ORIGINAL ARTICLE

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Factors associated with digital health literacy and attitude towards use of digital health technology among health workers of selected municipalities of Lalitpur district: a mixed method study

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Abstract

Introduction: Digital health literacy is an individual's ability to search, under-stand, and evaluate health information on digital media. There is huge gap in digital health literacy which is rising to create digital gap in context of Nepal which prevents everyone to experiences the advantages of digital health. This study aimed to assess health professionals' digital health literacy level, attitude towards use of digital health technology and associated factors in two munici-palities of Lalitpur district.

Method: A Cross-sectional study with a concurrent triangulation mixed-meth-od design was used among thirty-four health professionals working in prima-ry level health facilities in Lalitpur metropolitan and Mahalaxmi municipality. The duration of study was five weeks (September to October 2023). Variables such as age, education, job type were observed. Bivariate association with chi-square test was done for analysis and identified its associated factor while the-matic analysis was conducted for qualitative data.

Result: This study found 24(70.59%) health workers had high digital health lit-eracy while 23(67.65%) had good attitude. Factors such as marital status, job designation, and family monthly income found to be statistically significant with digital health literacy and Job designation, patient served per day, income and access to digital technology were significant with attitude. While triangu-lating variables such as income and access to digital technology identified as convergent and training, age and education was found to be divergent.

Conclusion: Digital health literacy was significantly influenced by technology and recommended to make computers more accessible, offer a training pro-gram and encourage a positive attitude toward this technology.

Keywords: Attitude, Determinants, Digital health, Digital literacy, Digital tech-nology, Health workers

INTRODUCTION

Digital health literacy, also known as electronic health literacy or e-Health literacy, is defined as an individual's ability to search, understand, and evaluate health information on digital media, actively engage in the exchange and interactions of health information, and use the acquired information for health management and health problem-solving.[1] In the 21st century, it is important to comprehend digital literacy which is much more than a basic understanding of technology; rather, it is a real tool at the service of citizenship that enables people to have equal access to a variety of service categories, including health services.[2]

Digital health literacy improves people's attitudes about disease and its prevention, so enhancing their physical, mental, and social health. [3] There is huge gap in digital health literacy which is uneven and rising to create digital gap in context of Nepal. This gap prevents everyone from having access to and the capacity to experience the advantages of digital health. As a result, this study aimed to assess health professionals' digital health literacy level, attitude towards use of digital health technology and associated factors in Lalitpur district.

METHOD

A Cross-sectional study with a concurrent triangulation mixed-method design is done to determine the digital health literacy, attitude towards use of digital health technology and its associated factors among health workers of primary level public health facilities of Lalitpur district. The study was conducted at selected municipalities i.e., Mahalaxmi municipality and Lalitpur metropolitan of Lalitpur District, Bagmati Province, Nepal as a pilot study. The duration of study was five weeks from September to October 2023. The study population were health workers providing health services at primary level public health facilities. A total of thirty-four health workers from various health facilities were taken for quantitative study while five in-depth interviews were taken for qualitative study. The sampling method was a non-probability purposive sampling technique.

The dependent variable was digital health literacy while independent variables included background variables as Age, Sex, Education level, Income , Marital Status, Work Experience, Designation, Type of public health facility & Job type and mediating variables as Attitude towards use of digital health technology, access to digital technology, type of digital devices access, access digital device in workplace, Internet Access, Source for access to internet, Training in digital technology, Motivation to use digital technology and number of patient served per day.

A self-administration method was used for semi-structured questionnaire to collect quantitative data while interview guide was used to interview the health workers for qualitative data. Digital health literacy was measured by e-HEALS tool which consisted eight items scale[4] while to measure attitude the digital health scale was used with twenty item questions using 5-point scale.[5] Digital health literacy was categorized to high and low based on cut-off value identified using Youden's index on ROC Curve result. Attitude was also categorized into good and poor using the ROC Curve. The e-HEALS tool and Digital Health scale for attitude has been widely used and well validation in numerous studies, with a Cronbach's α of 0.88[4] & 0.91[5] in original scale. The Cronbach's alpha in this study for e-HEALS tool is found to be 0.905, which is at excellent level.

For quantitative study, data were coded, entered in Epidata Version 3.1, and cleaned in MS-Excel 2013. Statistical analysis was done using Easy R 1.64 and STATA 13.0. Descriptive analysis included frequency, percentage and, median and inter-quartile range and, inferential statistical analysis included test of association between dependent and independent variables using Chi-square Test at the p-value less than 0.05.

For qualitative study, the data was first transcribed into Nepali language and then translated into English language. All the data were coded to maintain anonymity of participants. Thematic analysis has been done in excel. Braun and Clark's six step thematic analysis with inductive coding is used to perform qualitative analysis. Findings are presented based on identified theme with verbatim to support each thematic area. The findings from the quantitative and qualitative study are triangulated to find the convergence, divergence and expansion area.

RESULT

Part 1: Quantitative analysis

A total number of participants were 34 among them we found 18 (52.94%) male participants and 16 (47.06%) female participants. Around 21 (62.00%) participants were married. Most of the participants had Technical school leaving certificate (TSLC) education level. Twenty-four (70.60%) participants from health facilities were nurses. Eighteen (53.00%) participants were from basic health service centers (Table 1). Almost all the participants had access to digital technology, which was around 31 (91.00%) health workers. Meanwhile 33 (97.00%) participants had access to internet in any places. Eighteen (52.90%) health workers were not trained on any type of digital technology as found from the study (Table 2.2). We found that 24 (70.59%) participated health workers had a high digital literacy rate while 23 (67.60%) health workers had good attitude towards use of digital technology (Fig. 1).

Test of Association

From the findings we found marital status (p=0.0449), job designation (p=0.0169), family monthly income (p=0.0155) had a significant association with digital health literacy

Table 1. Socio-demographic characteristics of health workers

| Variables	Frequency(%)	Variables	Frequency(%)
Age (Completed Years)	37.59 ± 9.092	**Monthly Family Income (NPR)** N=34	
Sex	N=34	≥97,450	7(20.59%)
Male	18(52.94%)	48,751-97,449	6(17.65%)
Female	16(47.06%)	36,551-48,749	6(17.65%)
Marital Status N=34		24,351-36,549	13(38.24%)
Never Married	7(20.59%)	14,551-24,349	5(5.88%)
Married or living together	21(61.76%)	**Type of Public Health Facility at primary level**	N=34
Divorced/separated	4(11.76%)		
Widowed	2(5.88%)	Primary Health Care Centre (PHCC)	3(8.82%)
Educational level N=34		Health Posts (HP)	13(38.24%)
TSLC	11(32.35%)	Basic Health Service Centre	18(52.94%)
PCL or Intermediate	8(23.53%)	**Job Type** N=34	
Bachelor	8(23.53%)	Permanent	19(55.88%)
Master's and above	7(20.59%)	Temporary	15(44.12%)
Work Experience (Total years)	17.53 ± 8.32		
Job designation	N=34		
Nurse (Nursing Officer, Nursing Inspector, Staff Nurse, Sr. ANM, ANM)	24(70.59%)		
Paramedic (HA, Sr. AHW, AHW, Lab assistant, Radiographer, Physiotherapy, Pharmacy)	10(29.41%)		
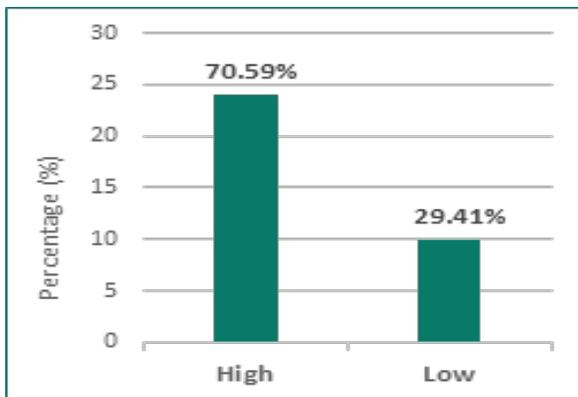
Figure 1. Digital health literacy level, N34

(Table 2.1). A bivariate association with attitude towards use of digital health technology found a significant association with these four variables i.e., Job designation (p=0.0135), patient served per day (p=0.025), income (p=0.0213) and access to digital technology (p=0.027) (Table 3.1).

Part 2: Qualitative analysis

A total of five in-depth interviews were taken with health workers of diverse backgrounds at different primary level health facilities. Themes, sub-themes, and codes were made for thematic analysis of qualitative data. Total eight themes were made i.e., Technology usage; Internet access, usage, and dependency; Digital health literacy; factors on digital health literacy; attitude towards use of digital technology; factors related to attitude; role of digital health for health workers; future perspective and personal experiences. Different codes were made for each theme.

Part 3: Triangulation of Qualitative and Quantitative

Findings

Convergent Finding

Quantitative data found job designation, marital status, and access to digital technology and income as a significant factor for digital health literacy which is triangulated by qualitative findings.

*"Nowadays, income matters. People are willing to invest in it. Socially, income has an impact. But now, even those with lower income want to use it, although they cannot always afford it. Poverty does matter and it is about accessibility. If you are wealthy, it's not challenging, but if you are poor, it's difficult to access." –**Staff Nurse, IDI 4***

Divergent Findings

In the qualitative findings training, age and education were explored to be a significant factor. However, in the quantitative study, these factors were not found to be significantly associated.

*"It is necessary to increase awareness, especially for elderly people who are not literate. It is not possible to convince them to use technology, so the focus should be on increasing literacy."- **Health Assistant, IDI 1***

Only 47% of participants had training in digital technology but the attitude towards training was found to be positive among most of the participants.

*"Training is essential, and everyone has received training in DHIS. Now, everyone is willing to invest in it. Secondly, taking training on how to operate a computer, even from the basics, can make a significant difference.**" –Staff Nurse, IDI 4***

Table 2.1. Bivariate association between Independent variables and digital health literacy level

Socio-demographic /Technological/ Organizational variables		Level of DHL		p-value
		High	**Low**	
Age (In years)	< 37.6	13 (81.2%%)	3 (18.8%)	0.2701
	≥ 37.6	11 (61.1%%)	7 (38.9%)	
Sex	Female	9 (56.2%)	7 (43.8)	0.1341
	Male	15 (83.3%)	3 (16.7)	
Marital Status	Never Married	7 (100%)	0 (0)	0.0449*
	Married or living together.	14 (66.7%)	7 (33.3)	
	Divorced/separated.	3 (75%)	1 (25)	
	Widowed	0 (0%)	2 (100)	
Educational level	TSLC	8 (72.7%)	3 (27.3)	0.8412
	PCL or Intermediate	5 (62.5%)	3 (37.5)	
	Bachelor	5 (62.5%)	3 (37.5)	
	Master's and above	6 (85.7%)	1 (14.3)	
Job designation	Nurse	14 (58.3%)	10 (41.7)	0.0169*
	Paramedics	10 (100%)	0 (0)	
Income (In Nepalese Rupees)	≥97,451	6 (85.7%)	1 (14.3)	0.0155*
	48,751-97,450	6 (100%)	0 (100)	
	36,551-48,750	2 (33.3%)	4 (66.7)	
	24,351-36,550	10 (76.9%)	3 (23.1)	
	4,851- 14,550	0 (0%)	2 (100)	
Type of Public Health Facility at primary level	PHCC	2 (66.7%)	1 (33.3)	0.8598
	Health Posts (HP)	10 (76.9%)	3 (23.1)	
	Basic Health Service Centre	12 (66.7%)	6 (33.3)	

Table 2.2. Bivariate Association between Independent Variables and digital health literacy level

Socio-demographic / Technological / Organizational variables		Level of DHL		p-value
		High	**Low**	
Job type	Permanent	15 (78.9%)	4 (21.1%)	0.2764
	Temporary	9 (60%)	6 (40%)	
Access to digital technology	Yes	22 (71%)	9 (29%)	1
	No	2 (66.7%)	1 (33.3%)	
Digital devices you have access to	Desktop computers	14 (87.5%)	2 (12.5%)	0.0538
	Laptop computer	10 (76.9%)	3 (23.1%)	0.6961
	Smartphones	19 (76%)	6 (24%)	0.3204
	Tablets	2 (50%)	2 (50%)	0.5595
	Digital medical devices	8 (66.7%)	4 (33.3%)	0.7039
	Smartwatch	5 (71.4%)	2 (28.6%)	1
Accessible digital technology in the workplace	Yes	20 (74.1%)	7 (25.9%)	0.394
	No	4 (57.1%)	3 (42.9%)	
Internet Access	Yes	23 (69.7%)	10 (30.3%)	1
	No	1 (100%)	0 (0)	
Source to access to Internet	Private Wi-Fi and mobile data	10 (58.8%)	7 (41.2%)	0.2587
	Workplace	18 (64.3%)	10 (35.7%)	0.2911
Training in digital technology	Yes	13 (81.2%)	3 (18.8%)	0.2701
	No	11 (61.1%)	7 (38.9%)	
Motivation to use digital technology.	Agree	13 (72.2%)	5 (27.8%)	1
	Strongly Agree	11 (68.8%)	5 (31.2%)	
Work Experience (In Years)	<17.5	11 (78.6%)	3 (21.4%)	0.467
	≥ 17.5	13 (65%)	7 (35%)	
Patients served per day	<18.6	11 (64.7%)	6 (35.3%)	0.708
	≥ 18.6	13 (76.5%)	4 (23.5%)	
Attitude of use	Good	18 (78.3%)	5 (21.7%)	0.2318
	Poor	6 (54.5%)	5 (45.5%)	

Table 3.1. Bivariate Association between Independent variables and attitude towards use of digital technology

Socio-demographic /Technological/ Organizational variables		Level of Attitude		p-value
		Good	Poor	
Age	< 37.6	11 (68.8%)	5 (31.2%)	1
	≥ 37.6	12 (66.7%)	6 (33.3%)	
Sex	Male	9 (56.2%)	7 (43.8%)	0.274
	Female	14 (77.8%)	4 (22.2%)	
Marital Status	Never Married	6 (85.7%)	1 (14.3%)	0.2087
	Married or living together.	14 (66.7%)	7 (33.3%)	
	Divorced/separated.	3 (755)	1 (25%)	
	Widowed	0 (0)	2 (100%)	
Educational level	TSLC	7 (63.6%)	4 (36.4%)	0.599
	PCL or Intermediate	6 (75%)	2 (25%)	
	Bachelor	4 (50%)	4 (50%)	
	Master's and above	6 (85.7%)	1 (14.3%)	
Job designation	Nurse	13 (54.2%)	11 (45.8%)	0.01351*
	Paramedics	10 (100%)	0 (0%)	
Income	≥97,451	6 (85.7%)	1 (14.3%)	0.0213*
	48,751-97,450	5 (83.3%)	1 (16.7%)	
	36,551-48,750	6 (100%)	0 (0%)	
	24,351-36,550	6 (46.2%)	7 (53.8%)	
	4,851- 14,550	0 (0%)	2 (100%)	
Type of public health facility at primary level	PHCC	3 (100%)	0 (0%)	0.6497
	Health Posts (HP)	8 (61.5%)	5 (38.5%)	
	Basic Health Service Centre	12 (66.7%)	6 (33.3%)	
Job type	Permanent	15 (78.9%)	4 (21.1%)	0.1512
	Temporary	8 (53.3%)	7 (46.7%)	

Table 3.2. Bivariate association between Independent variables and attitude towards use of digital technology

Socio-demographic / Technological / Organizational variables		Level of Attitude		p-value
		Good	Poor	
Access to digital technology	Yes	23 (74.2%)	8 (25.8%)	0.02757*
	No	0 (0%)	3 (100%)	
Digital devices you have access	Desktop computers	14 (87.5%)	2 (12.5%)	0.1134
	Laptop computer	9 (69.2%)	4 (30.8%)	0.6894
	Smartphones	20 (80%)	5 (20%)	0.1605
	Tablets	2 (50%)	2 (50%)	0.2683
	Digital medical devices*	10 (83.3%)	2(16.7%)	0.4325
	Smartwatch	5 (71.4%)	2 (28.6%)	1
Accessible digital technology in the workplace	Yes	20 (74.1%)	7 (25.9%)	0.178
	No	3 (42.9%)	4 (57.1%)	
Internet Access	Yes	22 (66.7%)	11 (33.3%)	1
	No	1 (100%)	0 (0%)	
Source to access to Internet	Private Wi-Fi and mobile data	13 (76.5%)	4 (23.5%)	0.2818
	Workplace	18 (64.3%)	10 (35.7%)	0.6431
Training in digital technology	Yes	11 (68.8%)	5 (31.2%)	1
	No	12 (66.7%)	6 (33.3%)	
Motivation to use digital technology	Agree	14 (77.8%)	4 (22.2%)	0.2743
	Strongly Agree	9 (56.2%)	7 (43.8%)	
Work Experience	<17.5	12 (85.7%)	2 (14.3%)	0.076
	≥ 17.5	11 (55%)	9 (45%)	
Patients served/Day	<18.6	15 (88.2%)	2 (11.8%)	0.025*
	≥ 18.6	8 (47.1%)	9 (52.9%)	

Expansive Findings

Culture related factors were not addressed by quantitative analysis but it was explored in qualitative analysis while some believe it has impact while others don't.

*"Cultural factors play a role; some people are a bit hesitant, while others willingly share their reports. Everyone can see my reports, and they all know about my condition." –**Lab Assistant, IDI 2***

*"Cultural factors don't have much influence." –**Staff Nurse, IDI 4***

DISCUSSION

This study found 24 (70.59 %) health workers with high digital health literacy and 23 (67.65%) health workers with good attitude of health workers in selected municipalities of Lalitpur district. A cross-sectional study conducted in Ethiopia among 423 health professionals found that only 51.80% had adequate digital literacy. Participants having high education level, access to digital technology, and having positive attitude has significant association actors with health professional's digital literacy. This study also concludes that only 74.70% of health professionals had favorable attitude towards health technology.[6]

Findings from the study conducted in Ethiopia among 401 study participants found that around 43.60% of respondents had high digital literacy, the associated factors were education level, high computer literacy, internet use, monthly income and knowledge on e-health along with favorable attitudes. [7] Our study found high DHL than the above study which is 70.59% and the significant association with job type (p-value<0.05 i.e., 0.0169), income (p-value-0.0155) and marital status (p-value-0.0449). A study from Nepal conducted among 125 health workers in Dharan has explored the digital e-health literacy where 24.80% of health workers were unsure about the usefulness of the internet for helping them to make decision about their health and only. Only 52.80% of health workers knew about the availability of health resources on the internet. [8] From our study we found similar finding in which 44.12% health workers found very useful in making decisions while 70.00% knew the availability of health resources on the internet.

This study has some limitations. The sample was selected through purposive sampling and the study was conducted with a limited sample size and time frame. So, the study findings may not be generalized.

CONCLUSION

Healthcare workers have a dominant role in digital health literacy, a desired level of digital health literacy among health care professionals will have a significant impact on enhancing patient digital health literacy. The result obtained from quantitative study shows that health workers have high digital health literacy with factors like income, marital status and education having significant impact on the digital health literacy but the attitude among the health workers is found to be poor with significant association with education and sources of internet use. The qualitative findings contradict some of the aspects of attitude towards digital technology, also convergent findings validate the results.

DECLARATIONS

Ethical Clearance
This study was a pilot study conducted for larger study. Ethical approval was taken from Institutional Review Committee (IRC) of Patan Academy of Health Sciences (PAHS) for that larger study (Ref: PHP2311071813).

Consent for Publication
Consent for publication was given by the authors.

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