



Nutrition Label Literacy and Nutritional Status of Village Health Volunteers in Prakhon Chai District, Buriram Province

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Abstract

This study aimed to assess nutritional label literacy and nutritional status among village health volunteers (VHVs) and to identify factors associated with overnutrition in VHVs. A cross-sectional study was conducted among 1,440 VHVs. Data were collected using a structured questionnaire and anthropometric measurements. Nutritional label literacy was assessed across three components: awareness and accessibility, understanding, and evaluation and application. Nutritional status was classified using Body Mass Index (BMI). Descriptive statistics were used to summarize participant characteristics. Multiple logistic regression analysis was used to identify factors associated with overnutrition. The results indicated that overall nutritional label literacy level among VHVs was moderate in 47.5% of participants, high in 48.7%, and low in 11.7%. More than half of the participants were classified as obese (50.2%), while 19.0% were classified as overweight. Based on multiple logistic regression analysis, participants aged over 60 years were significantly less likely to be overnourished than those under 40 years of age (Adjusted OR = 0.45, 95% CI: 0.28–0.69). In contrast, participants with underlying diseases were more likely to be overnourished (Adjusted OR = 1.54, 95% CI: 1.20–1.99). Nutritional label literacy was not found to be significantly associated with overnutrition. Despite moderate to high levels of nutrition label literacy among VHVs, overnutrition remains prevalent. This highlights the importance of community-based interventions that integrate nutrition literacy with efforts to reduce behavioral and health-related risks.

Keywords: Nutritional label literacy, Nutritional status, Village health volunteer

What was Known

Village health volunteers (VHVs) play a key role in health promotion within communities. However, their nutritional label literacy and nutritional status, particularly in rural areas like Prakhon Chai District, remain understudied.

What's New and Next

This study provides new evidence on VHVs' nutrition label literacy and nutritional status, identifying associated factors. The findings highlight the need for targeted training programs with clearly defined objectives to strengthen VHVs' nutrition-related competencies.

Introduction

Non-communicable diseases (NCDs), including cardiovascular disease, diabetes mellitus, hypertension, and obesity, have emerged as a major public health challenge worldwide. Globally, NCDs are responsible for approximately 71% of all deaths, with low- and middle-income countries bearing more than three-quarters of this burden⁽¹⁾. Thailand, like many other countries worldwide, has experienced the burden of NCDs. The World Health Organization (WHO) reports that NCDs cause approximately 400,000 deaths per year, or 74% of all deaths in Thailand⁽²⁾. The nutrition transition, characterized by increased consumption of processed foods, high sodium intake, sweetened beverages, and high-fat diets, has contributed to the rising prevalence of NCDs in Thailand⁽²⁾. To support informed consumer decision-making and protect public health, the Ministry of Public Health has implemented nutrition labeling policies that provide essential information on the energy and nutrient content of food products⁽³⁾. The nutrition labels help consumers make dietary choices that align with their nutritional needs and preferences. Therefore, using nutrition labels has been associated with improved dietary quality⁽⁴⁾. However, the effective use of nutrition labels depends on nutrition label literacy, which refers to the ability to access, understand, and apply nutritional information to guide decisions about diet and health⁽⁵⁾.

In Thailand, village health volunteers (VHVs) are integral to the nation's primary healthcare system. They play a vital role in health promotion, disease prevention, and health education among people in communities⁽⁶⁻⁹⁾. Their responsibilities often include disseminating information about healthy diets and encouraging appropriate food choices within these communities. Previous studies indicate that VHVs generally demonstrate a good level of health literacy⁽⁷⁻¹⁰⁾. Nutrition label literacy is a specialized skill set of health literacy, focusing on food and nutritional choices.

Therefore, VHVs must possess adequate nutrition label literacy to perform these tasks effectively. Empirical evidence demonstrated that higher nutrition literacy has been associated with lower odds of general obesity (OR = 0.66, 95%CI: 0.43–0.99), abdominal obesity (OR = 0.63, 95% CI: 0.46–0.87), and high body-fat percentage (OR = 0.55; 95% CI: 0.35–0.87) in Chinese adults⁽¹¹⁾. Similarly, evidence from Thailand indicated that individuals who did not read, understand, or use labels were 1.23 times (95%CI: 1.13–1.33) more likely to be obese, 1.33 times (95%CI: 1.17–1.51) more likely to have high blood pressure, and 1.26 times (95%CI: 1.14–1.39) more likely to have high blood lipid, compared to those with high label experience⁽¹²⁾. However, research on nutrition label literacy among VHVs remains limited. This study aims to assess nutrition label literacy and nutritional status among VHVs in Prakhon Chai District, Buriram Province. The findings are expected to inform future strategies to enhance VHVs' nutritional literacy and strengthen their role in community-based disease prevention and health promotion.

Materials and Methods

Participants and Procedures

The research design was a cross-sectional analytical study. The participants consisted of 1,140 village health volunteers (VHVs). The sample size was determined using the formula for multiple logistic regression analysis⁽¹³⁾. Stratified random sampling was conducted, with the 16 sub-districts of Prakhon Chai District, Buriram Province, serving as strata. VHVs were proportionally allocated from each sub-district based on the proportion of VHVs in each area. Subsequently, simple random sampling was applied within each stratum to select participants. The inclusion criteria were current service as VHV in Buriram Province for at least one year, age 18 years or older, and the ability to read and write.

Data collection and Instruments

Data were collected using a newly developed questionnaire, which was constructed based on a review of relevant literature. The questionnaire was divided into 4 sections

1) General characteristics including gender, age, education level, occupation, marital status, duration of service as a VHV, income, and underlying diseases.

2) The nutrition label knowledge section consisted of 10 questions. Six items were structured as three-option questions ("Yes," "No," and "Do not know/Not sure"), while four items were multiple-choice questions with four response options (A, B, C, and D). Each correct answer was awarded one point, while incorrect or "do not know" responses received zero points. The total

score was calculated and then classified into three knowledge levels based on Bloom's criterion-referenced framework⁽¹⁴⁾; high (80–100%), moderate (60–79%), and low (below 60%).

3) Nutritional label literacy assessment, which included three components: (1) awareness and accessibility to nutrition label information comprised 4 items, (2) understanding of nutrition label information comprised 5 items, and (3) evaluation and application of nutrition label information comprised 10 items. The answers were structured using a four-point Likert rating scale (4 = very easy, 3 = somewhat easy, 2 = somewhat difficult, and 1 = very difficult). Total scores were calculated for each domain and for the overall nutrition label literacy score. Nutritional label literacy levels were categorized into three levels based on the interval classification method proposed by Best⁽¹⁵⁾. The cut-off points for each domain were defined as follows: awareness and accessibility to nutrition label information (high ≥ 13 , moderate = 9–12, low = 4–8), understanding of nutrition label information (high ≥ 16 , moderate = 11–15, low = 5–10), and evaluation and application of nutrition label information (high ≥ 31 , moderate = 21–30, low = 10–20). The overall nutrition label literacy score was classified into three levels including high (≥ 58), moderate (39–57), and low (19–38).

4) Nutritional status was assessed using body weight and height to calculate Body Mass Index (BMI), which was derived from weight (kg) divided by height in meters squared (m^2). BMI was classified into four categories: underweight ($BMI < 18.5 \text{ kg}/m^2$), normal weight ($BMI 18.5\text{--}22.9 \text{ kg}/m^2$), overweight ($BMI 23.0\text{--}24.9 \text{ kg}/m^2$), and obese ($BMI \geq 25.0 \text{ kg}/m^2$)⁽¹⁶⁾. For analytical purposes, overnutrition was defined by including both overweight and obesity categories, while participants classified as normal weight or underweight were grouped as the reference category (non-overnutrition).

Instrument validity and reliability

Prior to data collection, the questionnaire was evaluated for content validity and reliability. Content validity was assessed by three experts in nutrition and public health using the Index of Item–Objective Congruence (IOC). The overall IOC value of the questionnaire was 0.90, indicating good content validity⁽¹⁷⁾. The revised questionnaire was pilot-tested among 30 Village Health Volunteers (VHVs), who were not included in this study. The pilot test was conducted to evaluate the reliability of the instrument. Reliability analysis showed acceptable internal consistency. For the nutrition label knowledge questionnaire, reliability was assessed using the Kuder–Richardson Formula 20 (KR-20), yielding a coefficient of 0.75. For the nutrition label literacy assessment,

internal consistency was evaluated using Cronbach's alpha coefficient, which yielded a value of 0.95⁽¹⁸⁾.

Statistical Analysis

Descriptive and inferential statistics were employed in the data analysis. Categorical variables were presented as frequencies and percentages, while continuous variables with a normal distribution were expressed as means and standard deviations. The multiple logistic regression analysis was conducted to identify factors associated with the outcome variable. Prior to model construction, multicollinearity among independent variables was assessed using the Variance Inflation Factor (VIF), with a value of less than 5 indicating no significant multicollinearity⁽¹⁹⁾. Simple logistic regression analysis was performed, and independent variables with a P-value < 0.25 were included in the multiple logistic regression model to adjust for potential confounding. The covariate variables included gender, age, education level, duration of service as a Village Health Volunteer, income, underlying diseases, Levels of knowledge, and Levels of Nutritional label literacy. The final model was derived using the backward elimination method, whereby non-significant variables were sequentially removed until only statistically significant predictors remained. The goodness-of-fit of the final model was evaluated using the Hosmer-Lemeshow test⁽²⁰⁾, and a P-value less than 0.05 was considered statistically significant.

Result

1. General characteristics

A total of 1,440 VHVs participated in the study. The majority were female (83.5%), with a mean age of 52.7 ± 9.7 years. A total of 41.2% of participants had completed primary education, while 42.1% had attained upper-secondary education or higher. Most participants worked in agriculture (71.8%), and more than three-fourths were married (76.1%). The mean duration of service as a VHV was 14.3 ± 10.3 years. More than half of the participants (55.4%) had served for over 10 years. Most participants (80.3%) reported a monthly income not exceeding 10,000 baht. Regarding underlying health conditions, 66.5% reported having no chronic diseases (Table 1).

2. Level of knowledge about nutrition labels of village health volunteers

More than half of the participants (57.4%) had a high level of knowledge about nutrition labels, while 20.3% and 22.3% had moderate and low levels, respectively (Table 2).

3. Nutritional label literacy.

The majority of participants demonstrated a moderate level of nutritional label literacy across all three components: awareness and accessibility to nutrition label information (49.4%), understanding of nutrition label information (49.8%), and evaluation and application of nutrition label information (52.9%). Overall, 47.5% of the participants had a moderate level of literacy, followed by a high level (40.8%) and a low level (11.7%), as shown in Table 3.

4. Nutritional status of village health volunteers

Based on BMI classification criteria, approximately half of the participants were classified as obese (50.2%), followed by normal weight (28.2%), and overweight (19.0%), while a small proportion was underweight (2.6%), as shown in Table 4.

5. The factors associated with overnutrition among village health volunteers.

After adjusting for potential confounders, age and underlying diseases were found to be significantly associated with overnutrition in VHVs. Participants aged over 60 years were significantly less likely to be overnourished compared to those under 40 years (AOR = 0.45, 95% CI: 0.28–0.69, $P < 0.0001$). Similarly, those with underlying diseases were more likely to be overnourished than those without (AOR = 1.54, 95% CI: 1.20–1.99, $P = 0.001$). However, nutritional label literacy was not significantly associated with overnutrition (Table 5).

Table 1 General characteristics (n=1,440)

General characteristics	Number (%)
Gender	
Female	1,203 (83.5)
Male	237 (16.5)
Age	
20 – 40 years	165 (11.2)
41 – 60 years	990 (68.8)
≥ 60 years	288 (20.0)
Mean ± SD (years)	52.7 ± 9.7
Education	
Primary	593 (41.2)
Lower-Secondary	241 (16.7)
Upper-Secondary or higher	606 (42.1)

Table 1 General characteristics (n=1,440) (Cont.)

General characteristics	Number (%)
Occupation	
Farmers	1,034 (71.8)
Merchant	88 (6.1)
Self employed	244 (16.9)
Other occupation	74 (5.1)
Marital Status	
Single	1,034 (71.8)
Married	88 (6.1)
Widowed	244 (16.9)
Separated / Divorced	74 (5.1)
Duration of service as a Village Health Volunteer	
≤ 10 years	642 (44.6)
> 10 years	798 (55.4)
Mean ± SD	14.3 ± 10.3
Monthly income	
≤ 10,000	1157 (80.3)
10,001 – 15,000	212 (14.7)
15,001 – 20,000	40 (2.8)
≥ 20,000	31 (2.2)
Underlying diseases	
No underlying diseases	958 (66.5)
Hypertension	231 (16.0)
Dyslipidemia	64 (4.5)
Diabetes mellitus	78 (5.4)
Other disease (e.g., cancer, cardiovascular diseases, chronic kidney disease, etc.)	109 (7.6)

Table 2 Levels of knowledge about nutrition labels (n=1,440)

Level of knowledge	Number (%)
High (80 - 100%)	826 (57.4)
Moderate (60 - 79%)	292 (20.3)
Low (< 60%)	322 (22.3)

Table 3 Levels of Nutritional label literacy by component and overall (n=1,440)

Component	Levels of nutritional label literacy		
	High	Moderate	Low
1. Awareness and accessibility of nutrition labeling information	502 (34.9)	711 (49.4)	227 (15.7)
2. Understanding about nutrition labeling	507 (35.2)	717 (49.8)	216 (15.0)
3. Evaluation and application of nutrition labeling information	456 (31.7)	763 (52.9)	221 (15.4)
4. Overall nutritional label literacy	587 (40.8)	684 (47.5)	169 (11.7)

Table 4 Nutritional status of village health volunteers. (n=1,440)

Body Mass Index; BMI	Number (%)
1. Underweight (BMI < 18.5 kg/m ²)	38 (2.6)
2. Normal (BMI 18.5 – 22.90 kg/m ²)	406 (28.2)
3. Overweight (BMI 23 – 24.90 kg/m ²)	274 (19.0)
4. Obese (BMI ≥ 25.0 kg/m ²)	722 (50.2)

Table 5 The factors associated with nutritional status among village health volunteers. (n=1,440)

Factors	Nutritional status (%)		Crude	Adjusted	95% CI	P-value
	Overnutrition	<u>Non-</u> <u>overnutrition</u>	OR	OR		
Age group						
< 40 years	120 (8.3)	42 (2.9)	Ref.	Ref.		
40 – 60 years	705 (49.0)	285 (19.8)	0.87	0.84	0.57 – 1.23	0.371
> 60 years	171 (11.9)	117 (8.1)	0.51	0.45	0.28 – 0.69	< 0.0001
Underlying diseases						
No	644 (44.7)	314 (21.8)	Ref.	Ref.		
Yes	352 (24.4)	130 (9.1)	1.32	1.54	1.20 – 1.99	0.001
Nutritional label literacy						
High	417 (29.0)	170 (11.8)	Ref.	Ref.		
Moderate	465 (32.3)	219 (15.2)	0.86	0.88	0.69 – 1.13	0.335
Low	114 (7.9)	55 (3.8)	0.84	0.87	0.60 – 1.27	0.477

Discussion

The findings revealed that although the majority of VHVs had moderate (47.5%) to high (40.8%) levels of nutrition label literacy, the prevalence of overnutrition remained high, with more than two-thirds of participants classified as overweight (19%) or obese (50.2%). The results determined that age and the presence of underlying diseases were significantly associated with overnutrition, whereas no significant association was found between nutrition label literacy and overnutrition among VHVs.

The relatively high levels of nutrition label literacy observed among VHVs may reflect the impact of sustained national health promotion efforts, particularly the focus on community health worker training implemented through various public health initiatives. Over the past decades, Thailand's Ministry of Public Health has integrated nutrition education and chronic disease prevention into its grassroots programs, consistently engaging VHVs in campaigns to promote public understanding of nutrition labels, Guideline Daily Amounts (GDA), and front-of-pack labeling⁽²¹⁾. Additionally, more than half of the VHVs in this study had accumulated over 10 years

of experience in community health services, which may have further contributed to their elevated literacy levels. The findings of this study align with previous research indicating that VHVs exhibit a high level of health literacy in the prevention of non-communicable diseases (NCDs). In terms of health behaviors related to NCD prevention, based on the "3Es 2Ss" principle (Eating, Exercise, Emotion, Smoking, and Alcohol), the overall behavior among VHVs was reported to be at an appropriate level⁽²²⁾. However, research examining nutrition label literacy specifically among Village Health Volunteers (VHVs) in Thailand remains limited. Nevertheless, existing evidence suggests that VHVs generally demonstrate a good level of health literacy, particularly in the prevention of non-communicable diseases (NCDs)^(22,24). The findings of this study support this observation and highlight the importance of continuously strengthening VHVs' competencies—particularly in nutrition label literacy—to enhance their effectiveness in promoting health within their communities.

The results of this study indicate a high prevalence of overnutrition among VHVs. Moreover, age and the presence of underlying diseases were found to be significantly associated with overnutrition. The VHVs aged over 60 years were significantly less likely to be overnourished compared to those under 40 years (AOR = 0.45, 95% CI: 0.28–0.69, $P < 0.0001$). This inverse association with age may be attributed to physiological changes that commonly occur in older adults, such as reduced appetite, slower metabolism, and decreased caloric intake. Additionally, older VHVs may demonstrate greater health consciousness and higher adherence to medical guidance, contributing to better weight control. Previous review literature suggests that older adults often adopt healthier lifestyle behaviors and are more likely to follow medical recommendations as part of chronic disease prevention and management⁽²³⁾. Conversely, VHVs with underlying diseases were more likely to be overnourished (AOR = 1.54, 95% CI: 1.20–1.99, $P = 0.001$). Non-communicable diseases (NCDs), including hypertension, hyperlipidemia, type 2 diabetes mellitus, cardiovascular disease, and metabolic syndrome, are strongly associated with overweight and obesity. An elevated body mass index (BMI) is a key risk factor in the development of these conditions and is linked to increased morbidity and mortality⁽²⁵⁾.

Moderate to high nutrition label literacy among VHVs were not significantly associated with overnutrition. This aligns with the conclusions from a systematic review and meta-analysis, which indicated that while nutrition label literacy can enhance the selection of healthier food products and improve diet quality, its influence on long-term health outcomes remains limited⁽²⁶⁾. One possible explanation for the lack of association between nutrition label literacy and

overnutrition in this study is that nutrition label literacy may support dietary decision-making and healthier food choices but does not necessarily lead to behavioral change. This may be particularly relevant in communities where socioeconomic constraints, cultural food preferences, and limited access to healthy food options may override nutritional knowledge in shaping actual dietary behaviors. Furthermore, nutritional status is influenced by a complex interplay of behavioral, environmental, and physiological factors. For example, total caloric intake, portion size, dietary patterns, and levels of physical activity all play important roles in determining body weight and metabolic outcomes^(27,28). This highlights the need for more comprehensive interventions that integrate nutrition label literacy with broader strategies targeting behavior modification, health promotion, and supportive food environments.

This study has a number of strengths. First, a large sample (1,440 VHV) was recruited, which enhances the statistical power and reliability of the findings. Second, nutritional status was assessed using directly measured body weight and height rather than self-reported data, thereby reducing potential measurement bias. However, some limitations should be considered. Because of the cross-sectional design, causal relationships cannot be established, and the directionality of the associations cannot be determined. In addition, other important determinants of nutritional status such as dietary intake, physical activity, and lifestyle behaviors were not assessed in this study. The absence of these variables may have resulted in residual confounding and may partly explain the lack of association between nutrition label literacy and overnutrition. Further studies should incorporate these factors and consider longitudinal designs to better understand the relationship between nutrition label literacy and nutritional status.

Conclusion

A majority of VHV in Prakhon Chai District, Buriram Province had moderate to high levels of nutrition label literacy. However, the prevalence of overnutrition remained high, with more than two-thirds classified as overweight or obese. Age and the presence of underlying diseases were significantly associated with overnutrition, whereas nutrition label literacy was not. These findings suggest that while improving nutritional knowledge through label literacy is important, it alone is insufficient to achieve healthier nutritional outcomes. Broader behavioral and contextual factors such as age-related changes, chronic health conditions, socioeconomic status, and lifestyle habits must also be addressed. Strengthening the role of VHV in community health promotion requires not only the enhancement of their nutrition knowledge but also ongoing training, skill

development, and behavioral support. Such efforts may improve both their individual health and their effectiveness as agents of change within the communities they serve.

Ethical Approval Statement

This study received ethical approval from the Khon Kaen University Ethics Committee (Exemption No. HE672123), under Announcement No. 2178/2563. The exemption was granted on the grounds that the research involved only non-invasive procedures, including surveys, interviews, and public behavioral observations related to educational assessments.

Author Contributions

MM was responsible for the study design, literature review, questionnaire development, data collection, initial data analysis, and interpretation of findings, under the supervision of PC. MM and PC re-analyzed the data and led the writing of the manuscript. Both authors reviewed and approved the final version of the manuscript prior to submission for publication.

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Conflicts of Interest

The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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