

Prevalence and Determinants of Health Professional Consultation Before Using Herbal and Dietary Supplements among Patients with Non-Communicable Diseases (NCDs): A Study Using a Modified KAP Framework

Amornrat Kamkhuru, B.Pharm¹, Tipaporn Kanjanarach, Ph.D.²

¹Master Student of Pharmacy Administration, Faculty of Pharmaceutical Sciences, Khon Kaen University, Khon Kaen 40002, Thailand, and Department of Pharmacy, Chaturapukpiman Hospital, Roi-Et 45180, Thailand.

²Associate Professor, Faculty of Pharmaceutical Sciences, Khon Kaen University, Khon Kaen 40002, Thailand.

Received 4 April 2025 • Revised 30 May 2025 • Accepted 6 June 2025 • Published online 29 October 2025

Abstract:

Objective: This study aimed to determine the prevalence and factors associated with consulting health professionals before using herbal and dietary supplements (HDS) among patients with non-communicable diseases (NCDs).

Material and Methods: A cross-sectional survey was conducted among 208 patients diagnosed with one or more of the following NCDs: diabetes, hypertension, or chronic kidney disease, who had used HDS between January and December 2024. Data were collected at Chaturaphakphiman Hospital, Roi Et Province, using a questionnaire based on the Knowledge, Attitude, and Practice (KAP) model. Attitude was assessed with 5 items (Cronbach's $\alpha=0.91$), and knowledge was measured with 13 items (KR-20=0.78). In addition to KAP, 5 other factors were included: sex, age, educational attainment, comorbidities, and duration since diagnosis.

Results: The prevalence of consulting health professionals before HDS use was 37.50%. The mean knowledge score was 8.71 ± 1.49 , and the mean attitude score was 3.03 ± 0.85 on a 5-point scale, indicating a neutral perception. Multiple logistic regression analysis showed that participants with higher knowledge scores were less likely to consult health professionals (OR=0.78, 95% confidence interval (CI): 0.64–0.92), whereas attitude was not significantly associated with consultation behavior. Of the 5 additional factors, only education level was significantly associated with consultation behavior. Patients with an education level of grade 6 or lower were more likely to consult (OR=1.80, 95% CI: 1.01–3.22).

Contact: Assoc. Prof. Tipaporn Kanjanarach, Ph.D.
Faculty of Pharmaceutical Sciences, Khon Kaen University,
Khon Kaen 40002, Thailand.
E-mail: otipkan@kku.ac.th

J Health Sci Med Res 2026;44(3):e20251274
doi: 10.31584/jhsmr.20251274
www.jhsmr.org

© 2025 JHSMR. Hosted by Prince of Songkla University. All rights reserved.
This is an open access article under the CC BY-NC-ND license
(<http://www.jhsmr.org/index.php/jhsmr/about/editorialPolicies#openAccessPolicy>).

Conclusion: These findings highlight the need for targeted educational interventions to promote appropriate consultation behavior among NCD patients.

Keywords: Attitude and practice (KAP) model, health professional, herbal and dietary supplements (HDS), knowledge, non-communicable diseases (NCDs)

Introduction

Non-Communicable Diseases (NCDs), including diabetes, hypertension, and chronic kidney disease, represent significant health issues that affect the quality of life of populations worldwide, with rising prevalence rates observed across different countries and a forecasted global rise in cases¹. In Thailand, the prevalence of NCDs also continues to rise², emphasizing the urgency of addressing these conditions in the country as well. Effective management of these conditions requires continuous medical care. However, patients now have easy access to herbal and dietary supplements (HDS), which may lead to their use without proper knowledge, potentially resulting in adverse interactions with prescribed medications or exacerbating existing health conditions. While studies have investigated the benefits of HDS in managing NCDs, there remains a lack of scientific evidence on their effectiveness and proper dosages. Moreover, some herbal products have clear evidence of adverse effects on patients with hypertension³, diabetes⁴, and chronic kidney disease^{5,6}. Therefore, the use of HDS among NCD patients should occur under medical supervision.

Previous studies have found that factors influencing the use of HDS among patients are often based on recommendations from family members, friends, or easily accessible media, rather than consulting health professionals⁷⁻¹⁰. Additionally, many consumers believe in the safety of natural herbs, leading to their use without considering potential risks¹¹.

In the context of Chaturaphakphiman Hospital, a 60-bed community hospital in Roi Et Province, the hospital provides regular NCD clinics and serves a population of 10,951 patients diagnosed with diabetes, hypertension, and/or chronic kidney disease. A survey conducted in 2024 found 735 households using potentially unsafe health products, many of which were HDS and taken without medical guidance¹².

Although extensive studies have been conducted on the use of HDS in general populations and chronic disease patients⁷⁻¹¹, no research in Thailand has specifically explored the factors influencing the decision to consult health professionals before using HDS. This research aims to fill this gap by examining the behaviors surrounding HDS use and the factors influencing patients with NCDs to consult health professionals before using these products.

This study employs the Knowledge, Attitude, and Practice (KAP) model as a conceptual framework to explore the factors influencing health professionals before using HDS among patients with NCDs. The KAP model, first proposed in the 1950s, was designed to analyze the relationship between knowledge, attitudes, and behaviors in the context of health¹³; it remains in use today^{14,15}. Its enduring relevance and simplicity make it particularly suitable for this study, as it allows for the assessment of health behaviors across diverse sociodemographic groups. In this modified framework, we integrated 5 additional sociodemographic factors: sex, age, educational attainment, comorbidities, and duration since diagnosis based on previous studies that suggested these factors are

associated with the use of HDS^{11,16–18}. These factors may also influence whether patients seek consultation with health professionals before using these products. By incorporating these sociodemographic variables, the modified KAP framework provides a more comprehensive understanding of the behavioral determinants, offering insights for targeted interventions aimed at improving patient safety.

Research methodology

This study is a cross-sectional survey approved by the Human Research Ethics Committee of Khon Kaen University, reference number HE672211.

Population and sample

The study population consists of patients with NCDs, including diabetes and/or hypertension and/or chronic kidney disease, who have used HDS, aged 18 years and older, residing in the Chaturaphakphiman district of Roi Et Province. The sample size was determined to be sufficient for logistic regression analysis, using the sample size formula from Peduzzi et al. (1996)¹⁹. The formula is $N = (10 \times k) / p$, where k is the number of independent variables and p is the event rate. This study has 7 independent variables, and from a pilot study, it was found that 36% of patients who have used HDS consulted health professionals before use. Therefore, the sample size required for this study was at least 194 participants, with an additional 10% to account for missing data, resulting in a total of 213 participants planned for recruitment. Upon data completion, a total of 208 participants were obtained.

Convenience sampling was used to recruit participants, with inclusion criteria being: (1) patients diagnosed with diabetes, hypertension, and/or chronic kidney disease in the outpatient department for at least 6 months, (2) use of HDS within one year prior to the survey (from January to December 2024), (3) ability to read and write Thai, and (4) voluntary willingness to participate in

the survey. Exclusion criteria were patients with dementia, Alzheimer's disease, psychiatric disorders, and those unable to care for themselves.

Instruments and instrument validation

The data collection instrument is a self-developed questionnaire, comprising 4 sections: (1) Demographic Characteristics (sex, age, educational attainment, comorbidities, and duration since diagnosis), (2) knowledge of HDS that covers 3 topics: definitions (3 items), safety of use (5 items), and selection principles (5 items), with answer choices of true, false, or unsure, (3) attitudes towards HDS: 5 items measured on a 5-point Likert scale, ranging from 1 (strongly disagree) to 5 (strongly agree), (4) consultation behavior with health professionals before using HDS. Questions about sources of information for their decision making in using HDS and types of HDS being used were also included in this section. Details of the knowledge questions are provided in the supplementary file.

The content validity of the questionnaire was assessed using item-objective congruence (IOC) by 3 experts in the fields of health professionals and herbal products with at least 10 years of experience designing questionnaires. Items with an IOC value of 0.5 or higher were retained. The clarity of the language used in the questionnaire was tested by 3 experienced village health volunteers (VHVs) with at least 10 years of experience. Subsequently, the questionnaire was piloted with 30 participants to assess the reliability of the attitude scale (Cronbach's α ²⁰=0.91) and the knowledge test (KR-20²¹=0.78).

Data collection

Data collection took place in January 2025. The researchers visited the outpatient clinic for NCD patients between 9:00 and 9:30 AM (when patients are waiting to see their doctor) from Monday to Friday. The study details

were explained to participants individually, and consent was obtained through action (no written consent). Participants were asked to complete the questionnaire in a designated area near the consultation room. If participants had difficulty reading or had vision issues, a research assistant read the questions aloud. Completed questionnaires were placed in a sealed box. To ensure consistency and minimize interviewer bias, all research assistants were trained prior to data collection on standardized questionnaire administration, neutral tone, and avoiding leading questions.

Data analysis

Descriptive statistics were used to analyze general data on patients, their consultation behavior, and sources of information for deciding to use HDS. Knowledge scores were categorized into 3 groups based on Bloom’s Taxonomy (1971): low level of knowledge (score 0–7 points or <60%), moderate level (score 8–10 points or 60–80%), and high level (score 11–13 points or >80–100%)²². Attitudes towards herbal and dietary supplements were divided into 3 categories: negative attitude (score 1.00–2.33), neutral attitude (2.34–3.67), and positive attitude (score 3.68–5.00)²³.

A two-step analysis was conducted to examine the factors associated with consultation behavior. First, univariate logistic regression was applied to identify the factors potentially influencing the behavior of consulting health professionals before using HDS. A significance level of p-value<0.25 was used to select candidate variables for the next step. Then, multivariate logistic regression was performed to determine the factors significantly associated with the behavior, using a significance level of p-value<0.05.

Three independent variables, i.e., knowledge of HDS, attitudes toward HDS, and age of the participants, were included in the model as continuous variables. Four independent variables, i.e., sex, educational attainment, comorbidities, and duration since diagnosis, were included as binary variables.

Results

The majority were female, aged between 21 and 86 years, with an average age of 56.04±12.13 years. Most participants had completed primary education (grade 6). The majority had one chronic disease, primarily hypertension, with the duration since diagnosis ranging from 1 to 40 years, with an average duration of 7.63±6.49 years. Detailed information is presented in Table 1.

Table 1 Characteristics of study participants by herbal and dietary supplements use

Characteristics	n (%)
Sex	
Female	132 (63.50)
Male	76 (36.50)
Educational attainment	
Primary education (grade 6)	125 (60.10)
Lower secondary education	34 (16.30)
Upper secondary/Vocational certificate	35 (16.80)
Higher vocational certificate	4 (1.90)
Bachelor’s degree or higher	10 (4.80)
Comorbidities	
Single disease	
Hypertension	106 (50.96)
Diabetes mellitus	32 (15.38)
Chronic kidney disease	2 (0.96)
Multiple diseases (two conditions)	
Diabetes and Hypertension	24 (11.54)
Hypertension and Hyperlipidemia	18 (8.65)
Diabetes and Chronic kidney disease	6 (2.88)
Hypertension and Chronic kidney disease	4 (1.92)
Hypertension and Heart disease	3 (1.44)
Multiple diseases (three conditions)	
Diabetes, hypertension, and hyperlipidemia	9 (4.33)
Diabetes, hypertension, and chronic kidney disease	4 (1.92)
Duration since diagnosis	
1–5 years	100 (48.10)
6–10 years	70 (33.70)
11–15 years	21 (10.10)
16–20 years	10 (4.80)
More than 21 years	7 (3.40)

Herbal and dietary supplements used and information sources

Thirteen single HDS were reported to be used by this sample group. These were: turmeric (Curcuma

longa, n=22), pandan leaves (*Pandanus amaryllifolius*, n=13), sappanwood (*Caesalpinia sappan*, n=13), rang jeud (*Thunbergia laurifolia*, n=12), shatavari (*Asparagus racemosus* n=12), kratom leaves (*Mitragyna speciosa*, n=12), garlic tablets (*Allium sativum*, n=9), green chiretta (*Andrographis paniculata*, n=9), soft-bone root (*Eurycoma longifolia*, n=9) and cordyceps (*Cordyceps sinensis*, n=7), makabid (*Dioscorea hispida*, n=1), nanchao wei (*Gymnema inodorum*, n=1), and lingzhi mushroom (*Ganoderma lucidum*, n=1). In addition, a mixed herbal product for pain relief was reported by 6 participants. This product was listed by the Thai Food and Drug Administration as being adulterated with corticosteroids.

Among those who consulted health professionals (n=78), physicians were the most commonly reported (n=31), followed by staff at health promotion hospitals (n=27). Both the group that consulted health professionals (n=78) and the group that did not (n=130) also sought information from non-health professional sources. Among those who did not consult health professionals, the top 2 primary sources of information influencing their decision to use HDS were the radio (n=42) and friends or acquaintances (n=40). Among those who did consult health professionals, the internet remained a primary source of information. Family members

and physicians were reported by an equal number of participants (n=31). Detailed data are presented in Table 2.

Knowledge of herbal and dietary supplements

Based on a 13-item questionnaire, the average knowledge score was 8.71±1.49, indicating a moderate level of knowledge. When categorized into 3 knowledge levels, it was found that 15.90% (n=33) had a low level of knowledge, 71.20% (n=148) had a moderate level of knowledge, and 13.00% (n=27) had a high level of knowledge. The most common incorrect responses were related to the side effects of HDS and drug-herb interactions (Table 3).

Attitudes toward herbal and dietary supplements

Based on a 5-item questionnaire, the average attitude score was 3.03±0.85, indicating a neutral attitude. Approximately 24.50% (n=51) had a positive attitude, 41.30% (n=86) had a neutral attitude (score: 2.34–3.67), and 34.10% (n=71) had a negative attitude.

When examining individual responses, most participants agreed that HDS do not have harmful effects when used alongside conventional medicine. However, they were not convinced that HDS are more effective, safer, or can replace conventional medicine (Table 4).

Table 2 Sources of information

Sources of information	Did not consult n=130 (%)	Consulted n=78 (%)
Non health professional		
Friends/Acquaintances	40 (30.77)	30 (38.46)
Radio	42 (32.31)	20 (25.64)
Internet (e.g., Facebook, TikTok)	24 (18.46)	33 (42.31)
Family members	18 (13.85)	31 (39.74)
Television	18 (13.85)	13 (16.67)
Health professional		
Physicians	-	31 (39.74)
Health promotion hospitals staff	-	27 (34.62)
Traditional Thai medicine	-	18 (23.08)
Community pharmacists	-	16 (20.51)
Hospital pharmacists	-	6 (7.69)

Behavior of consultation with health professionals before using HDS

Among 208 patients with NCDs, 78 individuals had consulted a health professional before using HDS, yielding a prevalence of 37.50%. The most common topics discussed during these consultations were: the benefits and risks of HDS products, the suitability of HDS for their specific condition, and the potential interactions between prescribed medications and the intended-to-use HDS. These consultations occurred fairly often or nearly every time before use (Table 5).

Additionally, among those who consulted health professionals, 53 out of 78 (67.90%) informed their provider

about their use of HDS. The most common reasons for disclosure were: seeking additional knowledge (n=17) and concern about interactions with conventional medication or their chronic disease (n=5).

Conversely, 130 patients had used HDS without consulting a health professional. Among them, 124 (95.40%) did not inform their health professional about their use of these products. Of the 85 patients who provided reasons for not disclosing, the majority stated that they did not see it as necessary because they had purchased or sourced the products themselves (Table 6).

Table 3 Knowledge of herbal and dietary supplements

Concept	Average score±S.D.
1. Meaning of herbal and dietary supplements (3 questions)	2.34±0.85
2. Side effects of herbal and dietary supplements and drug-herb interactions (5 questions)	2.51±0.91
3. Choosing herbal and dietary supplements (5 questions)	3.86±1.19

S.D.=standard deviation

Table 4 The items of attitudes toward herbal and dietary supplements (n=208)

Items	(%)				
	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
1. Herbal and dietary supplements have no harmful effects when taken with conventional medicine.	2.90	16.80	25.50	47.60	7.20
2. Using herbal and dietary supplements will allow me to stop taking my current conventional medicine.	4.30	34.10	28.80	27.40	5.30
3. Herbal and dietary supplements are more effective than conventional medicine.	6.30	40.90	25.50	21.20	6.30
4. Using herbal and dietary supplements is safer than using conventional medicine.	1.90	38.50	26.90	23.10	9.60
5. Herbal and dietary supplements can replace conventional medicine.	2.90	38.90	28.80	23.60	5.80

Table 5 Consultation behavior with health professionals before using HDS (n=78)

Items	(%)				
	Never	Rarely	Sometimes	Often	Very often
1. Interaction between current medications and herbal and dietary supplements	10.30	7.70	30.80	15.40	35.90
2. Benefits or risks of the intended herbal and dietary supplement	10.30	10.30	32.10	14.10	33.30
3. Herbal and dietary supplements can be used for treating diseases	11.50	10.30	25.60	17.90	34.60

HDS=herbal and dietary supplements

Table 6 Reasons for not Informing health professionals (n=85)

Reasons	n (%)
Self-purchased, no need to inform	46 (62.52)
Bought by family/friends/relatives	12 (16.44)
Considered a natural plant, not a medicine	9 (12.33)
Fear of doctor’s disapproval/scolding	7 (9.59)
Not taken regularly	4 (5.48)
No doctor’s visit during use	3 (4.11)
Unaware of the need to inform	2 (2.74)
Doctor did not ask	2 (2.74)

Factors Associated with Consulting Health Professionals before Using HDS

Univariate analysis suggested a potential association between knowledge about HDS and consultation behavior, whereas attitudes toward HDS were not significantly associated (p-value>0.25). Although females, patients with primary education (grade 6 or lower), those with comorbidities, and those diagnosed with an NCD for 5 years or more appeared more likely to consult health professionals, only educational attainment emerged as a potential factor associated with consultation behavior (Table 7).

Multivariate logistic regression analysis revealed that participants with a primary education (grade 6 or lower) were 1.80 times more likely to consult a health professional

before using HDS compared to those with higher education. Additionally, higher knowledge scores about HDS were associated with a lower likelihood of consulting health professionals before using HDS (Table 7).

Discussion

This study found that 37.5% of patients with non-communicable diseases (NCDs) consulted health professionals before using HDS, a rate slightly higher than in previous studies. For instance, Tangkiatkumjai et al. (2013) reported a consultation rate of 28% among patients with chronic kidney disease (CKD)²⁴, and Owusu et al. (2020) found a rate of 25% among patients with hypertension and/or diabetes in Jamaica¹⁰. This suggests a persistent gap in patient awareness regarding the importance of professional guidance when using HDS. Health professionals should address this gap by implementing targeted educational campaigns emphasizing the risks of unsupervised HDS use, particularly for patients with chronic conditions. Integrating HDS counseling into routine care services, such as NCD clinics, may also encourage more patients to seek professional advice.

Regarding the sources of information influencing patients’ decisions to use HDS, friends, radio, and the internet were the primary influences, a finding consistent with previous studies⁷⁻¹⁰. Even among those who consulted

Table 7 Factors associated with the behavior of consulting health professionals before using HDS

Factors	Consult n (%) n=78	Not consult n (%) n=130	Univariate analysis OR (95% CI)	Multivariable analysis OR (95% CI)
1. Sex				
Female	53 (67.95)	79 (60.77)	1.37 (0.76–2.47)	–
Male	25 (32.05)	51 (39.23)	1	
2. Educational attainment				
Grade 6 or lower	39 (50.00)	86 (66.15)	1.95 (1.10–3.47)**	1.80 (1.01–3.22)**
Grad 7 and upper	39 (50.00)	44 (33.85)	1	1
3. Comorbidities				
>1	29 (37.18)	39 (30.00)	1.38 (0.76–2.47)	–
1	49 (62.82)	91 (70.00)	1	
4. Duration since diagnosis (years)				
>5	42 (53.85)	66 (50.77)	1.13 (0.64–1.98)	–
1–5	36 (46.15)	64 (49.23)	1	
5. Age (years)			0.10 (0.97–1.02)	–
6. Knowledge of HDS			0.76 (0.62–0.92)**	0.78 (0.64–0.92)**
7. Attitudes toward HDS			0.88 (0.65–1.20)	–

*=p-value<0.25, **=p-value<0.05, HDS=herbal and dietary supplements, 95% CI= 95% confidence interval

health professionals, friends and media remained significant sources of influence, raising concerns about the reliability of the information patients receive. Furthermore, some of the HDS products used by patients, such as kratom leaves, Cordyceps, Lingzhi mushrooms, Makham Kha bid (*Garcinia cowa*), and steroids, have been associated with acute kidney injury (AKI) and hypoglycemia⁴⁻⁶, which calls for public health campaigns to address any misinformation and promote reliable sources.

Although pharmacists are experts in medicines and health products, they were not the most commonly consulted health professionals by patients with NCDs. This may be due to hospital dispensing units being busy and not conducive to consultations about HDS. However, patients were more likely to consult community pharmacists, as many HDS products are readily available in community pharmacies, making them more accessible. To optimize the role of hospital pharmacists in HDS counseling, hospitals should integrate structured consultation services within the pharmacy department and ensure hospital pharmacists are

trained on commonly used HDS products and their risks. Encouraging proactive counseling in community pharmacies could also help bridge the gap in professional guidance.

Our study also found that many patients did not disclose their HDS use to health professionals, believing it unnecessary. This highlights the need to raise awareness about the importance of discussing HDS use with healthcare providers. To improve patient safety, health professionals should actively educate patients about the importance of reporting HDS use. Routine screening for HDS use and fostering a nonjudgmental environment could facilitate disclosure. Additionally, as family members significantly influence patients’ decisions regarding HDS use, public health campaigns should also target family members to promote safe HDS use.

Given the structure of the healthcare system, it is unsurprising that among those patients with NCDs who consult health professionals, physicians were the most commonly consulted. This is because discussions about HDS could naturally occur during routine medical visits. In

the Thai healthcare system, Health Promotion Hospitals (HPHs) serve as the first point of contact for minor ailments and health promotion services. In line with their role in primary care, nurses and public health officers at HPHs were also frequently consulted about HDS use. Given this, we recommend further assessing the knowledge of these health professionals and developing standardized guidelines or manuals to support them in providing appropriate HDS counseling for patients with NCDs. Expanding HDS-related training programs for HPH staff may further strengthen their ability to provide accurate and evidence-based recommendations.

The study revealed 2 key factors influencing the behavior of consulting health professionals before using HDS: knowledge about HDS and educational attainment. Regarding knowledge about HDS, the study found that patients with higher knowledge scores were less likely to consult health professionals before use, while those with lower knowledge were more likely to seek professional guidance. This aligns with previous research indicating that patients with insufficient knowledge about HDS often consult professionals to better understand safety concerns and potential interactions^{8,10,17}.

However, the findings of this study did not fully support the assumptions of the KAP model, as attitudes toward HDS were not significantly associated with consultation behavior. In other words, attitudes toward the product did not directly influence the decision to consult health professionals before use. While most previous health studies using the KAP framework have found significant associations between attitudes and behavior²⁵⁻²⁷, only a few similar to our study have reported no significant relationship between these variables²⁸.

Of the 5 variables previously found to be significantly associated with HDS use in earlier studies^{11,16-18} and hypothesized to influence consultation behavior in this study, only educational attainment was found to be

significantly associated. This suggests that individuals with lower educational attainment may be more inclined to seek professional advice due to limited access to diverse sources of information^{29,30}. In contrast, patients with higher education levels may have greater access to health information through the internet or media, which may reduce their perceived need for professional consultation.

Although females, older patients, those with multiple comorbidities, and those diagnosed with an NCD for 5 years or more appeared more likely to consult health professionals than their counterparts (males, younger individuals, those with one comorbidity, and those more recently diagnosed), these associations were not statistically significant. Several factors may help explain this. First, the differences in consultation behavior may not have been large enough to reach statistical significance given the sample size of this study. Second, the decision to consult health professionals may be influenced by other psychosocial or contextual factors not captured in this study, rather than demographic or clinical characteristics alone. This finding is consistent with a previous study in Iran that applied the KAP framework alongside demographic and clinical variables to examine self-management in patients with type 2 diabetes mellitus. That study also found no significant associations with sex, age, duration since diagnosis, or comorbidity²⁸. Future research involving larger and more diverse populations may help clarify the influence of these factors on consultation behavior regarding HDS use.

Based on these findings, interventions can be implemented to improve patient safety and promote appropriate HDS use. Educational campaigns should target patients with lower educational attainment to enhance their understanding of HDS risks and benefits. These campaigns should also encourage consulting health professionals as part of the decision-making process, especially in cases of safety concerns or potential interactions. For patients with lower knowledge about HDS, educational programs could

provide clear, evidence-based information, particularly for patients with chronic conditions who may be on multiple medications. Although attitudes toward HDS were neutral in our study, fostering a positive attitude toward professional consultation, emphasizing its importance for patient safety, may still be valuable³¹.

This study offers valuable insights into the factors influencing patients' consultations with health professionals before using HDS. A key strength of the study is its focus on patients with NCDs at Chaturapatpimun Hospital, providing a clear understanding of this specific population.

Limitations

However, as this study focused on past consultation behavior, future research should examine patients' intentions to consult health professionals before using HDS, as intentions are a precursor to actual behavior³². A survey to explore KAP is limited compared to a qualitative study. Future research should incorporate a qualitative approach to gain more detailed insights into the factors influencing the decision to seek professional consultation about HDS. The study did not assess the credibility of information sources used by participants to make decisions about HDS. Future research should explore the credibility of these sources and the decision-making process, which could reduce recall bias and provide more accurate data, as seen in prior research¹⁷. It should also be noted that this study carries an inherent bias, as it included only patients who reported using HDS. This may have skewed the findings toward individuals who are more transparent in their interactions with the medical system. Finally, the findings are specific to patients at Chaturapatpimun Hospital and may not be generalizable to other populations or regions. Caution should be exercised when applying these results to broader contexts.

Acknowledgement

We acknowledge the Faculty of Pharmaceutical

Sciences, Khon Kaen University, for its partial financial support of this research.

Conflict of interest

There are no potential conflicts of interest to declare.

References

1. World Health Organization (WHO). Noncommunicable diseases. [monograph on the Internet]. Geneva: WHO; 2024 [cited 2025 Jan]. Available from: <https://www.who.int/news-room/factsheets/detail/noncommunicable-diseases>.
2. World Health Organization (WHO). Noncommunicable diseases. [monograph on the Internet]. Geneva: WHO; 2024 [cited 2025 Jan]. Available from: <https://www.who.int/news-room/factsheets/detail/noncommunicable-diseases>.
3. Geijerstam P, Joelsson A, Rådholm K, Nyström FH. A low dose of daily licorice intake affects renin, aldosterone, and home blood pressure in a randomized crossover trial. *Am J Clin Nutr* 2024;119:682–91. doi: 10.1016/j.ajcnut.2024.01.011.
4. Rai A, Eapen C, Prasanth VG. Interaction of herbs and glibenclamide: a review. *ISRN Pharmacol* 2012;2012:659478. doi: 10.5402/2012/659478.
5. National kidney foundation. (2019) "Herbal Supplements and Kidney Disease" [homepage on the Internet]. New York: National Kidney Foundation; 2019 [cited 2025 Jan 16]. Available from: <https://www.kidney.org/atoz/content/herbalsupp#it-safe-to-use-herbalsupplements-if-i-have-kidney-disease>
6. Tangkiatkumjai M, Sansuk N, Chaiyarak S, Sripr S, Lumboot U, Absuwan W, et al. Acute kidney injury related to cordycepin: thirteen cases from Thailand. *Research Square* 2021. 13th, 2022. doi: 10.21203/rs.3.rs-1420916/v1.
7. Tangkiatkumjai M, Boardman H, Praditpornsilpa K, Walker DM. Reasons why Thai patients with chronic kidney disease use or do not use herbal and dietary supplements. *BMC Complement Altern Med* 2014;14:473. doi: 10.1186/1472-6882-14-473.
8. Sirivan P. The use of herbal medicine based on knowledge, attitudes and perception of service providers and recipients at Mae Tha Hospital, Mae Tha district, Lamphun province. [Master's thesis]. Bangkok: Thammasat University; 2016.
9. Sukhareonchaikul P. Attitude of generation y consumers about thai herbal usage. [Master's thesis]. Bangkok: Mahidol University; 2014.

10. Owusu S, Gaye YE, Hall S, Junkins A, Sohail M, Franklin S, et al. Factors associated with the use of complementary and alternative therapies among patients with hypertension and type 2 diabetes mellitus in Western Jamaica: a cross-sectional study. *BMC Complement Med Ther* 2020;20:314.
11. Ünlüyol D, Gökçekuş H, Kassem Y, Tezer M, Meriçli F, Yavuz DÖ. Complementary and alternative medicines in northern Cyprus: public awareness, patterns of use, and attitudes. *Healthcare (Basel)*. 2023;11:977.
12. Department of Public Health. [homepage on the Internet]. Roi Et: HDC; 2024 [cited 2024 Oct]. Available from: <https://ret.hdc.moph.go.th/hdc/reports/page>.
13. Harris L. The use of the knowledge, attitudes, and practices (KAP) model in the study of agricultural practices. *J Soc Sci Res* 1950;23:58–65.
14. Sohal K, Kambole R, Owibingire SS. Oral health-related knowledge, attitudes, and practices of diabetic patients in Tanzania. *Int Dent J* 2025;75:256–62.
15. Hamshari S, Hamadneh S, Ajlone AM, Mashni AW, Jubeh MA. Knowledge, attitude, and practice (KAP) of primary health physicians towards glucose self-monitoring in patients with type2 diabetes mellitus in Palestine. *BMC Prim Care* 2025 10;26:33. doi: 10.1186/s12875-025-02720-5.
16. Damnjanovic I, Kitic D, Stefanovic N, Zlatkovic-Guberinic S, Catic-Djordjevic A, Velickovic-Radovanovic R. Herbal self-medication use in patients with diabetes mellitus type 2. *Turk J Med Sci* 2015;45:964–71.
17. Welz AN, Emberger-Klein A, Menrad K. The importance of herbal medicine use in the German health-care system: prevalence, usage pattern, and influencing factors. *BMC Health Serv Res* 2019;19:952.
18. Kifle ZD. Prevalence and associated factors of herbal medicine use among adult diabetes mellitus patients at government hospital, Ethiopia: an institutional-based cross-sectional study. *Metabol Open* 2021;11:100120. doi: 10.1016/j.metop.2021.100120.
19. Peduzzi P, Concato J, Kemper E, et al. A simulation study of the number of events per variable in logistic regression analysis. *J Clin Epidemiol* 1996;49:1373–9.
20. Cronbach LJ. Coefficient alpha and the internal structure of tests. *Psychometrika* 1951;16:297–334.
21. Kuder GF, Richardson MW. The theory of the estimation of test reliability. *Psychometrika* 1937;2:151–160.
22. Bloom BS. Taxonomy of educational objectives: The classification of educational goals. handbook I: Cognitive domain. New York: David McKay; 1971.
23. Best J. Evaluation research: a systematic approach. 2nd ed. Beverly Hills (CA): Sage Publications; 1977.
24. Tangkiatkumjai M, Boardman H, Praditpornsilpa K, M Walker D. Prevalence of herbal and dietary supplement usage in Thai outpatients with chronic kidney disease: a cross-sectional survey. *BMC Complement Altern Med* 2013;13:1–9.
25. Subedi D, Jyoti S, Thapa B, Paudel S, Shrestha P, Sapkota D, Bhatt BR, Adhikari H, Poudel U, Gautam A, Nepal R, Al-Mustapha Al. Knowledge, attitude, and practice of antibiotic use and resistance among poultry farmers in Nepal. *Antibiotics (Basel)* 2023;12:1369.
26. Li X, Shi Y, Wei D, Gong Y, Yan X, Cai S. Knowledge, attitude, and practice toward weight management among diabetic patients in Qidong City, Jiangsu Province. *BMC Public Health* 2024;24:1–9.
27. Du Y, Cai X, Hong X, Chen Y, Chen C, Gong J, et al. Knowledge, attitude, and practice of coronary heart disease patients towards antithrombotic therapy. *BMC Public Health* 2025;25:549.
28. Ghannadi S, Amouzegar A, Amiri P, Karbalaefar R, Tahmasebinejad Z, Kazempour-Ardebili S. Evaluating the effect of knowledge, attitude, and practice on self-management in type 2 diabetic patients on dialysis. *J Diabetes Res* 2016;3730875.
29. Nguyen MT, Feeney T, Kim C, Drake FT, Mitchell SE, Bednarczyk M, et al. Patient-level factors influencing palliative care consultation at a safety-net urban hospital. *Am J Hosp Palliat Care* 2021;38:1299–1307
30. Ngampradit Y, Pradithaprecha A, Prasertchai A. Factors affecting pregnant and breastfeeding women's decisions to receive a covid-19 vaccine in Chiang Mai province. *Reg Health Promot Cent 9 J* 2024;8:266–80.
31. Duangmahasorn S, Srisuriyawet R and Homsin P. Effects of positive development program on attitude toward premarital sex, perceived self-efficacy, and intention to refuse premarital sex among early adolescents. *J Nurs Educ* 2015;8:85–98.
32. Feil K, Fritsch J, Rhodes RE. The intention-behaviour gap in physical activity: a systematic review and meta-analysis of the action control framework. *Br J Sports Med* 2023;57:1265–71.