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ORIGINAL ARTICLE

Health literacy and behavioral model of Dhammanamai among village health volunteers in the Northern Thailand

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ABSTRACT

This cross-sectional study aimed to explain the level of health literacy and health behavior, investigate relevant factors, predict factors, and construct the behavioral model of Dhammanamai among village health volunteers (VHVs) in northern Thailand. The sample participants were 347 VHVs in Phayao Province, Thailand. They were selected by using the multi-stage random sampling technique. In this research, a questionnaire was used for collecting data that was administered from June-August 2021. Data were analyzed through descriptive analysis, independent-sample t-tests, one-way ANOVA and stepwise multiple regression analysis. The results revealed that both health literacy and health behaviors regarding Dhammanamai had an adequate level ($\overline{X}$ = 62.69, SD = 8.284; $\overline{X}$ = 52.83, SD = 6.149). The years of VHVs experience was significantly related to health literacy (p-value = 0.004) and the total components of health literacy on Dhammanamai were significantly related to health behavior (r=0.543). The behavioral model of Dhammanamai identified four independent variables that significantly influenced health behavior regarding Dhammanamai; health literacy (p-value < 0.001) age (p-value < 0.01) disease condition (p-value < 0.05) and sex (p-value < 0.05). These affecting factors were taken to construct the health behavior regarding Dhammanamai and could predict model at 33.7%. The health behavior regarding Dhammanamai model is equal to constant (19.20) + HLD (0.417) + AGE (0.124) – DISEASE CONDITION (1.604) + SEX (1.774). The recommendation should be taken to establish a health literacy program regarding Dhammanamai among Village Health Volunteers in the same area study.

Key words:
health literacy; health behavior model; Dhammanamai, village health volunteers

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INTRODUCTION

The environmental changes, socio-economic and political situations, and population affected the health behavior of people[1]. Almost 70% of all deaths were patients with non-communicable diseases (NCDs) like heart disease, stroke, cancer, diabetes and chronic lung disease[2]. In Thailand, the mortality rate by NCD during 2014-2018 was ranked first on health problems[3] which led to the high cost of health care which was solved by behavioral change and self-care. Therefore, the measure to promote and enable people to access, understand, appraise and make decisions about their health behavior is significant. This is called health literacy[1,4], defined as the cognitive and social skills which determine people to access, and understand how to take care of themselves to be healthy and [5-6] also discovered that people who have low health literacy could lead to low self- care, increasing NCDs and high cost of health care.

At present, health literacy is a crucial concern of the Thai government[7], and Thai Traditional Medicine (TTM) was taken as a part of the national plan of health development (2017-2021) [8]. TTM is a valuable cultural heritage and indigenous wisdom which was based on the philosophy of holistic care. Dhammanamai is a part of TTM and was recognized through holistic care on lifestyle, recreation, emotional and mental health which were different from modern medicine. Dhammanamai is a healthy natural method that was used for promoting health, preventing diseases and rehabilitation. Dhammanamai was applied in Buddhism which consists of 3 concepts as follows: 1) healthy body refers to promoting physical health by exercise, food according to life elements and sleeping, 2) healthy mind refers to promoting mental health. This is a dharma practice that is composed of virtue, concentration and wisdom, 3) healthy behavior refers to promoting the quality of life and family[9].

Village Health Volunteers (VHVs) are important persons in the health system of Thailand, they take the role of change agents in order to encourage people's participation in self-care, family and community because VHVs live in their community and had gained knowledge from health personnel and had also practiced caring for the people in their community. VHVs need to understand health literacy and health behavior regarding Dhammanamai to support the participation process and be role models in their community[10].

Many studies on health literacy identified various groups of aging people[11-13], worker people[14-16], hypertension patients[17], cardiovascular disease patients[18], immigrants[19], worker people and aging[20], public sector[21], corn field farmers[22], undergraduate students[23] and VHVs[24-25] and found that health literacy was significant to sex[19,26], age[17,19,26], experience of work[20], disease conditions, income and education[19,26], occupation[19,22,27], attitude, prevention and outcome of expectation[22] and health literacy are also relevant to health behavior[11-12,15-16,21,23,25,28-30]. Furthermore, many studies identified that socioeconomic factors were significantly associated with health behavior which were sex[18,30], age [13,19,31] and disease condition[32]. The issue of health literacy and health behavior were studied in terms of health care, NCDs prevention[17] and pesticide risk reduction[33]

In Phayao province which is located in northern Thailand, the data showed that NCDs were among the top ten diseases, with hypertension was ranked first[34] and the NCDs rate in Phayao was higher than the NCDs mortality rate in Thailand caused by health determinant factors[35]. Behavior modification and health literacy regarding Dhammanamai were necessary to solve the

problems of NCDs. Therefore, we conducted research on the topic of health literacy and model of health behaviors on Dhammanamai among VHVs in Northern Thailand to explain the level of health literacy and health behavior, investigate relevant factors, predict factors and construct the behavioral model of Dhammanamai among VHVs in the north of Thailand. The purpose was to construct health literacy and health behavior intervention regarding Dhammanamai for VHVs to become change agents on health literacy and health behavior regarding Dhammanamai for sustainable health in the area of study.

METHODS

The target population of this cross-sectional study was 15,137 Village Health Volunteers in Phayao province, Thailand who registered in the information system of Primary Health Care Division, Ministry of Public Health, Thailand on February 28, 2021.[36] 347 VHVs were calculated by N4 study program [37-38] which defined the proportion from previous study = 0.70[39], error (d) = 0.05, alpha (α) = 0.05 as shown below:

$$n = \frac{Np(1-p)z^2_{1-\frac{\alpha}{2}}}{d^2(N-1)+p(1-p)z^2_{1-\frac{\alpha}{2}}}$$

= 316

We added at least 9.6 % to the estimated sample size to allow for losses. Therefore, the
sample size needed will be 347 VHVs. Inclusion criteria for the participants were those VHVs, who had at least 1 year of VHVs experience in the area of study and had signed consent forms. People who could not complete the data in the research instruments were excluded.

All samples were selected by multi-stage cluster sampling through the following steps we designed: firstly, we divided Phayao province into 3 zones as follows: zone A consisted of districts, Mueang Phayao, Dok Khamtai and Phu Kamyao district: zone B was made up of Chun, Chiang Kham and Chiang Muan district and: zone C comprised of Pong, Mae Chai, and Phu Sang district. In the second step, we randomized 3 districts from the 3 zones which were Mueang Phayao, Chun and Mae Chai districts. In the third step, 3 sub-districts were randomized from the 3 districts, Mae Chai sub-district from Mae Chai district, Mae Kha sub-district from Mueang Phayao district and, Prathad Khing Kaeng sub-district from Chun district. In the final step, 347 VHVs were randomized by using stratified random sampling as shown in Fig.1

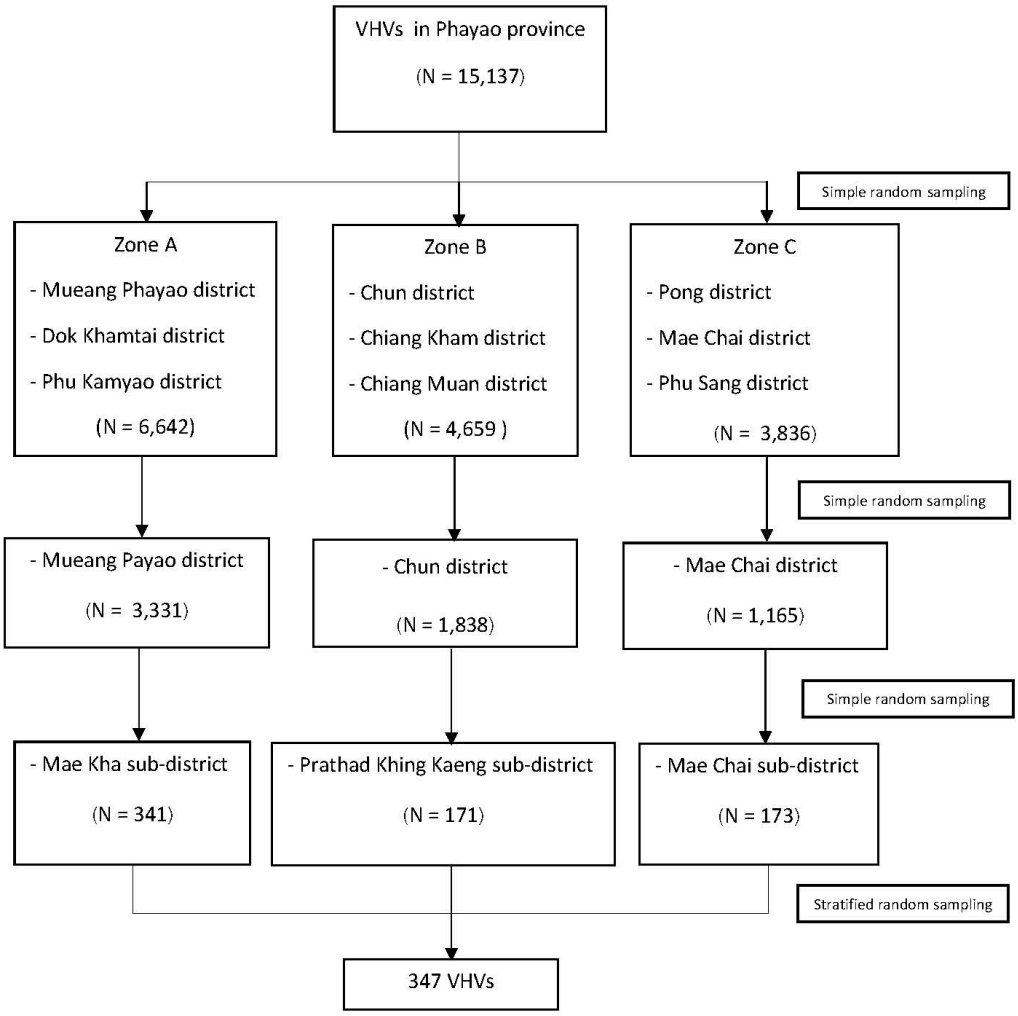

Figure 1 flowchart for study selection

RESEARCH INSTRUMENTS

A questionnaire was constructed by the research team based on the literature review about health literacy, health behavior, Dhammanamai and relevant research. The instrument consisted of 3 parts as follows:

Part 1: The demographic variables assessed were sex, age, years of work experience, marital status, disease condition, education, occupation and monthly income.

Part 2 : Health literacy regarding Dhammanamai (HLD) consisted of 8 items and 8 scores of cognitive HLD; 14 items and 70 scores of information access and health services HLD, health communication HLD, media literacy HLD and self-management HLD; 7 items and 7 scores of judging health care HLD. All 85 scores of HLD were grouped as follows: scores < 60% - inadequate HLD, scores ≥ 60 – < 70 % - adequate HLD, scores ≥ 70 – < 80 % - good HDL, and scores ≥ 80 % - excellent HLD[40].

Part 3: Health behavior regarding Dhammanamai (HBD) consisted of 15 items with 75 scores of self-care on HBD and social health participation on HBD. The scores of HBD were grouped as follows: scores < 60% - inadequate HBD, scores ≥ 60 – < 70 % - adequate HBD, scores ≥ 70 – < 80 % - good HBD, and

scores ≥ 80 % - excellent HBD[40]. This study used Spearman Ranks (r) criteria[41] as follows: 0.91 - 1.00 = very high, 0.71 - 0.90 = high, 0.51 - 0.70 = moderate, 0.31 - 0.50 = low and 0.00 - 0.30 = very low.

Before collecting data, the questionnaire was verified for its content validity by 3 expert groups and was analyzed by using index of item – objective congruence with a result of 0.97. We tried out the instrument on 30 similar samples in this study. The Kuder-Richardson-20 was used for the reliability of cognitive and judging health care HLD with a result of 0.652 and 0.601. The Cronbach's Alpha coefficient for information access and health services HLD, health communication HLD, media literacy HLD and self-management HLD were 0.734 and HBD was 0.670.

According to the data collection method, before collecting data, this study was approved by the Ethical Committee of Phayao University No. 1.2/021/64. After that, we have done the following: 1) trained 5 assistants in the researcher team in order to understand this study; and 2) made an appointment sample at the area to collect data on June-August 2021 in Phayao province, in the north of Thailand. The collection with the response rate was 100%, and they were inspected for completion and accuracy before the data analysis.

Descriptive analysis was used to analyze demographic variables. Univariate analysis used t-test analysis, one-way ANOVA by using Scheffe's method and Pearson Product Moment Correlation analysis. Multivariate analysis used Multiple Regression analysis to predict variables and construct a model which was determined at 0.05 as the criteria for hypothesis acceptance.

RESULTS

Demographic data revealed that 88.2 % were females, 68.0 % were 40 – 59 years, 37.8 % had 1 – 9 years of work experience, 79.8 % were married, 64.3% of the samples in the aspect of disease condition were healthy, 51.0% had primary school education, 45 % of the samples earned a living from agriculture and 89.9 % had below 15,000 monthly income.

Table 1. The total scores of HLD had an adequate level ($\overline{X}$ = 62.69, SD. = 8.284) and the components of HLD, cognitive and information access and health services also had an adequate level ($\overline{X}$ = 5.51, SD. = 1.345; $\overline{X}$ = 10.32, SD. = 1.665). Moreover, the levels of health communication, self-management, media literacy and judging health care were at a good level.

The total scores of BHD had an adequate level ($\overline{X}$ = 52.83, SD. = 6.149) and the components of HLD, self-care also had an adequate level ($\overline{X}$ = 43.62, SD. = 6.229). Whereas, the level of social health participation was at an excellent level, as shown in Table 1.

Table 1 Mean, standard deviation and level of HLD and BHD (n=347)

HLD	In-adequate	Adequate	Good	excellent	$\bar{X}$	Meaning	S.D.
HLD							
1. Cognitive	80 (23.1)	89 (25.6)	93 (26.8)	85 (24.5)	5.51	Adequate	1.345
2. Information access and health services	66 (19)	96 (27.7)	73 (21)	112 (32.3)	10.32	Adequate	1.665
3. Health communication	45 (13)	72 (20.7)	58 (16.7)	172 (49.6)	11.29	Good	2.539
4. Self-management	30 (8.6)	45 (13)	102 (29.4)	170 (49)	22.96	Good	3.911
5. Media literacy	67 (19.3)	71 (20.5)	37 (10.7)	172 (49.6)	7.06	Good	1.992
6. Judging health care	57 (16.5)	0	98 (28.3)	192 (55.3)	5.56	Good	1.169
Total	45 (13)	126 (36.4)	123 (35.5)	52 (15.1)	62.69	Adequate	8.284
BHD							
1. Self-care BHD	68 (19.6)	162 (46.7)	76 (21.9)	41 (11.8)	43.62	Adequate	6.229
2. Social health participation	5 (1.4)	16 (4.6)	14 (4)	312 (89.9)	9.21	Excellent	1.282
Total	29 (8.4)	153 (44.1)	107(30.8)	58 (16.7)	52.83	Adequate	6.149

In Table 2, the overall demographic variables related to HLD consisted of 8 variables; sex, age, year of VHVs experience, marital status, disease condition, education, occupation and monthly income. The study revealed that the year of VHVs experience was significantly related to HLD with a p-value of 0.004, but sex, age, marital status, disease condition, education, occupation and monthly income were not related to HLD.

Table 2 The relation between demographics variables and HLD

Demographic Variables	HLD n (%)				p-value
	Inadequate	Adequate	Good	Excellent	
Sex					.836 [a]
Male	4 (9.8)	17 (41.5)	14 (34.1)	6 (14.6)	
Female	41 (13.4)	110 (35.9)	109 (35.6)	46 (15.1)	
Age					.333[b]
20-39	4(13.3)	14(46.7)	10(33.3)	2(6.7)	
40-59	27(11.4)	83(35.2)	91(38.6)	35(14.8)	
≥60	14 (17.3)	30 (37)	22 (27.2)	15 (18.5)	
	Mean = 52; S.D.= 9.21; Min= 20 Max= 74				
Year of VHVs experience					.004[b]*
1 - 9	16 (12.2)	47 (35.9)	56 (42.7)	12 (9.2)	
10 - 19	17 (14.4)	43 (36.4)	37 (31.4)	21 (17.8)	
20 - 29	11 (17.7)	29 (46.8)	13 (21)	9 (14.5)	
30 - 39	1 (2.8)	8 (22.2)	17 (47.2)	10 (27.8)	
Mean = 13.8					
Marital status					.224[b]
Single	4 (14.3)	10 (35.7)	11 (39.3)	3 (10.7)	
Married	34 (12.3)	100(36.1)	97 (35.0)	46 (16.6)	

Demographic Variables	HLD n (%)				p-value
	Inadequate	Adequate	Good	Excellent	
Separated	1 (4.0)	12 (48.0)	11 (44.0)	1 (4.0)	
Disease condition					.121[a]
No	6 (35.3)	5 (29.4)	4 (23.5)	2 (11.8)	
Yes	45 (13.0)	127 (36.6)	123 (35.4)	52 (15.0)	
Education					.398[b]
Primary school	22 (12.4)	75 (42.4)	55 (31.1)	25 (14.1)	
High school	18 (11.8)	49 (32.2)	61 (40.1)	24 (15.8)	
Diploma/ Bachelor	5 (27.8)	3 (16.7)	7 (38.9)	3 (16.7)	
Occupation					.468[b]
Agriculture	17 (10.9)	61 (39.1)	56 (35.9)	22 (14.1)	
No work	8 (20.0)	15 (37.5)	11 (27.5)	6 (15.0)	
Business	6 (12.0)	22 (24.0)	16 (32.0)	6 (12.0)	
Labourer	14 (13.9)	29 (28.7)	40 (39.6)	18 (17.8)	
monthly income (baht)					.264[b]
<15,000	36 (11.5)	118 (37.8)	109 (34.9)	49 (15.7)	
15,001 – 20,000	5 (26.3)	6 (31.6)	7 (36.8)	1 (5.3)	
>20,000	4 (25)	3 (18.8)	7 (43.8)	2 (12.5)	

Note a = Independent-samples t-test, b = one-way ANOVA,

The six components of HLD and the total score of HLD were significantly related to BHD as shown in the following: self-management and health communication were at a high level (r = 0.862, r = 0.794); media literacy, information access and health services, and total components were at a moderate level (r= 0.650, r= 0.607, r = 0.543); judging health care was at a low level (r = 0.354) and; cognitive component was at a very low level (r = 0.236) as shown in Table 3.

Table 3 The relation between the components of HLD and BHD

Components of HLD	BHD		
	r	p-value	Level
1. Cognitive	0.236	< 0.001	very low
2. Information access and health services	0.607	< 0.001	moderate
3. Health communication	0.794	< 0.001	high
4. Self-management	0.862	< 0.001	high
5. Media literacy	0.650	< 0.001	moderate
6. Judging health care	0.354	< 0.001	low
Total components	0.543	< 0.001	moderate

The result of multiple regression of BHD is shown in Table 4. Four models were examined and the results were as follows:

In Model 1, HLD had a very strong significance (p- value < 0.001). In Model 2, the age variable was added and had a strong significance (p-value < 0.01). In Model 3, disease condition was added and had a slightly strong significance (p- value < 0.05), but the age variable in model 2 changed into very strong significance in model 3. Model 4 covered all variables and it showed that 4 significant variables were very strong such as HLD (p- value < 0.001) and age (p-value < 0.001). The study showed not only the very strong and significant variables but also showed that sex and the disease condition were slightly

strong and significant (p-value < 0.05,<0.05) to BHD.

From Model 1 to Model 4, R Square increased, and Model 4 was the fittest model for this study. Thus, the intention model in this study was constructed by 4 significant variables affecting the HBD such as HLD, age, disease condition and sex. This Model 4 could be predicted at 33.7% and the statistical functions are as follows:

Y = 19.201+ 0.417 HLD + 0.124 age – 1.604 condition disease + 1.774 sex

Table 4 Stepwise Multiple Regression Analysis for BHD

Variables	Model 1 B (SE)	Model 2 B (SE)	Model 3 B (SE)	Model 4 B (SE)
1. Sex (X_1)				1.774 (.896)*
2. Age (X_2)		.099 (.033) **	.122 (.034) ***	.124 (.034) ***
3. Year of VHVs experience (X_3)				
4. Marital status (X_4)				
5. Disease condition (X_5)			-1.533 (.647)*	-1.604 (.645)*
6. Education(X_6)				
7. Occupation (X_7)				
8. Monthly income (X_8)				
9. HLD (X_9)	.434 (.037)***	.426 (.036)***	.419 (.036)***	.417 (.036)***
Constant	25.564	20.944	20.733	19.201
R Square	.298	.317	.329	.337
P value	<0.001	0.003	0.018	0.049
F test	139.430	76.006	53.258	41.281

Note p-value <0.05, ** p-value <0.01, *** p-value <0.001*

DISCUSSION

All samples had gained HLD with an adequate level which means that they can practice some Dhammanamai. In contrast with the study of the Department of Health Education in Thailand which revealed that the health literacy of the population was at a high level[42] because Dhammanamai was established on the policy of the Department of Health Service Support in 2019 and after that, with the emergence of Covid-19 pandemic this policy was not recognized the same as the control and prevention of the Covid-19 pandemic. In addition, this study revealed that BHD of all samples had an adequate level which corresponds to the study of Noppakao et al[43] which showed that the TTM and alternative medicine of behavior in VHVs had an adequate level because Dhammanamai was a part of TTM. Years of VHVs experience was 13.79 years which was in line with the study of Boonmun[24] who revealed that VHVs experience was 13.36 years because of the similarity of the group. This study showed that the years of VHVs experience were significantly related to health literacy which coincides with the study of Levey and Janke [20] which showed that work was significantly related to health literacy, because social activities were the conditions that lead to health literacy[44-45] concepts recognizing that experience could establish learning for constructing concrete concepts to put into practice in the future, so VHVs who had more experience could lead to health literacy.

HLD of samples strongly and significantly related to BHD (r=0.543) at p-

value < 0.001 which corresponds to various research in Thailand such as Tantranont et al.[14] but this study was higher than Darun's study[16] and Khampisut's study[23] because of the different study group. The overseas research of Lui et al,[11] Geboers et al,[12] Lee et al[19] and Abedini et al[28] also reported that health literacy was significantly related to health behavior. In addition, this study revealed that HLD strongly predicted BHD (p-value < 0.001) which coincides with Lee et al[19] which showed that health literacy predicted health behavior because health literacy is a crucial factor that could empower village health volunteers (VHVs) to be knowledgeable for accessing, understanding, appraising and applying to decision making for health promotion and disease prevention in daily life[7] and health literacy can motivate individual capacity to stay healthy[46].

It is not only HLD that strongly predicted BHD but also age had strongly predicted BHD (p-value < 0.001) which is relevant to the study of Visanuyothin et al[47] which indicated that health literacy was related to self-management behavior (p-value < 0.05) and Orem[48] identified that age could influence self-care behavior and[49] also said that age was a socioeconomic factor which can influence with behavior.

Two-third of the samples were healthy and the study showed that the disease condition predicted HBD in the samples (p-value < 0.05). The reason was because self-care was the first activity to save their lives and people had to do them appropriately and continuously, as it established the efficacy of self-care and disease conditions that can lead to healthy behavior after their recovery from the disease[50]. This study is related to Lee et, al.[32] which revealed that the health behavior of obesity was significantly related to chronic diseases. Almost all of the samples were females and it was found that sex predicted HBD of the samples (p-value < 0.05). This study was related to the study of Lijuan et al [18] who identified that sex predicted health behavior among patients with cardiovascular diseases and Norasing &Thanomphan[30] identified that sex was related to health behavior among patients with uncontrolled sugar levels or blood pressure.

According to the four dependent variables, we constructed the behavioral model of Dhammanamai among VHVs and this model was predicted at 33.7 % which was higher than the study [42] which revealed that TTM model among VHVs was predicted at 22.2 % because of the different topic and different area of study. Dhammanamai model should be applied by policymakers to construct the HLD policy which considered the male group, younger VHVs, and those who had disease conditions and researchers should establish BHD intervention for VHVs in Phayao Province as well.

CONCLUSION

The findings of this study showed that the HLD and BHD of the samples had an adequate level and the year of VHVs experience was significantly related to HLD. The model of BHD included HLD, age, disease condition, and sex. In combination, these variables can predict the BHD model at 33.7 %. Therefore, future research should study other potential variables which may be expected to have an effect on the BHD in order to find the co-variables for predicting the BHD model more effectively, leading to further development of the VHVs in a more complete manner to become change agents to mobilize health promotion.

RECOMMENDATIONS

Based on the research findings, the recommendations are addressed as the following: policy recommendation: health organizations should promote the Dhammanamai concept for VHVs to

become change agents to mobilize health promotion and the quality of life of people. For the practical policy recommendation: health facilities should set up a health literacy program for VHVs in the same area of study.

LIMITATION

Our research was done with the target population only in the province of Phayao Thailand, so our findings should not be generalized. If there are researchers interested in doing similar study, the results will be helpful as a reference in an area of study similar to the province of Phayao.

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