The Association Between Perceived Level of COVID-19-Related eHealth Literacy and Adherence to Preventive Practices Against COVID-19 Infection Among Adult Patients in Healthway Family Clinics in Marikina and Rizal: An Analytical Cross-Sectional Study

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Background: The internet contains both accurate and false coronavirus-related information. Is the public equipped with electronic health literacy in navigating online material to make informed health decisions?
Objective: This study measured Filipino adults' perceived level of COVID-19-related eHealth literacy, and how this affects their adherence to preventive practices against COVID-19 infection.
Methods: In this analytical cross-sectional study, data were collected from 345 adult respondents who were patients, and their companions, consulting in Healthway Family Clinics in Marikina and Rizal. They answered self-administered electronic questionnaires in English or Filipino. The data collection tool was adapted from the Coronavirus-Related eHealth Literacy Scale (CoV-eHEALS) with permission from the authors. Pearson correlation determined the relationship between mean CoV-eHEALS and mean Protective Behavior Adherence (PBA) score. ANOVA determined the relationship of CoV-eHEALS and PBA with sociodemographic variables.
Results: Higher Covid-related eHealth literacy is associated with better adherence to protective behaviors against COVID-19. The overall mean CoV-eHEALS is 23.67 while the overall mean PBA score is 3.81 (r=0.32). Younger age, female sex, and high educational attainment are associated with high CoV-eHEALS. Female sex and high educational attainment are associated with high PBA score.
Conclusion: eHealth literacy is essential for COVID-19 awareness since it influences the public's engagement in preventive behavior. Sociodemographic variables should be considered in health education, targeting individuals of younger age, male sex, and lower education. Evaluation of the reliability of online sources Filipinos use to gather health-related information is a possible focus for future research.

Key words: electronic health literacy, COVID-19, eHEALS

Introduction

The COVID-19 pandemic crippled health systems and economies around the globe. People sought Covid-related information from the internet and social media.[1] The accessibility of the internet makes it an effective means of communicating with the public.[2] Unfortunately, there is also complex, contradictory, and false information online, prompting the World Health Organization to declare an 'infodemic' on February 15, 2020.[3] Health literacy entails people's knowledge and competencies to obtain, process, and understand health information to make appropriate health decisions.[4]

In 2006, Norman and Skinner introduced the concept of electronic health (eHealth) literacy by generating eHeals, "an 8-item measure of eHealth literacy developed to measure consumers' combined knowledge, comfort, and perceived skills at finding, evaluating, and applying electronic health information to health problems."[5] In 2021, An, et al. conducted a web-based survey of US adults using the CoV-eHEALS tool, a modified version of eHEALS, "to focus specifically on health information available on the internet about the coronavirus."[6] The study analyzed the relationship between: 1) CoV-eHEALS scores and the participants' demographic characteristics, and 2) CoV-eHEALS scores and the participants' COVID-19–related KAPs. The study showed

"a clear and consistent association between higher coronavirus-related eHealth literacy and greater knowledge, lower conspiracy beliefs, and greater engagement in protective behaviors."[6] That study was the springboard for this research.

This study's main objective was to find out whether a higher self-rated level of eHealth literacy is associated with greater adherence to protective measures against COVID-19. The researchers were interested in duplicating the study of An, et al. in the Philippine setting to see how results differed in a country which is resource poor, and where eHealth literacy might be low. They wanted to see how Filipino adults judge their own ability to distinguish between information that is of good or poor quality, and how confident they feel in utilizing the information for sound health decisions.

Methods

Study Design and Setting

The study design was analytical cross-sectional. The study settings were Healthway Family Clinics in Riverbanks, Marikina and Angono, Rizal.

Subjects

The study participants were adult patients and their companions consulting in the said clinics. Data were collected via self-administered Google Form questionnaires in English or Filipino, depending on the respondent's preference. The respondent's e-Informed Consent was secured. By typing their full name, respondents signified their consent to participate in the study. Confidentiality was observed by the researchers in every step of data collection. Three hundred forty five respondents were recruited. Sample size computation was done using OpenEpi based on a population size of 1,080. There was an anticipated percent frequency of outcome of 50 (the portion of the population expected to demonstrate high e-health literacy related to COVID-19), a confidence level of 95%, and a design effect of 1.

Inclusion and Exclusion Criteria

Inclusion criteria: 1) 18 years old and above; 2) individuals who consulted in Healthway Family Clinics during the study period (November 2021); 3) guardians accompanying pediatric patients, and companions of adult patients.

Exclusion criteria: 1) Individuals without internet or social media access; 2) individuals who did not comprehend either English or Filipino; 3) patients who were unstable and in distress; and 4) those with no consent.

Data Collection

The data collection tools were adapted from the: 1) Coronavirus-Related eHealth Literacy Scale (CoV-eHEALS), and 2) Protective Behavior Adherence (PBA) tool, with permission from the authors, Lawrence An, et al, and translated into Filipino by the Sentro ng Wikang Filipino of UP Diliman. Cov-eHEALS was developed by An, et al. based on Norman and Skinner's 2006 eHEALS tool. It measures a person's combined knowledge and perceived skills at finding, evaluating, and applying electronic health information about COVID-19. The PBA tool measures conformity to practices recommended by health authorities against COVID-19.

The CoV-eHEALS tool is an 8-item questionnaire with a 4-point Likert scale. The highest possible score is 32. Respondents were categorized as having HIGH CoV-eHEALS (>21 points) or LOW CoV-eHEALS (</= 20 points). The PBA tool is a 7-item questionnaire with a 5-point Likert scale which measures the respondent's adherence to behaviors like washing hands, wearing masks, and the like. The mean score ranges from 1 to 5, and overall PBA score is obtained by getting the average score of the 7 items. The higher the score, the more adherent a person is to the protective behavior. These scoring systems were described by An, et al. and were adapted in measuring outcomes for this study.

Data Analysis

The primary outcome of interest in this study was the relationship between the mean CoV-eHEALS (independent variable) and the mean PBA score (dependent variable). Pearson correlation test was used to determine if there was a relationship between the 2 variables. The secondary outcome of interest was the relationship between the mean CoV-eHEALS and the sociodemographic variables. Since age is a continuous variable, Pearson correlation test was used to determine its relationship with CoV-eHEALS. ANOVA was used to determine association between mean Cov-eHEALS and sociodemographic variables, and between mean PBA score and sociodemographic variables.

Ethical Considerations

The e-Informed Consent detailed the study's goals, benefits, and risks. Participants could withdraw from the study anytime. Confidentiality was ensured by limiting who had access to the data. Only the 2 principal investigators had access to the responses submitted by respondents. Respondents were identified by their initials. The researchers did not use external storage devices to limit where the research data was stored. After keeping the data for one year, stored data will be erased using software applications to delete electronic files.

Results

Three hundred forty five participants were included in this study and categorized based on age, sex, and educational attainment. For age, respondents were grouped according to young (18-41 years), middle-aged (42-65 years) and older (66 years and above) adults. Most respondents were young adults (58.84%) and female (66.38%). A larger part were college graduates (46.09%). 228 (66.90%) answered the Filipino questionnaire, while 117 (33.91%) answered the English questionnaire.

Table 1. Sociodemographic characteristics of survey respondents

Sociodemographic Characteristics		Number (N=345)	Percentage (%)
Age	18-41 years	203	58.84
	42-65 years	125	36.23
	66 years & older	17	4.93
Sex	Female	229	66.38
	Male	116	33.62
Highest Educational Attainment	Elementary Graduate	15	4.35
	High School Graduate	89	25.80
	College Undergraduate	76	22.03
	College Graduate	159	46.09
	Post Graduate	6	1.74

The overall mean CoV-eHEALS score is 23.67, while the mean PBA score is 3.81. The mean CoV-eHEALS score is positively correlated with mean PBA score (r=0.32), which meant that higher Covid-related eHealth literacy was associated with greater adherence to protective behaviors against COVID-19. The strength of association between the two is moderate.

Table 2. Overall mean of total COV-eHEALS and PBA scores (Pearson Correlation).

	Overall Mean	SD	Correlation Coefficient	p-value
CoV-eHEALS Score	23.67	6.13	0.32	0.00
PBA Score	3.81	0.65		

There was a significant association between age and CoV-eHEALS. Age was negatively correlated with mean CoV-eHEALS (r=-0.298), indicating that the older the age, the lower the CoV-eHEALS. The strength of this association, however, was weak. There was no significant association between PBA score and age (p-value 0.284). Age appeared to be negatively correlated with mean PBA score (r=-0.58); however, this was not statistically significant.

Table 3. Correlation of age with CoV-eHEALS and PBA scores (Pearson Correlation)

	Correlation Coefficient	p-value
CoV-eHEALS	-0.298	0.000
PBA score	-0.58	0.284

ANOVA was used to check the association between mean CoV-eHEALS and sociodemographic variables. With p-values less than 0.05, the associations of CoV-eHEALS with sex and educational attainment were significant. Females had a higher mean CoV-eHEALS (24.12) than males (22.78). Only elementary graduates exhibited low CoV-eHEALS scores below 20 points. Post Graduates had the highest mean CoV-HEALS of 28.83, followed by College Graduates (25.97), then College Undergraduates (22.64), and High School and Elementary Graduates (21.66 and 14.2, respectively).

ANOVA was also used to check the association between mean PBA score and sociodemographic variables. With p-values less than 0.05, the associations of PBA score with sex and educational attainment were significant. Females had a higher mean PBA score (3.9) than males (3.64). PBA score was highest among Post Graduates at 4.38, followed by College Graduates (3.93), then College Undergraduates (3.80), and High School and Elementary Graduates (3.65 and 3.25, respectively). Based on the results, females as well as those with higher educational attainment had higher Cov-eHEALS and PBA scores.

Discussion

This study demonstrated that higher Covid-related eHealth literacy was associated with better adherence to protective behaviors against COVID-19. This was consistent with the US study by An, et al. which showed a clear association between high CoV-eHEALS and greater engagement in protective behaviors. The results resembled those of a Hong Kong study (Guo, et al. 2021) in which adults with the highest eHEALS score were found to have high adherence to wearing surgical masks, washing hands, and social distancing.[7] An Australian study (McCaffery, et al. 2020) showed similar results: people with inadequate health literacy were less able to identify behaviors to prevent COVID-19 infection than people with adequate health literacy.[8] A study on Chinese netizens (Li, et al. 2020) demonstrated that disease

Table 3. Association of mean CoV-eHEALS and mean PBA score with sex and educational attainment (ANOVA).

	Mean COV eHEALS	SD	p-value	Mean PBA Score	SD	p-value
Sex						
Male	22.78	0.74	0.027	3.64	0.63	0.000
Female	24.12	0.81		3.90	0.65	
Educational Attainment			0.000			0.000
Elementary Grad	14.2	0.91		3.25	0.78	
High School Grad	21.66	0.83		3.65	0.72	
College Undergrad	22.64	0.74		3.80	0.66	
College Grad	25.97	0.53		3.93	0.53	
Post Grad	28.83	0.53		4.38	0.47	

knowledge and eHealth literacy are significant predictors of preventive behaviors against COVID-19.[9] A study conducted among university students in Pakistan concluded that health literacy positively predicted the students' protective behaviors.[10]

In contrast, a study by Yodmai, et al. (2021) among older adults in Thailand concluded that health literacy was not associated with COVID-19 preventive behaviors. In this study, sufficient income, easy access to health services, and good family support were factors associated with good COVID-19 preventive behaviors.[11]

Age

One of the secondary objectives of this study was to find out how sociodemographic factors affect Covid-related eHealth literacy. This study showed that younger age was associated with higher CoV-eHEALS. This was consistent with the study of Guo, et al. in which age was found to be inversely associated with the eHEALS score.[7] The study by An, et al. however, did not find an association between the participants' CoV-eHEALS and age.[6] This study showed that there was no association between age and adherence to protective behaviors against COVID-19. A Mexican study (Sánchez-Arenas 2021) and a Finnish study (Eronen, et al. 2021) demonstrated the opposite finding.[12,13]

Sex

Females had a higher Covid-related eHealth literacy and greater protective behavior adherence compared to males. This was similar to the results of studies in Pakistan (Naveed, et al. 2021), Mexico, and Germany (Lüdecke, et al. 2020) which showed that being female was associated with higher odds of protective behavior.[10,12,14]

Educational Attainment

This study showed that educational attainment was associated with self-reported Covid-related eHealth literacy. Although the study did show that higher educational attainment equates to higher CoV-eHEALS, there were studies that have shown this positive correlation. A Hong Kong study found that education was positively associated with eHEALS score.[7] A US study found that individuals with higher educational attainment reported higher CoV-eHEALS scores.[6] This study showed that educational attainment was also associated with adherence to protective behaviors against COVID-19. This was similar to the results of a German study in which people with lower educational levels were less likely to observe preventive behaviors such as avoiding gatherings or increasing hand hygiene.[14] A study in Mexico among adults similarly concluded that people with high education reported significant engagement in COVID-19 preventive actions.[12]

This study focused on the perceived eHealth literacy of participants and their adherence to preventive practices against COVID-19. The data collection tool measured self-perception of Covid-related eHealth literacy. It did not provide an objective assessment of how respondents verify and navigate electronic information related to COVID-19, which sources they get their information from, and how they process this information.

Conclusion and Recommendations

The COVID-19 infodemic highlighted that poor health literacy is an underestimated public health problem globally. The study showed that individuals with high COVID-related eHealth literacy had greater adherence to protective behaviors against COVID-19 infection. The data collected showed that respondents with younger age, female sex, and high educational attainment had higher CoV-eHEALS. Based on ANOVA, all sociodemographic variables were shown to be significantly associated with CoV-eHEALS. Sex and educational attainment were also significantly associated with PBA. Age was the only variable that was shown not to be associated with PBA both in Pearson's correlation and ANOVA.

Clearly, eHealth literacy is essential for COVID-19 awareness, which influences the public's engagement in preventive behavior. Focusing on improving eHealth literacy could be a useful public health strategy to control the pandemic. Sociodemographic variables should be considered in the development of educational materials, targeting individuals of younger age, male sex, and lower education. Dissemination of correct information on preventive behaviors against COVID-19 should be made more appealing to these particular groups. Further studies can be undertaken to objectively evaluate the eHealth literacy of Filipinos: their ability to search for health information online and evaluate its reliability. Another recommendation is to determine which online sources Filipinos get their COVID-19-related information from and if these are verified. Engagement in Covid-preventive measures can also be compared among those who use various online platforms to search for COVID-related information: social media vs. web-based encyclopedias vs. public health websites. Since this study was conducted after the mass vaccine rollout had begun, it's possible that vaccinated people are more likely to adhere to preventive measures. A study comparing PBA among vaccinated vs. unvaccinated individuals is another possible recommendation.

References

1. Pérez-Escoda A, Jiménez-Narros C, Perlado-Lamo-de-Espinosa M, Pedrero-Esteban LM. Social networks' engagement during the COVID-19 pandemic in Spain: health media vs. healthcare professionals. Int J Environ Res Public Health 2020 Jul 21;17(14):5261.
2. Freberg K, Palenchar MJ, Veil SR. Managing and sharing H1N1 crisis information using social media bookmarking services. Public Relat Rev 2013 Sep; 39(3):178-84.
3. Eysenbach G. How to fight an infodemic: the four pillars of infodemic management. J Med Internet Res 2020;22(6):e21820.
4. Abdel-Latif MMM. The enigma of health literacy and COVID-19 pandemic. Public Health Pract 2020 Jun 30;185: 95-6.
5. Norman CD, Skinner HA. Eheals: the ehealth literacy scale. J Med Internet Res 2006 Nov 14;8(4):e27.
6. An L, Bacon E, Hawley S, Yang P, Russell D, Huffman S, Resnicow K. Relationship between Coronavirus-related ehealth literacy and COVID-19 knowledge, attitudes, and practices among US adults: web-based survey study. J Med Internet Res 2021 Mar 29;23(3):e25042.
7. Guo Z, Zhao SZ, Guo N, Wu Y, Weng X, Wong JY, Lam TH, Wang MP. Socioeconomic disparities in eHealth Literacy and preventive behaviors during the COVID-19 pandemic in Hong Kong: cross-sectional study. J Med Internet Res 2021 Apr 14; 23(4):e24577.

8. McCaffery KJ, Dodd RH, Cvejic E, Ayrek J, Batcup C, Isautier JM, Copp T, Bonner C, Pickles K, Nickel B, Dakin T, Cornell S, Wolf MS. Health literacy and disparities in COVID-19-related knowledge, attitudes, beliefs and behaviours in Australia. Public Health Res Pract 2020 Dec 9;30(4):30342012.
9. Li X, Liu Q. Social media use, eHealth literacy, disease knowledge, and preventive behaviors in the COVID-19 pandemic: cross-sectional study on Chinese netizens. J Med Internet Res 2020 Oct 9;22(10):e19684.
10. Naveed MA, Shaukat R. Health literacy predicts COVID-19 awareness and protective behaviours of university students. Health Info Libr J 2021 Oct 1:10.1111/hir.12404.
11. Yodmai K, Pechrapa K, Kittipichai W, Charupoonpol P, Suksatan W. Factors associated with good COVID-19 preventive behaviors among older adults in urban communities in Thailand. J Prim Care Comm Health 2021 JanDec;12:21501327211036251.
12. Sánchez-Arenas R, Doubova SV, González-Pérez MA, Pérez-Cuevas R. Factors associated with COVID-19 preventive health behaviors among the general public in Mexico City and the State of Mexico. PLoS One 2021 Jul 23;16(7):e0254435.
13. Eronen J, Paakkari L, Portegijs E, Rantanen T. Coronavirus-related health literacy and perceived restrictiveness of protective measures among communitydwelling older persons in Finland. Aging Clin Exp Res 2021 Aug;33(8): 2345-53.
14. Lüdecke D, von dem Knesebeck O. Protective behavior in course of the COVID19 outbreak-survey results from Germany. Front Public Health 2020 Sep 24;8:572561.