# DETERMINANTS OF eHEALTH LITERACY LEVEL AMONG ROYAL THAI ARMY PERSONNEL: A CASE STUDY

LTC Thanita Wongjinda[1,2] and Surasak Taneepanichsakul[2]

[1]Royal Thai Army Medical Department, Bangkok; [2]College of Public Health Sciences, Chulalongkorn University, Bangkok, Thailand

**Abstract**: The use of internet based information and communication technology to obtain health information (eHealth) has gained increasing attention in public health. People need to know how to access accurate, appropriate health information (eHealth literacy). The objective of this study was to determine the eHealth literacy level among Royal Thai Army (RTA) personnel and identify factors associated with the level of eHealth literacy. Baseline data from this study will be used for both developing and evaluating a program to promote eHealth literacy among RTA personnel. In 2016, RTA personnel in Bangkok who admitted to accessing the internet were asked to fill out a questionnaire to test their eHealth literacy. The results were quantified into an eHealth literacy scale. Three hundred subjects were included in this study. The mean age of study subjects was 34 (range: 19-59) years. Of the study subjects, 73.7% had previously accessed health information on the internet. The average score was 31.6 (range: 20-40) points, with a score of ≥26 points being determined to have adequate eHealth literacy. On multivariate analysis using logistic regression, eHealth literacy level was significantly influenced by perceived usefulness of the internet in making decisions about health ($p$ = 0.017) and perceived importance of being able to access eHealth resources ($p$ = 0.006). Our study suggested the best method to improve eHealth literacy among RTA personnel is to educate the population on the perceived usefulness of the internet and the importance of being able to access eHealth resources. Further studies are needed to determine the quality of eHealth information accessed and determine which RTA personnel would benefit the most from a program to improve eHealth literacy.

**Keywords:** eHealth literacy, Royal Thai Army personnel

## INTRODUCTION

With the advancement of information and communication technologies (ICT), the number of people using the internet has grown. According to the International Telecommunication Union (2015), the global internet penetration rate increased sevenfold from 6.5% to 43% between 2000 and 2015. In 2016, an estimated 3.4 billion people world-wide (approximately 46.1% of the total population) had an internet connection (Internet Live Stats, 2017). In Thailand, National Statistical Office (2016)

Correspondence: Lieutenant Colonel Thanita Wongjinda, Royal Thai Army Medical Department, 8 Phayathai Road, Ratchathewi District, Bangkok 10400, Thailand.
Tel: 66 (0) 2354 4421; Fax: 66 (0) 2354 4421
E-mail: thanitasom@yahoo.com

reported 29.8 million Thai citizens (47.5% of the Thai population) used the internet in 2016.

More people are using ICT to obtain health information (eHealth) (WHO, 2006). Fox and Duggan (2013) reported estimated 72% of US internet users search to internet for health information in 2012. In Norway, the percentages of those surveyed who reported using the internet to obtain health information has continued to increase over time from 19% in 2000 to 67% in 2007 and finally 84% in 2010 (Wangberg *et al*, 2009). Nine out of 10 internet users from South Korea reported using the Internet to obtain health information (Park and Lee, 2015).

E-Health is a rapid growing area in health (WHO, 2006). E-Health is embraced by many because of its ability to deliver health information in a cost-effective, innovative way (Obasola *et al*, 2015). Much has been written about the advantages of using eHealth to promote health (Norman and Yip, 2012; Huberty *et al*, 2013; Guttierrez *et al*, 2014; Delgado *et al*, 2015; Montagni *et al*, 2016; Muellmann *et al*, 2016). However, eHealth is useless if people lack the skills or ability to access it.

E-Health literacy is defined as the ability to seek, find, understand, and appraise health information from electronic sources, and apply such knowledge gained to addressing or solving a health problem (Norman and Skinner, 2006).

Although an abundance of online health information exists, the quality of information varies (Park and Lee, 2015). E-Health users need to have adequate skills to identify whether the quality of the health information accessed on the internet is high or low. People need to have the technology and access to the internet to be able to avail themselves of eHealth. An adequate level of eHealth literacy is required to be of public health benefit in a population. E-Health is inaccessible to a large percentage of the population due to poor computer skills, lack of websites and poor health knowledge (Robinson and Graham, 2010). Previous studies have found eHealth can be beneficial but adequate assessment needs to be made (Norman and Skinner, 2006; Astrid and Lars, 2015; Park and Lee, 2015).

E-Health literacy has been studied in various populations from the USA, Germany, Greece, China, Korea, and Hong Kong (Norman and Skinner, 2006; Chan *et al*, 2009; Koo *et al*, 2012; Soellner *et al*, 2014; Astrid and Lars, 2015; Park and Lee, 2015; Xesfingi and Vozikis, 2016). Some studies have focused on adolescent eHealth literacy, and some on adults, but little is known about eHealth literacy among uniformed services personnel in Thailand.

E-Health may be useful in promoting health among Royal Thai Army (RTA) personnel. Interest in eHealth among RTA personnel has increased. Therefore, we determined to assess eHealth literacy among RTA personnel and factors associated with eHealth literacy level in order to gain baseline data for both developing and evaluating a program to promote eHealth literacy among RTA personnel.

## MATERIALS AND METHODS

We conducted a cross sectional study of RTA in Bangkok, Thailand in 2016 among those who used the internet in order to determine their eHealth literacy level.

E-Health literacy was determined using a questionnaire developed from the eHealth Literacy Scale (eHEALS), an eight-item measure of eHealth lit-

eracy by Norman and Skinner (2006). The questionnaire aimed to assess the respondent's knowledge, comfort, and perceived skills at finding, evaluating, and applying eHealth information to health conditions. The questions were answered using a five-point Likert scale, ranging from 1 (strongly disagree) to 5 (strongly agree). The possible score ranged from 8 to 40 with 40 being the highest level of eHealth literacy.

The eHEALS was translated from English to Thai and back to determine accuracy. The reliability test was determined by the Cronbach's alpha coefficient to be 0.89. E-Health literacy was categorized as being adequate or inadequate using a cut-off score of ≥ 26 (Richtering *et al*, 2017).

Data were analyzed using descriptive statistics to identify: 1) frequencies and percentages of general characteristics, internet use, eHealth use experience, perceived usefulness of the internet in making decisions about health, perceived importance of being able to access health resources on the internet, and eHealth literacy level; and 2) means and standard deviations for age and eHealth literacy score. Bivariate analysis using the Fisher's exact test was then conducted to explore factors associated with eHealth literacy level. Multivariate analysis with logistic regression was used to determine factors significantly associated with eHealth literacy level.

To perform this study, ethical approval was obtained from the Institutional Review Board of the Royal Thai Army Medical Department. Participants were asked to give informed consent prior to the study. The research data were treated confidentially and did not contain any identifiable information of the participants to ensure anonymity.

Table 1
Characteristics of study participants.

| Characteristics | Number (%) |
|---|---|
| Age in years | |
| 19-29 | 135 (45.0) |
| 30-39 | 68 (22.7) |
| 40-49 | 72 (24.0) |
| 50-59 | 25 (8.3) |
| Rank level | |
| Private | 92 (30.7) |
| Non-commissioned officer | 198 (66.0) |
| Commissioned officer | 10 (3.3) |
| Education level | |
| High school or lower | 210 (70.0) |
| Diploma or certificate | 37 (12.3) |
| Undergraduate degree or above | 53 (17.7) |
| Monthly income in Thai Baht | |
| < 15,000 | 177 (59.0) |
| 15,000-24,999 | 101 (33.7) |
| ≥ 25,000 | 22 (7.3) |
| History of underlying disease | |
| No | 213 (71.0) |
| Yes | 87 (29.0) |
| Perceived health | |
| Fair or less | 64 (21.3) |
| Good | 208 (69.3) |
| Very good | 28 (9.4) |

## RESULTS

**Sample characteristics**

Three hundred participants were included in the study. All the participants were male aged 19-56 years. Sixty-six percent were non-commissioned officers; 70% had an education level of high school or less and 59% had a monthly income < 15,000 Thai Baht. Seventy-one percent of participants reported no history of underlying disease and 78.7% reported their health was either good or very good (Table 1).

Table 2
Internet use and eHealth experience and literacy among study participants.

| Characteristics | Number (%) |
|---|---|
| Internet use | |
| Less than daily | 67 (22.3) |
| Daily | 233 (77.7) |
| E-Health experience | |
| No previous experience | 79 (26.3) |
| Previous experience | 221 (73.7) |
| E-Health literacy level | |
| Inadequate (score < 26) | 23 (7.7) |
| Adequate (score ≥ 26) | 277 (92.3) |

Table 3
Factors associated with eHealth literacy level on univariate analysis.

| Characteristics | eHealth literacy level | | *p*-value[a] |
|---|---|---|---|
| | Inadequate *n* (%) | Adequate *n* (%) | |
| E-Health experience | | | |
| No previous experience | 13 (14.1) | 79 (85.9) | 0.007 |
| Previous experience | 10 (4.8) | 198 (95.2) | |
| Perceived usefulness of internet on making decision about health | | | |
| Unsure or not useful | 17 (24.3) | 53 (75.7) | <0.001 |
| Useful or very useful | 6 (2.6) | 224 (97.4) | |
| Perceived importance of accessibility of health resources on the internet | | | |
| Unsure or unimportant | 16 (28.6) | 40 (71.4) | <0.001 |
| Important or very important | 7 (2.9) | 237 (97.1) | |

[a]Fisher's extract test.

All participants reported using the internet at least once during the previous three months since internet use was an inclusion requirement; 77.7% reported using the internet daily. Seventy-three point seven percent of participants had previously searched the internet for health advice. The mean eHealth literacy score was 31.6 (range: 20-40). Ninety-two point three percent had adequate eHealth literacy (a literacy score ≥ 26 points) (Table 2).

Eighty-eight point four percent of participants either agreed or strongly agreed that they know where to find helpful health resources on the internet. Seventy-three point three percent of participants either agreed or strongly agreed that they feel confident in using information from the internet to make health decisions (data not shown).

Fifty-six point four percent of participants stated the internet is useful and 20.3% stated it is very useful in helping them make decisions about their health (Fig 1). Sixty-two point three percent of participants said it is important and 19.0%

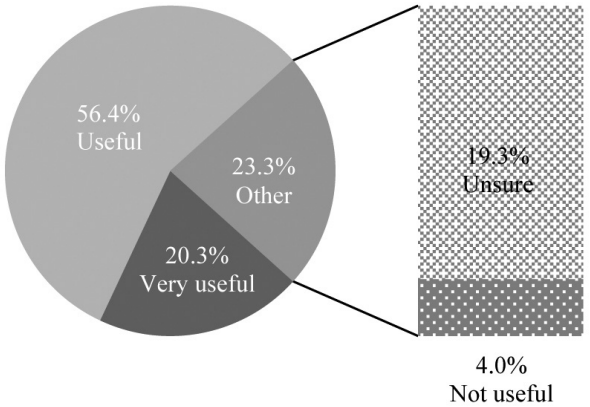


Fig 1–Perceived usefulness of the internet for making decisions about health.

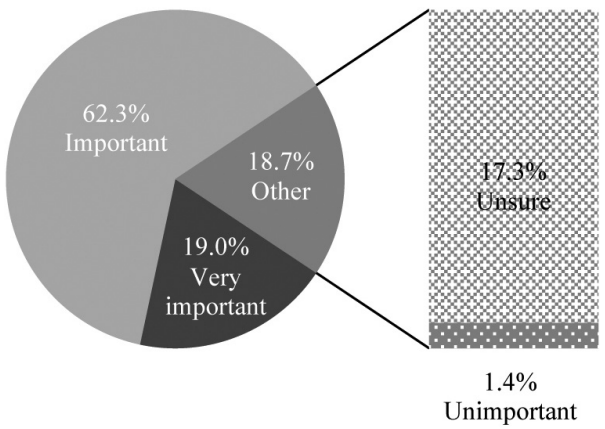


Fig 2–Perceived importance of accessibility to health resources on the internet.

said it is very important to be able to access health resources on the internet (Fig 2).

**Factors associated with eHealth literacy level**

On univariate analysis, eHealth literacy was significantly associated with eHealth use experience ($p = 0.007$), perceived usefulness of the internet in making decisions about health ($p < 0.001$), and perceived importance of accessibility of health resources on the internet ($p < 0.001$) (Table 3).

**Multivariate analysis of eHealth literacy level**

On multivariate logistic regression analysis, factors significantly ($p < 0.05$) associated with eHealth literacy levels were: perceived usefulness of the internet to make decisions about health and perceived importance of being able to access health resources on the internet (Table 4).

## DISCUSSION

We conducted this study to determine the eHealth literacy level of RTA personnel and factors associated with that literacy. Our results show the eHealth literacy level among study subjects was adequate following the scoring system described previously (Richtering *et al*, 2017). The mean score in our study was higher than a study from Hong Kong (24.1) (Chan *et al*, 2009) among university students, from South Korea (27.1) (Park and Lee, 2015) among nursing students and from the US (29.7) (Baeg and Park, 2015) among adult Americans. However, the above studies were carried out several years before our study. E-Health is changing rapidly and increasing; therefore, older studies may not be easily comparable with our study results.

In our study, 2 factors were associated with eHealth literacy on multivariate analysis: perceived usefulness of the internet in making decisions about health and perceived importance of accessibility of eHealth resources. A study from South Korea (Park and Lee, 2015) among nurs-

Table 4
Factors associated with eHealth literacy level on multivariate analysis.

| Characteristics | Odds ratio | 95% CI | *p*-value |
|---|---|---|---|
| Age 40-59 years (Reference: 19-39) | 0.566 | 0.126 - 2.549 | 0.459 |
| Rank level of officer (Reference: private) | 1.185 | 0.331 - 4.241 | 0.795 |
| Higher than high school education level (Reference: high school or lower education level) | 0.534 | 0.160 - 1.779 | 0.307 |
| Monthly income in Thai Baht of ≥ 15,000/month (Reference: < 15,000/month) | 1.760 | 0.410 - 7.560 | 0.447 |
| History of underlying disease (Reference: no history of underlying disease) | 1.188 | 0.331 - 4.261 | 0.792 |
| Good or very good perceived health status (Reference: poor to fair perceived health status) | 2.696 | 0.851- 8.544 | 0.092 |
| Daily internet use (Reference: not daily internet use) | 2.049 | 0.672 - 6.250 | 0.208 |
| Previously used eHealth (Reference: no previous use of eHealth) | 1.795 | 0.598 - 5.389 | 0.297 |
| E-Health perceived to be useful or very useful (Reference: eHealth perceived to be not useful or unsure | 4.606 | 1.311 - 16.187 | 0.017 |
| E-Health perceived to be important or very important (Reference: eHealth perceived to be unimportant or unsure | 5.253 | 1.594 - 17.310 | 0.006 |

ing students found subjects with a high eHealth literacy level felt the internet was a useful or very useful tool to help make decisions about health and it is important or very important to access health resources on the internet more often than subject with a lower eHealth literacy level. Our results suggest improving perceptions about the usefulness of eHealth might improve the proportion of those who use it among our study subjects.

Further studies are needed to determine if improving eHealth literacy in our study population will improve public health in this population. Astrid and Lars (2015) found eHEALS had been used as a baseline assessment to monitor effectiveness of eHealth literacy improvement program.

There were some limitations in our study. E-Health literacy was determined using eHEALS, which evaluates the perceptions of subjects regarding their skills in using and comfort with eHealth, not those skills directly (Norman and Skinner, 2006). Further studies are needed to determine those skills directly. Perceived eHealth literacy may not reflect quality of eHealth information accessed. Further studies are needed to determine the quality of health information accessed.

In conclusion, our study found the majority of study subjects had an adequate eHealth literacy level. Further studies are needed to determine if this literacy translates into health benefits. The quality of information accessed and effect of that information needs assess-

ment before programs can be developed to improve eHealth literacy.

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