

# Relationship between Health Literacy in Disease Prevention and Quality of Life of Older People in the Region Public Health of Thailand

Suwattana Onprasonk, MPH<sup>1</sup>, Supaporn Thuybungchim, PhD<sup>1</sup>, Nitchanan Yotha, MPH<sup>1</sup>, Jira Saksasitorn, MD<sup>1</sup>

<sup>1</sup> The Office of Disease Prevention and Control 7<sup>th</sup>, Khon Kaen, Thailand

**Objective:** To examine relationship between health literacy (HL) in disease prevention associated with the quality of life (QOL) of the older people.

**Materials and Methods:** Three hundred sixty elderly persons aged 60 to 80 years living in the Health District 7 of Thailand were included in this study. The subjects were randomized by the multi-stage sampling technique. The data were collected using the HL in disease prevention and WHOQOL-OLD questionnaire. The data were analyzed by descriptive statistics and multiple logistic regression analysis.

**Results:** The results showed that most of the HL in disease prevention was in the sufficient to excellent level at 71.67%, and most of the QOL was in the good level at 85.84%. The factors relating to the QOL in the elderly included HL in disease prevention at a sufficient to excellent level (adjusted OR 2.17, 95% CI 1.18 to 3.99,  $p=0.013$ ).

**Conclusion:** HL in disease prevention is associated with QOL in the older people. Therefore, HL in disease prevention among the older people should be continually strengthened to have a good QOL as long as possible in old age.

**Keywords:** Health Literacy; Quality of Life; Older people; Associated factors

Received 19 December 2022 | Revised 26 January 2023 | Accepted 6 February 2023

**J Med Assoc Thai 2023; 106(3): 307-13**

**Website:** <http://www.jmatonline.com>

In 2021, the global older population were about 1 billion people. The number of older adults is expected to increase exponentially within the next few years<sup>(1)</sup>. Thailand has a total population of 66.5 million as of 2019, with 11 million people aged 60 years and over, accounting for 16.73%<sup>(2)</sup>. Thailand's aging population is expected to rise to 20% by 2022, meaning that it will become a completely aged society. In 2019, the Health District 7 of Thailand, consisting of Khon Kaen, Roi Et, Kalasin, and Maha Sarakham provinces, had a population of 5,054,166, and 16.99% were older people<sup>(2)</sup>. The increase in the elderly population is causing a state of higher dependence, which affect their quality of life (QOL) because of

health problems. Most diseases of the older people are chronic illnesses, congenital diseases, mental, and social systems. The World Health Organization (WHO) defines QOL as a person's sense of their place in life about their objectives, aspirations, standards, and concerns as well as the culture and value systems in which they live<sup>(3)</sup>.

Most of the older people in Thailand have a moderate QOL<sup>(4-9)</sup>. The government promoted "Measures to implement National Agenda on Aged Society", a policy related to improving the QOL of the older people. It advocated a suitable approach or a form of activity supporting physical and mental stability in life to have the potential to be self-reliant<sup>(9)</sup>. Strategies for preventing and reducing the severity of the problem are health promotion well-being, physical activity, nutrition modification, self-care behaviors, health literacy (HL), enhancing the elderly's self-esteem, improving cognitive abilities, mental abilities, providing sufficient social support, promoting good family relationships, monthly living allowance, fund health insurance program, and support the budget for the activities of the elderly community<sup>(10-13)</sup>. Therefore, the government has established the Second National Plan on the Elderly (2002 to 2021) to encourage the elderly to have a good

## Correspondence to:

Onprasonk S.

The Office of Disease Prevention and Control 7<sup>th</sup>, Khon Kaen 40000, Thailand.

**Phone:** +66-89-4205131

**Email:** [tooktagam@yahoo.com](mailto:tooktagam@yahoo.com)

## How to cite this article:

Onprasonk S, Thuybungchim S, Yotha N, Saksasitorn J. Relationship between Health Literacy in Disease Prevention and Quality of Life of Older People in the Region Public Health of Thailand. *J Med Assoc Thai* 2023;106:307-13.

DOI: 10.35755/jmedassocthai.2023.03.13816

QOL by living a life of value, dignity, self-reliance, financial security, family life, health, safety, and inclusive quality welfare<sup>(14)</sup>.

One of the elements that is closely related to QOL, is the level of HL. HL is the ability of individuals to learn, to understand, and to utilize existing information to maintain and promote optimal health to QOL<sup>(15)</sup>. Previous studies found that inadequate HL had been associated with lower health behaviors, higher average hospitalization, difficulty in verbal interaction with health service providers, and weaker health status<sup>(16-19)</sup>. In addition, the study of Limited Literacy and Mortality in The Elderly by Sodore et al.<sup>(20)</sup> showed that limited HL is associated with a nearly two-fold increase in mortality in the elderly. However, there are very few studies on the relationship between HL and QOL in older people using World Health Organization Quality of Life questionnaire-version for older people (WHOQOL-OLD) in Thailand. Thus, the present researchers were interested to study the relationship between HL in disease prevention and QOL of older people in the Health District 7 of Thailand. The results could be used as information to create programs to promote and enhance the HL of the older people and contribute to improve their QOL.

### Objective

The present study was aimed to examine HL in disease prevention associated with the QOL of the elderly.

### Materials and Methods

Institutional ethical approval was obtained from the Ethical Committee for Research in Human Subjects Department of Diseases Control (FWA 00013622). Informed consent was obtained for experimentation with human subjects. Privacy rights of human subjects were always observed. The authors declare they had no conflict of interest with respect to the research study.

### Study design

A cross-sectional study with an interview questionnaire was conducted. Univariate and multivariate analyses with logistic regression were performed to assess the associated factors.

### Participant and study sites

Participants in the present study were aged 60 to 80 years living in the Health District 7. The required sample size was calculated according to formula of

**Table 1.** Modified sample size from multiple correlation coefficient (RHO)

$\rho$	VIF	N2 $\rho$
0.1	1.01	86
0.2	1.04	88
0.3	1.10	93
0.4	1.19	101
0.5	1.33	113
0.6	1.56	132
0.7	1.96	166
0.8	2.78	235
0.9	5.26	445

VIF=variance inflation factor

Hsieh et al. (1998)<sup>(21)</sup> as follows:

$$n_1 = \frac{P(1-P)(Z_{1-\alpha} + Z_{1-\beta})^2}{[B(1-B)(P_0 - P_1)^2]} = 84.42$$

$$P = (1-B)P_0 + BP_1 = \text{event rate} = 0.43$$

$P_0$  = the proportion of low HL level of the elderly (decision-making skill) and good QOL = 27/125 = 0.22<sup>(22)</sup>

$P_1$  = the proportion of high HL level of the elderly (decision-making skill) and good QOL = 137/255 = 0.54<sup>(22)</sup>

$B$  = the proportion of high HL level of the elderly (decision-making skill) = 255/380 = 0.67<sup>(22)</sup>

$\alpha$  = type I error at significant level = 0.05, therefore  $Z_{1-\alpha/2} = 1.96$

$\beta$  = type II error at power of test = 90%, therefore  $Z_{1-\beta} = 1.28$

The required sample size for multivariate case could also be approximated from the univariate case by inflating it with the same factor.

$$\text{Variance inflation factor (VIF)} = \frac{1}{(1 - \rho^2_{1,2,\dots,p})}$$

$$n_p = n_1 \times \text{VIF}$$

$n_p$  = number of samples are required for a logistic regression model

$n_1$  = number of samples of primary

$\rho_{1,2,\dots,p}$  = multiple correlation coefficients of HL versus QOL was estimated to be 0.8 and thus the VIF is 2.78 (Table 1).

After adjusting for the VIF and design effect 1.5, a sample size of 235 × 1.5 = 352, with a target number of participants at 360, was needed for fitting a multiple logistic regression model. The study's sample population was selected using a multiple-stage method of random sampling. The ethical approval was obtained from the Department of Disease Control of Thailand Board (FWA 00013622). Before commencement of the intervention, written

informed consents were obtained from all the participants, and a formal administrative approval sought from the school director.

### Measurement

The questionnaire was recommended from three experts, IOC value was 0.99. The questionnaire included closed ended questions in three parts with Part I for the general information, Part II for HL in disease prevention, and Part III for the WHOQOL-OLD Manual<sup>(4)</sup>. The Part II for HL in disease prevention was developed from the concept of Nutbeam<sup>(23)</sup>, Sorensen et al.<sup>(24)</sup>, and Srisaeng and Deenamjued<sup>(25)</sup>. The items comprised of six components, which were 1) access to information and health services, 2) knowledge and understanding, 3) communication skills, 4) media literacy, 5) self-management, and 6) decision-making skills. It tested the reliability of the HL tools. Its reliability was 0.96. The overall score was from 40 to 200 points. It was interpreted into four categories, inadequate HL with 40 to 100 points, problematic HL with 101 to 131 points, sufficient HL with 132 to 169 points, and excellent HL with 170 to 200 points<sup>(24)</sup>. For the Part III, WHOQOL-OLD Manual<sup>(4)</sup>, the 24 QOL items with rating scale were composed of six components, which were 1) sensory abilities, 2) autonomy, 3) past-present and future activities, 5) death and dying, and 6) social participation. It tested the reliability of the QOL tools. Its reliability was 0.91. Participants with a score higher than 69 were categorized as having ‘good’ QOL<sup>(26)</sup>.

### Data analysis

Descriptive statistical analysis assessed HL and QOL using percentage, mean ± standard deviation (SD). Inferential statistics, including simple logistic regression were performed to obtain unadjusted and adjusted odd ratios with 95% confidence interval (CI) for factors associated with QOL. Covariates that were associated at a p-value of less than 0.25 with QOL in univariate analysis were further explored in multiple logistic regression. A p-value less than 0.05 was regarded as statistically significant. Data were analyzed with the use of the Stata/IC, version 15 (StataCorp LLC, College Station, TX, USA).

### Results

Three hundred sixty older people were enrolled in the present study, with 66.39% female, 28.06% were in the age group of 65 to 69 years, 87.50% had a primary school education, 64.17% were married,

**Table 2.** Characteristics of the sample and quality of life

General information	Frequency (n=360); n (%)
Sex	
Female	239 (66.39)
Age (years)	
60 to 64	97 (26.94)
65 to 69	101 (28.06)
70 to 74	71 (19.72)
75 to 80	91 (25.28)
Mean±SD	69.2±6.1
Education level	
No formal education	4 (1.11)
Primary school	315 (87.50)
Secondary school	38 (10.56)
Diploma/university	3 (0.83)
Status	
Single	17 (4.72)
Divorced	2 (0.56)
Widow	110 (30.56)
Married	231 (64.17)
Working	
Not Working	108 (30.00)
Merchant	10 (2.78)
Agriculture	230 (63.88)
Employee	10 (2.78)
Retired government official	2 (0.56)
Living arrangements	
Living alone	15 (4.17)
Living with couple	208 (57.78)
Living with children	121 (33.61)
Living with relatives	16 (4.44)
Comorbidities	
No	172 (47.78)
Yes	188 (52.22)
• Diabetes	47 (13.05)
• Hypertension	68 (18.89)
• Diabetes and hypertension	24 (6.67)
• Others	49 (13.61)
Income sufficiency	
In debt with insufficient income	11 (3.13)
No debt but insufficient income	97 (26.94)
Sufficient income	150 (41.67)
School clubs for elderly	
Yes	128 (35.56)
Smoking	
Yes	50 (13.89)
Alcohol drinking	
Yes	81 (22.50)
Health literacy level	
Inadequate	21 (5.83)
Problematic	81 (22.50)
Sufficient	205 (56.95)
Excellent	53 (14.72)

SD=standard deviation

**Table 3.** Quality of life

Quality of life	Frequency (n=360); n (%)
Total (good)	309 (85.83)
Sensory abilities (good)	266 (73.89)
Autonomy (good)	277 (76.94)
Past, present, and future activities (good)	282 (78.33)
Social participation (good)	276 (76.67)
Death and dying (good)	256 (71.11)
Intimacy (good)	329 (91.39)

63.88% were agriculture, 57.78% were living with spouses, 52.22% were sick, 41.67% had sufficient income, 35.56% attended school clubs for elderly, 13.89% were smoking, 22.50% were drinking, and 71.67% were sufficient to excellent HL as shown in Table 2.

The rate of good QOL was 85.83%. For six components, including sensory abilities, autonomy, past/present/future activities, social participation, death and dying, and intimacy, QOL reported 266 (73.89%), 277 (76.94%), 282 (78.33%), 276 (76.67%), 256 (71.11%), and 329 (91.39%), respectively, as shown in Table 3.

In doing a crude analysis using simple logistic regression, the results found that 60 to 69 years old associated with QOL 1.92 times (95% CI 1.05 to 3.50,  $p=0.034$ ) compared to 70 to 80 years old, secondary school or higher associated with QOL 3.54 times (95% CI 0.83 to 15.14,  $p=0.088$ ) compared to less than secondary school, married associated with QOL 1.73 times (95% CI 0.95 to 3.14,  $p=0.073$ ) compared to single/divorced/widower, living with partner associated with QOL 2.31 times (95% CI 0.70 to 7.54,  $p=0.167$ ) compared to living alone, sufficient

income associated with QOL 1.51 times (95% CI 0.81 to 2.82,  $p=0.195$ ) compared to insufficient income, smoking associated with QOL 2.06 times (95% CI 0.71 to 5.98,  $p=0.189$ ) compared to not smoking, and sufficient to excellent level of HL associated with QOL 2.17 times (95% CI 1.18 to 3.99,  $p=0.013$ ) compared to inadequate to problematic level of HL as shown in Table 4.

The effects of age, education level, status, living arrangements, income sufficiency, smoking, and HL level were tested in the multivariable logistic regression. HL level remained in the final model, sufficient to excellent level of HL associated with QOL 2.17 times (95% CI 1.18 to 3.99,  $p=0.013$ ) compared to inadequate to problematic level of HL as shown in Table 5.

## Discussion

In the present study, almost three-quarters of older adults had sufficient to excellent levels of HL (71.67%), which was inconsistent with the previous studies in 2017<sup>(27)</sup>, 2019<sup>(28)</sup>, 2020<sup>(29)</sup>, 2021<sup>(9)</sup>, and 2022<sup>(30,31)</sup>.

Most of the older people had a good QOL (85.84%), which was consistent with the previous finding in the central Part of the Northeast of Thailand (69.5%)<sup>(27)</sup>, the Northeast of Thailand at 42.09%<sup>(9)</sup>, and Phrae Province (66.30%)<sup>(32)</sup>. However, it was inconsistent with the previous surveys of QOL in similar populations from 2020 to 2022, which had QOL at fair level<sup>(29,30,33-35)</sup>.

At present, there is more care for the older people from the Act on the Elderly, 2003 (Revised Edition 2010) focusing on improving the QOL of the older people. The older people shall have right to access

**Table 4.** Crude analysis of QOL associated factors presented as odd ratio using simple logistic regression

Factors	Crude OR	95% CI	p-value
Sex (male)	1.01	0.54 to 1.90	0.964
Age (60 to 69 years)	1.92	1.05 to 3.50	0.034
Education level ( $\geq$ secondary school)	3.54	0.83 to 15.14	0.088
Status (married)	1.73	0.95 to 3.14	0.073
Working (yes)	1.29	0.69 to 2.40	0.429
Living arrangements (with partner)	2.31	0.70 to 7.54	0.167
Comorbidities (yes)	1.16	0.64 to 2.10	0.621
Income sufficiency (sufficient)	1.51	0.81 to 2.82	0.195
School clubs for elderly (yes)	1.09	0.59 to 2.01	0.784
Smoking (yes)	2.06	0.71 to 5.98	0.189
Alcohol drinking (yes)	1.42	0.66 to 3.05	0.372
Health literacy level (sufficient to excellent)	2.17	1.18 to 3.99	0.013

OR=odds ratio; CI=confidence interval

**Table 5.** Multivariable analysis of QOL associated factors presented as adjusted odd ratio using multiple logistic regression

Factors	Initial model			Final model		
	Adjusted OR	95% CI	p-value	Adjusted OR	95% CI	p-value
Age (60 to 69 years)	1.46	0.75 to 2.80	0.263	-	-	-
Education level ( $\geq$ secondary school)	2.60	0.59 to 11.43	0.207	-	-	-
Status (married)	1.27	0.65 to 2.47	0.486	-	-	-
Living arrangements (with partner)	1.63	0.453 to 5.86	0.455	-	-	-
Income sufficiency (sufficient)	1.42	0.75 to 2.69	0.286	-	-	-
Smoking (yes)	1.66	0.56 to 4.94	0.362	-	-	-
HL level (sufficient to excellent)	1.64	0.86 to 3.12	0.133	2.17	1.18 to 3.99	0.013

HL=health literacy; OR=odds ratio; CI=confidence interval

the protection, promotion, and support, which these will affect the promotion of good QOL for the older people in Thailand. However, the government are unable to adequately cover the needs of all areas of the older people. For the older people, there is lack of caregivers in physical health problems and mental health, and poverty problems, as a result, declines the QOL of the older people<sup>(36,37)</sup>.

HL in disease prevention was associated with QOL in the older people. These results are very similar to a previous study in U.K., which was also conducted on older adults with long-term conditions and show that, good HL had associated with good health-related QOL in the older people<sup>(38)</sup>. In South Korea, which aimed to explore the relationships among sociodemographic, HL, self-efficacy, social support, health-promoting behavior, and health-related QOL in older adults, found that those were important for older individual's QOL HL<sup>(39)</sup>. Study in the upper Northeast of Thailand, found that the older people having good HL were associated with good QOL<sup>(30)</sup>. In addition, the study of older people in the three Southern border provinces of Thailand found that HL and perceived health status had significant influence on QOL at the p-value less than 0.01<sup>(29)</sup>.

Although HL and QOL in the samples should be at a good level, HL decreases with increasing age<sup>(40)</sup>. Low HL has consistently been associated with cognitive and social skills that give people insufficient motivation and inability to have access, non-perception, and improper use of information to maintain and promote optimal health status. Many studies have concluded that lower HL is correlated with poorer health outcomes<sup>(41)</sup>.

## Conclusion

The older people in the Health District 7 of Thailand had sufficient to excellent levels of HL, and most of the QOL was at a good level. HL in

disease prevention was associated with QOL in the older people.

## What is already known on this topic?

Older people with sufficient to excellent levels of HL were more likely to have a good QOL.

## What this study adds?

The benefit of this study is the known relationship between HL in disease prevention and the QOL of the older people. The information can be used to continuously enhance HL in disease prevention for the older people.

## Funding disclosure

The present study was funded by the Prince Rangsit of Chai Nat Foundation.

## Conflicts of interest

The authors declare no conflict of interest.

## References

1. Foundation of Thai Gerontology Research and Development Institute (TGRI). Situation of the Thai older persons 2021. Nakhon Pathom, Thailand: Institute for Population and Social Research, Mahidol University; 2021.
2. National Statistical Office, Thailand. Demography population and housing branch [Internet]. 2020 [cited 2021 Mar 20]. Available from: <http://statbbi.nso.go.th/staticreport/page/sector/th/01.aspx>.
3. World Health Organization. Programme on mental health: WHOQOL Measuring quality of life. Geneva: WHO; 1997.
4. Nanthamongkolchai S, Tuntichaivanit C, Munsawaengsub C, Charupoonphol P. Factors influencing life happiness among elderly female in Rayong Province, Thailand. *J Med Assoc Thai* 2009;92 Suppl 7:S8-12.
5. Muenhor C. Relationship between self-care behavior

- and quality of life of the elderly, Nakhon Phanom Province. *Thai J Nurs* 2011;60:54-61.
6. Tongdee J, Rongmuang D, Nakchatree C. Health status and quality of life among the elderly in the southern border provinces of Thailand. *Nurs J Minist Public Health* 2012;22:88-99.
  7. Ketklai P, Jantaraposi W. Factors associated with quality of life of the elderly who receive subsistence allowance in Pannanikhom District, Sakon Nakhon Province. *J Off DPC7 Khon Kaen* 2012;19:55-64.
  8. Hongthong D, Somrongthong R, Ward P. Factors influencing the Quality of Life (QoL) among Thai older people in a rural area of Thailand. *Iran J Public Health* 2015;44:479-85.
  9. Sirisuwan P, Phimha S, Banchonhattakit P. Active aging, health literacy, and quality of life among elderly in the Northeast of Thailand. *Indian J Forensic Med Toxicol* 2021;15:2645-50.
  10. Department of Older Persons, Ministry of Social Development and Human Security. Measures to implement national agenda on aged society 6 sustainable 4 change. Bangkok: Amarin Printing and Publishing; 2019.
  11. Huppert FA. Psychological well being: Evidence regarding its causes and consequences. *Appl Psychol: Health Wellbeing* 2009;1:137-64.
  12. Rippe JM, editor. *Lifestyle medicine*. 3rd ed. Boca Raton: Taylor & Francis; 2019.
  13. Geboers B, Reijneveld SA, Jansen CJ, de Winter AF. Health literacy is associated with health behaviors and social factors among older adults: Results from the lifelines cohort study. *J Health Commun* 2016;21:45-53.
  14. Department of Older Persons, Ministry of Social Development and Human Security. The 2nd national plan on the elderly (2002 - 2021), revised edition 1st. Bangkok: Thepphenwanis Printing; 2010.
  15. van der Heide I, Heijmans M, Schuit AJ, Uiters E, Rademakers J. Functional, interactive and critical health literacy: Varying relationships with control over care and number of GP visits. *Patient Educ Couns* 2015;98:998-1004.
  16. Baker DW, Parker RM, Williams MV, Clark WS. Health literacy and the risk of hospital admission. *J Gen Intern Med* 1998;13:791-8.
  17. Javadzade SH, Sharifirad G, Radjati F, Mostafavi F, Reisi M, Hasanzade A. Relationship between health literacy, health status, and healthy behaviors among older adults in Isfahan, Iran. *J Educ Health Promot* 2012;1:31.
  18. Liu YB, Liu L, Li YF, Chen YL. Relationship between health literacy, health-related behaviors and health status: A survey of elderly Chinese. *Int J Environ Res Public Health* 2015;12:9714-25.
  19. Aryankhesal A, Niknam N, Hasani M, Mengelizadeh N, Aghaei N, Ghaedchukamei Z, et al. Determining the relationship between health literacy level and quality of life among the elderly living in nursing homes. *J Educ Health Promot* 2019;8:225.
  20. Literacy and Mortality in The Elderly: The Health, Aging and Body Composition Study. *J Gen Intern Med*. 2006;21:806-12.
  21. Hsieh FY, Bloch DA, Larsen MD. A simple method of sample size calculation for linear and logistic regression. *Stat Med* 1998;17:1623-34.
  22. Suksri S, Settheetham D. Health literacy and self care related to quality of life of elderly in Amnatcharoen Municipality Amnatcharoen Province. *KKU Res J (Graduate Study)* 2017;17:73-84.
  23. Nutbeam D. The evolving concept of health literacy. *Soc Sci Med* 2008;67:2072-8.
  24. Sørensen K, Van den Broucke S, Fullam J, Doyle G, Pelikan J, Slonska Z, et al. Health literacy and public health: a systematic review and integration of definitions and models. *BMC Public Health* 2012;12:80.
  25. Srisaeng P, Deenamjued W. Health literacy of healthy aging among elderly in Bangkok Metropolitan: Development and validation of health literacy scale. *J R Thai Army Nurs* 2019;20:340-50.
  26. World Health Organization. WHOQOL-OLD manual. Copenhagen: WHO European Office; 2006.
  27. Srithanee K. Relationship between health literacy and quality of the elderly's life at the central part of the North-East Thailand. *J Health Syst Res* 2017;11:26-36.
  28. Aryankhesal A, Niknam N, Hasani M, Mengelizadeh N, Aghaei N, Ghaedchukamei Z, et al. Determining the relationship between health literacy level and quality of life among the elderly living in nursing homes. *J Educ Health Promot* 2019;8:225.
  29. Rakpanusit T, Khoyneung N, Isaramalai S, Kuha A. Effects of health literacy and self-perceived health status on quality of life of elderly in three southern border provinces of Thailand. *Southern Coll Netw J Nurs Public Health* 2020;7:182-94.
  30. Prachaiboon T, Banchonhattakit P, Sirisuwan P, Namuang A, Padchasuwan NH, Sukrueangkul A. Association between health literacy and quality of life among elderly in the Upper Northeast of Thailand. *Health Sci J Thailand* 2022;4:48-56.
  31. Ruangkiatkul N. Factors associated with health literacy among Thai older adults. *J Dep Med Serv* 2022;47:80-6.
  32. Daengthern L, Thojampa S, Kumpeera K, Wannapornsiri C, Boonpracom R. Factors affecting quality of life and longevity in the elderly people in Phrae City, Thailand. *Asian Pac Isl Nurs J* 2020;5:48-54.
  33. Kulprateepunya K, Atsawametakul W, ThasanoaElter P, Saelue J, Pisaipan P, Namwong A. Health status of elderly in Thai society. *UMT Poly J* 2020;17:581-95.
  34. Kabmanee N, Ouicharoen S, Sakulkoo P. The quality of life of the elderly in Thamboon Nongphai Muang, Udornthani. *J Boromarajonani Coll Nurs Surin* 2021;11:27-39.

35. Jengan N, Pradidthaprech A, Choomsri P, Sae-Ung K, Sitakalin P, Laoraksawong P. Factors associated with the quality of life in the elderly with non-communicable diseases in Nakhon Si Thammarat, Thailand. *Trends Sci* 2022;19:2688-96.
36. Department of Older Persons, Ministry of Social Development and Human Security. The 2nd national plan on the elderly (2002 - 2021), revised edition 2nd. Bangkok: Samlada Printing; 2019.
37. Phanphakdee P. Needs for social welfare services among elderly persons in Takram-en subdistrict administrative organization, Tha Maka district, Kanchanaburi province [Thesis]. Bangkok: Silpakorn University; 2021.
38. Panagioti M, Skevington SM, Hann M, Howells K, Blakemore A, Reeves D, et al. Effect of health literacy on the quality of life of older patients with long-term conditions: a large cohort study in UK general practice. *Qual Life Res* 2018;27:1257-68.
39. Lee MK, Oh J. Health-related quality of life in older adults: Its association with health literacy, self-efficacy, social support, and health-promoting behavior. *Healthcare (Basel)* 2020;8:407.
40. Baker DW, Gazmararian JA, Sudano J, Patterson M. The association between age and health literacy among elderly persons. *J Gerontol B Psychol Sci Soc Sci* 2000;55:S368-74.
41. Berkman ND, Sheridan SL, Donahue KE, Halpern DJ, Viera A, Crotty K, et al. Health literacy interventions and outcomes: an updated systematic review. *Evid Rep Technol Assess (Full Rep)* 2011;(199):1-941.