

# Knowledge, Attitudes and Perceptions on the Use of Telemedicine Among Adults Aged 18-34 in Manila, Philippines During the COVID-19 Pandemic



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## ABSTRACT

Telemedicine has been an emerging method for delivering healthcare services due to the challenges brought by the COVID-19 pandemic. This descriptive quantitative correlational study is aimed at assessing the knowledge, attitudes and perceptions (KAP), and their relationship among adults aged 18-34 without prior experience in the use of telemedicine in Manila, Philippines during the COVID-19 pandemic. The study had 322 eligible respondents who answered an online survey questionnaire of three parts that asked for their socio-demographic profile, KAP on telemedicine. Descriptive statistics, profile analysis and Spearman's rho were utilized as statistical tools. The respondents' knowledge was on an average to low level, and attitude and perception towards telemedicine were both neutral. Results showed no significant difference between the KAP of the respondents when analyzed according to socio-demographic variables. Knowledge and attitude have a weak positive linear relationship

while knowledge and perception have a moderate positive linear relationship. A strong positive linear relationship was indicated between attitude and perception. A positive attitude can be attributed to a positive perception towards telemedicine but both do not consequently come from high knowledge levels of it.

**Keywords:** Telemedicine, Knowledge, Attitudes, Perceptions, COVID-19

## INTRODUCTION

Telemedicine has emerged as a modern healthcare delivery service platform due to the rapid development in communications technology[1]. It is the use of any form of telecommunications technology to provide healthcare services between the physician and patient who are at different locations. Presently, the advancements made by the availability of the internet widened the scope of telemedicine. Telemedicine could now be made available over the internet through the use of different web-based technologies such as e-mails and other forms of web interactions[2]. Due to the COVID-19 pandemic, the delivery of healthcare services virtually has been on the rise since. The limitations and restrictions,

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protocols to reduce transmission risk brought about by this situation accelerated the need for alternative ways of conducting health consultations[3]. However, effective healthcare delivery through telemedicine is not guaranteed[3]. Despite the promising potential of telemedicine, the uptake has been scarce for both healthcare professionals and patients in the Philippines. The COVID-19 pandemic emphasized that a large proportion of healthcare professionals are not properly trained in conducting virtual consultations[4]. In addition, the study by Checcucci et al.[5] also showed that most patients, or interviewees, did not have access to the basic requirements needed to conduct telemedicine consultation (computer, smartphone, tablet and internet connection).

With the ongoing COVID-19 pandemic, it is possible to see a change in the perceptions of Filipinos towards telemedicine as travel restrictions limit the movement of the population and as fear and anxieties of people for hospitals grow. Given this situation, this study will examine the KAP of 18-34 year olds on telemedicine. It is necessary to consider the standpoint of the public regarding this intervention knowing that they are directly involved. This study will provide a way to gauge the knowledge and perceptions on, and acceptance of telemedicine in the Philippine setting which can help in understanding whether telemedicine is worth pursuing. This will be beneficial to the community, doctors and medical personnel, and future researchers.

This study was limited to the KAP of respondents on telemedicine during the COVID-19 pandemic. As knowledge cannot be physically measured by an instrument, the use of the word refers to the individual's perceived knowledge about telemedicine. Due to the ongoing pandemic, this study was conducted through an online questionnaire.

## METHODOLOGY

### Research Design

This study utilized a cross-sectional community survey design with a descriptive quantitative correlational method. Quantitative data collected through a survey questionnaire will help in determining the respondents' attitude towards telemedicine and if there is a significant relationship between their KAP on telemedicine and their intent of use. A comparative

analysis on the respondents' socio-demographic profile was also conducted to further understand the relationship of the variables under study.

### Subjects

This research made use of purposive sampling and 322 eligible respondents participated in the study. This yielded a 5% margin of error at 95% confidence interval, calculated using the Raosoft Inc. sample size calculator from the estimated 14,158,573 total population of Manila, Philippines[6].

The criteria for inclusion were Filipinos who are aged 18-34 years old, reside in Manila, Philippines, have not participated in any form of telemedicine previously, and are able to use electronic gadgets, and read and understand English and/or Filipino. A Manila resident is a person whose address on a driver's license, a voter registration card, a lease, an income tax return, property tax bills, or utility bills is Manila City. Those who do not fall within these criteria were excluded from the study.

### Data Measure/Instrumentation

A survey questionnaire composed of three main parts (socio-demographic profile, knowledge on telemedicine, and attitudes and perceptions on telemedicine) was utilized for this study. The said questionnaire was adapted from Ayatollahi et al.[7] and Lin[8] but was modified to better fit the current study. Knowledge focused on the individual's perceived knowledge, or self-assessment of knowing the information; attitude is referred to as the level of acceptance towards the use of telemedicine that may either be positive or negative, while; Perception is the belief on the use of telemedicine.

The first part of the questionnaire was in the form of a simple question and answer. The second and third part was in the form of a Likert scale ranging from 1 to 5 where 1 = Very Low and 5 = Very High, and 1 to 7 where 1 = Strongly Disagree and 7 = Strongly Agree. Scores for the second and third part were summarized, transformed to scores ranging from 0-100, and interpreted using a specified scale for each section. Each respondent's scores were computed by summing up their responses on each section of the questionnaire. Since the range of scores differ per section (the number of items per section are not the same), a linear transformation

was used to force the scores to be bounded between 0 and 100.

Prior to data gathering, pilot testing was done and the survey questionnaire used was subjected to Cronbach alpha testing for validity and reliability. All sections of the used questionnaire got an internal consistency ranging from acceptable (0.75) to excellent (0.91).

### Data Gathering Procedure

The study was conducted using a survey questionnaire through Google Forms to gather the needed data. The questionnaire was disseminated using social media platforms (Facebook, Messenger, and Instagram) since face-to-face collection of data was not possible due to the pandemic. Consent letters were provided to the respondents before they participated in the study to seek permission to be a part of the research process. After the data had been collected, it was sorted and organized prior to analysis and interpretation. Personal information and other data gathered from the questionnaire were given unique codes, and stored in a locked folder. These were all kept in a password protected computer wherein the gathered data will be deleted and destroyed two years after the study has concluded. No information was publicly reported in any way that may identify the participant. Data was not made available for secondary use outside this study.

### Ethical Considerations

The study has been approved by the Faculty of Pharmacy Research Ethics Committee (FOPREC).

### Data Analysis

The results of the data were processed for computer analysis. Tests for proportion were utilized to determine the age group of 18-34 year olds as a majority. The mean and standard deviation for each item was determined to identify where the KAP of most participants lie and if these are spread out or close to the mean. A profile analysis of KAP was utilized to determine any significant difference when analyzed according to socio-demographic variables. The analysis included three stages that test

for several hypotheses. These statistical tests were used to test the second null hypothesis. Spearman's rho was used to identify any correlation that would test the first null hypothesis.

## RESULTS

A total of 390 respondents participated in the online survey and only 322 were eligible after data cleaning based on the inclusion and exclusion criteria of the study.

### Sociodemographic Profile of the Respondents

Majority of the respondents were 20-24 years old (71.4%) and females dominated the sample comprising about 57.1% of the total respondents. In terms of highest educational attainment, around half (49.69%) of the respondents were high school graduates, 46.58% had a bachelor's degree, and only 3.73% are postgraduate degree holders. With regard to the monthly income, exactly half of the respondents had a monthly income of Php 10,000 and below. A summary of the respondents' sociodemographic profile is presented in Table 1.

### Knowledge, Attitudes and Perceptions Towards Telemedicine

As presented in Table 2, the average score for knowledge is 41.55 with a standard deviation of 25.53 points. This indicates that the respondents had average to low knowledge on telemedicine. In terms of attitude, it has an overall mean of 67.67 with a standard deviation of 17.19 points, suggesting that the respondents had a neutral attitude towards telemedicine. Lastly, the overall score for their perceptions is 65.91 with a standard deviation of 13.88 points, which showed that they had a neutral perception towards telemedicine.

Table 3 displays the average scores of KAP of the respondents analyzed by their sociodemographic variables. For age, the 18 to 19 years old age group had the lowest knowledge score (38.71) while the 20 to 24 (42.33) years old age group had the highest score among the groups. Meanwhile, the 30 to 34 years old age group had the lowest average attitude and perception scores of 65.31 and 61.53, respectively. It also showed that there

**Table 1:** Summary of the Socio-demographic Characteristics of Survey Respondents

Variable	Frequency	Percentage
Age		
18 to 19 yrs. old	35	10.9%
20 to 24 yrs. old	230	71.4%
25 to 29 yrs. old	36	11.2%
30 to 34 yrs. old	21	6.5%
Sex		
Female	184	57.1%
Male	138	42.9%
Highest Educational Attainment		
High School and below	160	49.7%
College or bachelor's degree	150	46.6%
Graduate School	12	3.7%
Monthly Income		
Php 10,000 and below	161	50.0%
Php 10,001 - Php 20,000	27	8.4%
Php 20,001 - Php 45,000	38	11.8%
Php 45,001 - Php 75,000	24	7.5%
Php 75,001 - Php 130,000	27	8.4%
Php 130,001 - Php 220,000	23	7.1%
Php 220,001 and above	22	6.8%

**Table 2:** Summary Statistics of Knowledge, Attitudes and Perceptions towards Telemedicine of Survey Respondents

Variable	Mean	SD	Remark
Knowledge	41.55	25.53	Average
Attitude	67.67	17.19	Neutral
Perceived Usefulness	69.89	18.79	Neutral
Intention to Use	66.01	18.89	Neutral
Perceptions	65.91	13.88	Neutral
Efficiency	72.11	15.67	Fairly Positive
Financial Cost	72.42	17.15	Fairly Positive
Reliability	58.33	17.01	Fairly Negative
Perceived Ease of Use	65.9	19.33	Neutral
Interaction	62.06	17.95	Neutral

was no significant difference in the mean KAP scores of the age groups ( $p=0.609$ ).

For sex, females had a higher mean knowledge score (44.02) compared to males (38.26). On the

other hand, only a slight difference was observed for attitude and perception with mean scores of 67.53 and 66.36 for females, and 67.86 and 65.31 for males, respectively. It also showed that there was no sufficient evidence to conclude that KAP differs by sex ( $p=0.212$ ).

For highest educational attainment, those with a high school degree and bachelor's degree had similar scores across the three categories. Those who had a graduate degree got the lowest mean knowledge score (38.33) among the three groups but also got the highest attitude score (71.03) among the groups. With this, there was no significant difference between the respondents' KAP and highest educational attainment ( $p=0.818$ ).

For monthly income, those with a monthly income between Php 45,001 and Php 75,000 have the lowest mean KAP scores of 36.67, 61.31 and 61.35, respectively. It can be observed that there was a large variation in the knowledge scores across income groups but small variations could be observed on the attitude and perception scores. There was no significant difference between the respondents' KAP and monthly income ( $p=0.428$ ).

Table 4 displays the estimated correlation between the variables through the Spearman rank-order correlation coefficient. The correlation between knowledge about telemedicine and attitude towards the use of it was 0.3637, which indicated a weak to moderately weak positive linear relationship between the two variables. Meanwhile, the correlation between knowledge about telemedicine and perceptions towards its use was 0.4176. This indicated that there was a moderate positive linear relationship between the two variables. Lastly, the correlation between attitude and perception towards the use of telemedicine was 0.7477, indicating a strong positive linear relationship.

## DISCUSSION

### Sociodemographic Profile of the Respondents

#### Age

Majority of the participants in the study were aged 20 to 24 years old followed by 25 to 29. A study by Cranford[9] stated that individuals in the said age groups are 20% more willing to adopt technology compared to older age groups which may be the

**Table 3:** Summary Mean Scores of Knowledge, Attitudes and Perceptions Towards Telemedicine of Survey Respondents per Socio-demographic Variable

	Knowledge	Attitude	Perception	p-value
<b>Age Group</b>				
18 to 19 yrs. old	38.71	66.26	63.89	0.609
20 to 24 yrs. old	42.33	67.99	66.60	
25 to 29 yrs. old	40.83	68.39	65.96	
30 to 34 yrs. old	39.05	65.31	61.53	
<b>Sex</b>				
Female	44.02	67.53	66.36	0.212
Male	38.26	67.86	65.31	
<b>Highest Educational Attainment</b>				
High School and below	41.47	68.74	66.57	0.818
College or bachelor's degree	41.90	66.27	65.30	
Graduate School	38.33	71.03	64.67	
<b>Monthly Income</b>				
Php 10,000 and below	40.40	67.44	66.56	0.428
Php 10,001 - Php 20,000	40.93	66.75	65.38	
Php 20,001 - Php 45,000	39.47	67.11	66.44	
Php 45,001 - Php 75,000	36.67	61.31	61.35	
Php 75,001 - Php 130,000	51.11	71.16	64.84	
Php 130,001 - Php 220,000	46.52	72.26	65.91	
Php 220,001 and above	42.73	69.37	67.13	

**Table 4:** Correlation of Knowledge, Attitudes and Perceptions Towards Telemedicine

Variables	Spearman's rho	p-value
Knowledge and attitude	0.3637	< 0.0001
Knowledge and perception	0.4176	< 0.0001
Attitude and perception	0.7477	< 0.0001

reason as to why majority of the respondents came from the same age group.

**Sex**

In this study, the majority (57.1%) of the participants were females. This was similar to the findings of Tingle[10] wherein females were found to utilize telemedicine services more than males would. It was also stated that 56.9% of the females completed their telehealth consultations compared to males (43.1%). Similarly, a study conducted by Escoffery[11] also concluded that females were more likely to participate in telemedicine services

and demonstrate behaviors towards telemedicine or e-health services than males since females tend to seek more information regarding health issues online coupled with the advice of health professionals.

**Highest Educational Attainment**

Almost half (49.7%) of the respondents had at least high school education while 46.6% had a bachelor's degree. According to Scott Kruse, et al.[12], one of the barriers to telemedicine is the level of education to which van Deursen and van Dijk[13] added that the highest educational attainment is the most important contributing factor in being equipped with internet skills. Since the majority of the respondents have middle to high level of education, it can be said that they are equipped with the necessary internet skills required to have access to telemedicine and its services.

**Monthly Income**

Exactly half of the respondents had a monthly income of less than Php 10,000. This may largely

be because a majority of the respondents are still students (based on their age and highest educational attainment) and do not have a monthly salary. Nonetheless, the results are still supported by Ryu[2] which stated that low-income countries still have a willingness to participate in telemedicine and telehealth systems. Ryu[2] also stated that there was a desire to implement telemedicine solutions in developing countries as they see this as an opportunity to improve the current healthcare system.

### Knowledge, Attitudes and Perception Towards Telemedicine

#### Knowledge

The overall knowledge of the respondents was considered average to low. In the study by Malhotra, et al.[14], low knowledge levels were attributed to a person's lack of exposure to telemedicine. Similarly, a study conducted on physicians by Albarrak, et al.[15] showed that the participants had average knowledge of telemedicine since there were low numbers of training, workshops and meetings involving the discussion of telemedicine's advantage. It was explained that the knowledge of the user was critical to the successful implementation of telemedicine[15]. Knowledge levels may also vary based on the length of implementation of telemedicine at a certain place[16].

#### Attitudes

The respondents were considered to have a neutral attitude towards the use of telemedicine, which was parallel to the study conducted by Kumar and McNeil[17] where majority of their respondents who had no experience in using a telemedicine product had a neutral response when it came to user acceptability of neurology telemedicine technology.

#### Perceptions

The respondents had a neutral perception towards telemedicine with the subcategories efficiency and financial cost obtaining fairly positive outlooks. In a study conducted by Acharya and Rai[18], a majority of their respondents were content with their telemedicine experience as it was conveniently scheduled for them. In addition to that, Dick et al. as cited in Acharya

and Rai[18] mentioned that telemedicine was well accepted due to the financial savings it was able to bring. Meanwhile, the respondents had a fairly negative perception on the reliability of telemedicine. This subcategory relies on the current status of telemedicine in a particular place as stated by Bali[19]. The respondents' view on the reliability of telemedicine may be due to its novelty as well since it was a fairly new concept to the Philippines.

### Knowledge, Attitudes and Perceptions Towards Telemedicine by Sociodemographic Variables

#### Age Group

No sufficient evidence may prove any significant differences in the KAP of respondents between 18 and 34 year olds, which could be due to the close proximity of the ages ( $p=0.609$ ). Accordingly, remarkable deviations in responses within the age group were not found, but instead could be seen when they, as a whole, are compared against much older age groups. A study conducted by PwC[20], a professional services network, stated that 18 to 34 year olds are the most open to technological advancements and the digital future among any other age groups. This can also be reflected in the survey conducted by American Well[21], another telehealth service provider, which showed that it was the 18 to 34 year olds that were most inclined (41%) to transition from their primary care physicians to those who offer virtual care.

#### Sex

The behavior of respondents' KAP towards telemedicine did not differ by sex ( $p=0.212$ ). This is supported by the study of Haluza and Wernhart[22] that indicated the prevailing use of health applications by both male (39%) and female (42%) were already high. Therefore, there was no significant difference in the prevalence of general usage of mobile health applications between the two. Similarly, in the study of Escoffery[11], the composite e-Health literacy scale scores between male (29.69) and female (30.11) respondents presented no significant differences as both sexes were reported to have comparable perceived skills in using the internet for their health concerns.

### Highest Educational Attainment

There is no sufficient evidence that would indicate any difference when KAP is analyzed by the respondents' highest educational attainment ( $p=0.818$ ). In a study performed by Park et al.[23], university students were surveyed on their behavioral intention to use mobile learning. Their survey showed that most students have a positive attitude, behavior, perceived usefulness, and perceived ease of use, indicating that they have high acceptance of technology. It was also mentioned that more people are inclined to use information technology in every field to catch up with the rapid changes happening globally. Grani [24] mentioned that external factors could have an effect on a student's attitude in utilizing technology. However, since there were no respondents from people without formal education, the lack of data leaves no evidence that education has a significant effect on KAP towards telemedicine.

### Monthly Income

There is no sufficient evidence that would indicate any difference when the respondents' KAP is analyzed based on their monthly income ( $p=0.428$ ). In a study done by Li[25], mobile medical treatment (MMT) users were surveyed on their attitudes and perceived ease of use. The survey showed that most users had a positive attitude and perceived ease of use which indicated a high acceptance of mobile health (mHealth) services regardless of the social demographic that includes gender, age, education level and monthly income.

### Correlation of Knowledge, Attitudes and Perceptions Towards Telemedicine

A weak to a moderately weak positive linear relationship was seen between knowledge about telemedicine and attitude towards the use of it. On the other hand, knowledge and perceptions towards telemedicine have a moderate positive linear relationship. This result suggests that the likelihood of having a positive attitude and perception towards the use of telemedicine does not necessarily come from a high level of knowledge about it. This is parallel to a similar study conducted among clinicians by Ayatollahi, et al.[7] which showed that although clinicians have limited knowledge about

telemedicine, a majority of the respondents still think it is necessary. Valikodath, et al.[26] explored diabetic retinopathy patients' attitudes toward telemedicine and revealed that the majority had not heard of telemedicine but are willing to participate in such a practice. Willingness was greatly influenced by their perceived convenience of telemedicine.

Additionally, a study conducted by Patel[27] among pharmacy students revealed that 40% of the respondents are only slightly to not at all knowledgeable about telepharmacy, a part of the collective telemedicine term. Despite the low knowledge on telepharmacy, the students showed a positive perception of its relative advantage as compared to the conventional face-to-face method. A majority of them believed that the COVID-19 pandemic paved the way for practicing telepharmacy and had seen its importance as a tool to improve the clinical aspects of health care[27].

In terms of the relationship between attitude and perception towards telemedicine, these two variables have a strong positive linear relationship, meaning that the more positive attitude a person has towards the use of telemedicine, the more likely it is for them to have a positive perception about the use of telemedicine. This coincides with the results of the study by Russo, et al.[28] that investigated on the attitudes of families of pediatric patients towards telemedicine. These pediatric families showed a positive attitude along with a strong interest towards telemedicine. Specifically, families of those undergoing genetic consultation showed a positive perception towards telemedicine. In the study of Dey and Bhattacharya[16], most of their study participants appreciated telemedicine's interactive nature and considered it as a tool that could improve both access to healthcare and quality of care. Most of these study participants expressed their willingness to use telemedicine. Moreover, Rho, et al.[29] supports how a positive attitude most likely reflects a positive perception towards telemedicine. Their study showed that perceived ease of use influenced perceived usefulness and the behavioral intention to use telemedicine.

### CONCLUSION

Advances in the medical field together with the ongoing COVID-19 pandemic have caused a shift in the mode of delivery for various healthcare providers.

Although telemedicine was more utilized during this pandemic, the majority still have average to low knowledge about this topic. While the behavior of their KAP does not differ per socio-demographic variable, the study concluded that positive attitudes most likely reflect a positive perception towards

telemedicine but does not necessarily equate to higher levels of knowledge about telemedicine. This analysis provides a great benefit to the assessment of the public's impression on using modern technology in consultations as an alternative to traditional clinical visits.

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