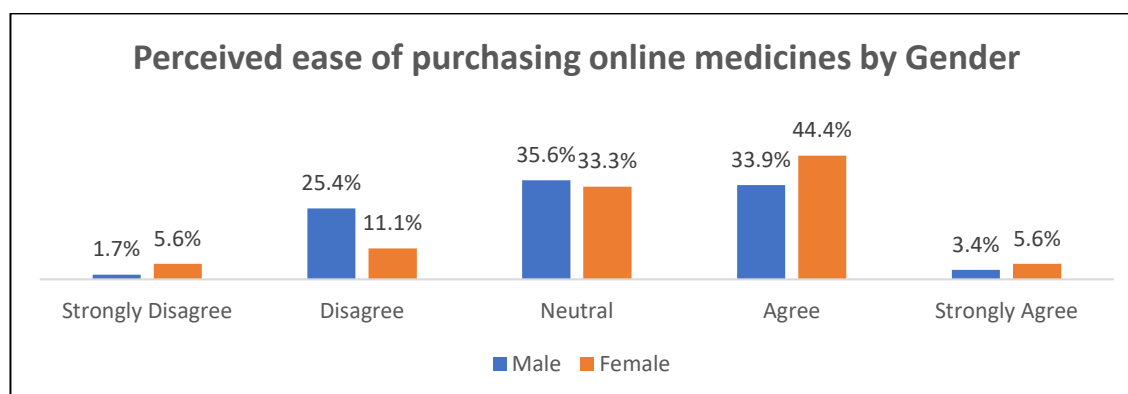


Figure 4.28: Perceived ease of purchasing online medicines by Gender

When a similar analysis w.r.t to Gender was performed, it was observed that **females find it easier to purchase drugs online than males**. Around 50% of females and 37.3% of males find convenience in buying drugs online than from a pharmacy store while 27.1% of males and 16.7% of females still physically visit a pharmacy store.

d) Perceived safety of online Health Services

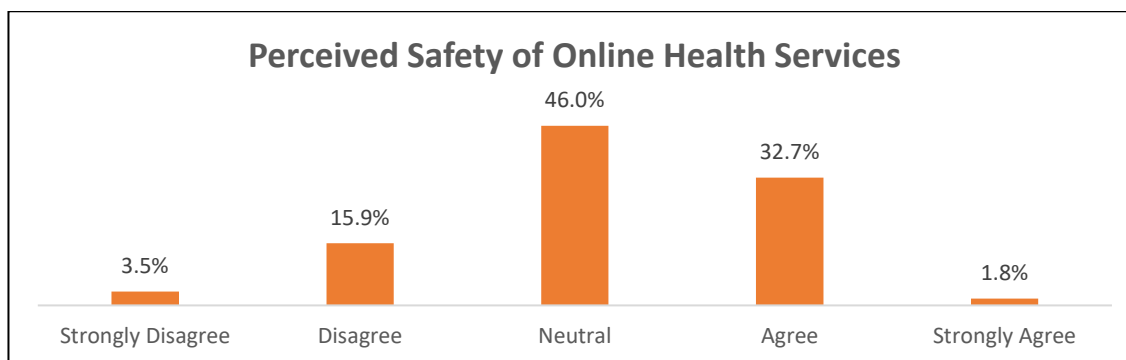


Figure 4.29: Perceived Safety of the online health services

The perception regarding the safety and privacy of online services was recorded. Around **34.5% of older adults agreed that online health services are safe and they have no concerns about their privacy and data** whereas around 20% of the respondents do not find the online health services as safe. It is also observed that 46% of the respondents are not sure whether their health data available online is safe or not.

e) Perceived cost of online Health Services

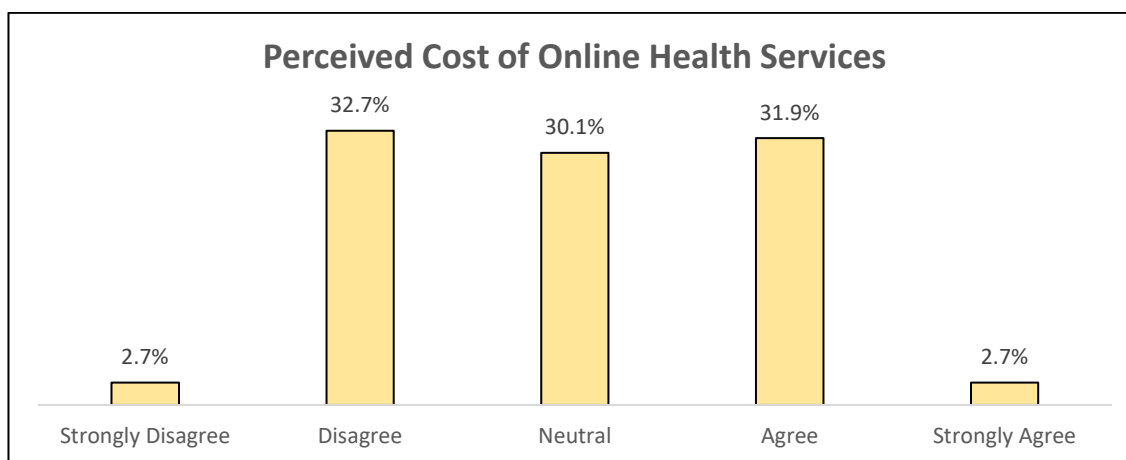


Figure 4.30: Perceived Cost of Online Health Services

Around **35.4% of the respondents believe that the online health services saves cost than to physically visit the doctor.** However, even a similar proportion of respondents are still of the belief that it will cost them more money to manage their health online.

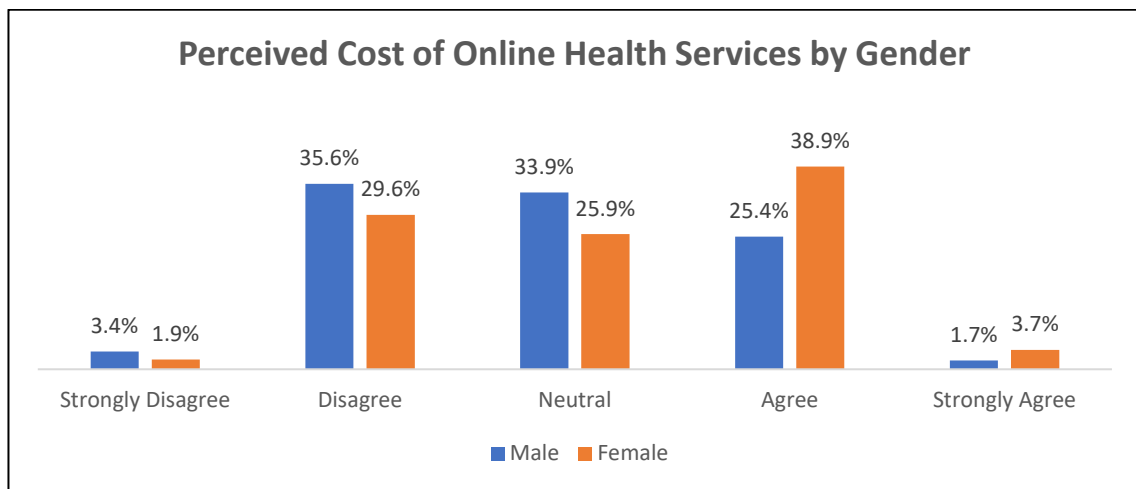


Figure 4.31: Perceived Cost of Online Health Services by Gender

To assess this perception by Gender, a bivariate analysis was performed which reflected that more **males (39%) believed that the online health services save cost than the 31.5% of the females**. Around 42.6% of the females are of the view that the digital health services will cost them more money to manage their health.

D. Challenges faced by the older adults in adoption of digital health

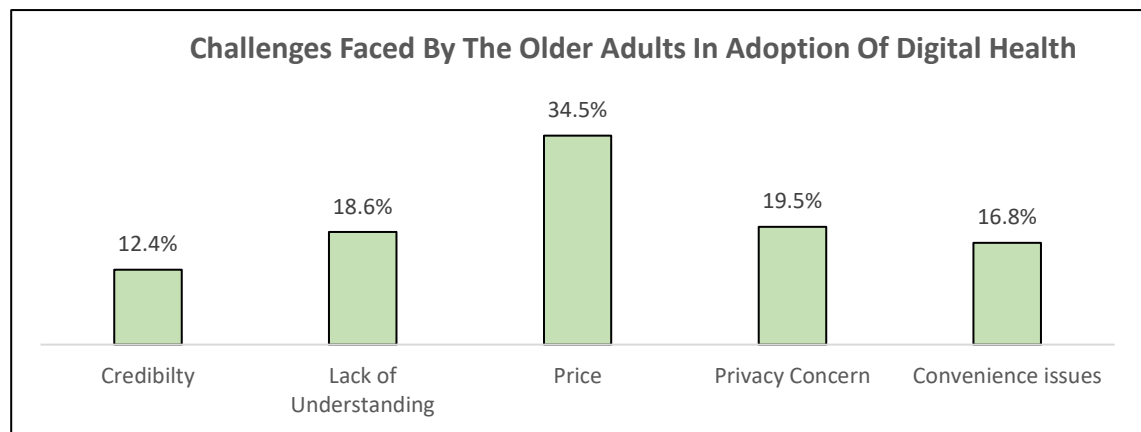


Figure 4.32: Challenges faced by the older adults in adoption of Digital Health

The main obstacles that prevented older persons from using digital health services was recorded. It can be observed that price is a major factor that led to lesser adoption of the digital health services by the older adults (34.5%) followed by privacy concerns (19.5%) and difficulty in understanding these services (18.6%). Other major challenge includes credibility and convenience issues.

5. DISCUSSION

This is a cross sectional study that assesses the Knowledge, Attitude and Perception of older adults on the Digital Health Services. The study shows the difference in the knowledge, attitude and perception towards the various digital health services and how their behavior towards these services have changed post pandemic. The analysis is done by comparing their responses across Gender, age and highest qualification. Around 77.9% of older adults who are the part of the study had the access to smartphone with internet and hence should be able to easily access these services.

The study revealed that while the access to the digital health services has increased tremendously post pandemic, **a significant percentage of the older adults still do not access these services and prefer the traditional way of using health services.** The **majority of the respondents did however have some idea about digital health services** though **males had a greater idea about online health-related services** when compared to females. It was also observed that the knowledge of the types of telemedicine services was low among the older adults; hence, the less knowledge automatically affects the use of these services.

The **most commonly accessed e-health service is the remote laboratory services**, i.e. receiving the online lab reports. However, the pandemic also seemed to change the attitude of the older adults toward the various digital health services. According to the findings of the study, **the use of e-pharmacy has significantly increased after the pandemic.**

Other commonly accessed online health services include scheduling online appointments with doctors and remote consultations. A previous study conducted in Finland in 2021, reported that as the age increased, the likelihood of using online health services tend to decrease.[7]

While assessing the attitude of older adults, an appalling finding is the attitude of the older adults towards the credibility of these services. The older adults' **neutral attitude towards such services clearly indicates how unaccepting they are of these services.** They do not seem to show a great interest in these services and do not totally rely on them. However, a majority of the respondents do believe that these services save time than the traditional way of accessing the healthcare services. For example, **the older adults seem to access the online pharmacy more than physically visiting a pharmacy store.** This is a clear

indicator of how the attitude of the older adults is shifting toward the digital health services, no matter how smaller the inclination looks today.

The major challenges faced by the older adults are the **lack of understanding of these services and some privacy concerns**. Along with this, a much greater problem is the perception of the older adults about the price of these services. Older adults perceive these services as highly costly which can act as a significant barrier in them accessing these services. A study conducted in China in 2020 revealed that the barriers that prevent the adoption and utilization of digital technology by older adults included fear of consequences and a lack of proper knowledge of digital technologies.[8]

Differences in gender, age and qualification was highly apparent in the attitude and perception of the older adults towards digital health services. However, a study conducted in United Kingdom in 2020 showed no significant differences in attitudes towards digital health technology w.r.t gender.[9]

The findings of this study will help the programmers to implement various programs and policies that enhance the usage of these digital health services by the older adults. Since the study has touched upon the various parameters that can restrict the usage of these services by older adults, the findings can prove to be suitable for launching various digital health programs that can increase the accessibility of these services by elderly.

However, the findings of the study had several limitations. There may be different circumstances that exist outside the urban population and hence more clear results will be obtained once the rural population is also considered.

6. CONCLUSION

The study concluded that the knowledge of older adults is high in several aspects. However, there is still a long way to go in increasing the accessibility of the digital health services by older adults. The general attitude and perception about these services is good but certain apprehensions regarding cost, privacy and credibility of these services is still present. There is a need of several more studies like these in India so that the findings can be seen in a broader aspect. Such knowledge is necessary to develop initiatives that are simple and easy to use so that they could eliminate disparities in access to healthcare services. It is highly important for the initiatives directed towards digital health to be able to cater to the needs

and demands of its target audience so that all people irrespective of the age or gender have the required knowledge and attitude towards its use.

Recommendations:

- Focus on increasing awareness among older adults through targeted campaigns, workshops, self-help groups and NGOs to increase the adoption of the digital health services.
- Efforts such as setting up of Community-based centers in rural and urban areas to provide such workshops at the community-level may be undertaken.
- Identifying the Digital Health Champions is a highly efficient way to deliver digital skills. A Digital Health Champion is a volunteer who has undertaken the necessary online health services, is a registered member of the programme at the Centers, and helps older people gain confidence and skills in using technology.

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