Factors influencing self-management of health behaviors among older adults with chronic kidney disease in Chiang Rai Province, Thailand

Warut Duangchit[1], Manuchet Manotham[2*] Taweewun Srisookkum[2], Natnapa Promma[2], Nattapon Pansakun[2], Pornpana Somjit[2]

[1]Department of Psychiatry and Substance Abuse, Phan Hospital, Chiang Rai, Thailand
[2]School of Public Health, University of Phayao, Phayao, Thailand

Corresponding Author: Manuchet Manotham **Email:** manuchet.ma@up.ac.th

ABSTRACT

The burden of chronic kidney disease (CKD) and its associated risk factors is expected to rise alongside the rapidly increasing global population of older adults. A new trend in CKD management emphasises the adoption of self-management (SM) approaches. This cross-sectional study aims to investigate the proportion of self-management of health behaviors (SMHB) and identify the factors influencing SMHB among older adults with CKD in Chiang Rai Province, Thailand. The study sample comprised 408 individuals aged $\geq$ 60 years, selected using a multi-stage sampling method. Data were collected through face-to-face interviews conducted from April to June 2024 and analysed using descriptive statistics, Pearson's product-moment correlation, Spearman's rank correlation coefficient, simple linear regression and multiple regression analysis. The average age of the participants was 70.0 ± 6.7 years, with over one-third (38.5%) reporting CKD stage 2 and 32.4% at stage 1. The findings indicated a good proportion of SMHB (79.4%) among older adults with CKD in Chiang Rai Province, with an average SMHB score of 44.0 ± 12.8. Multiple regression analysis revealed that self-condition management for health promotion (SCMHP), maintaining self-care for health (MSCH), participation in social health activities (PSHA), health literacy related to self-care practices (HLSCP) and occupation were significant predictors of SMHB. Collectively, these factors explained over half of the variance in SMHB levels ($R^2 = 0.619, p < 0.05$). Consequently, the study suggests that promoting sustainable SMHB among older adults with CKD should be a healthcare priority for precautionary prevention.

Keywords:
self-management; health behaviors; chronic kidney disease; older adults

INTRODUCTION

Chronic kidney disease (CKD) in older adults is a significant global health concern. With age, individuals become increasingly susceptible to CKD due to declines in kidney function and the presence of comorbidities such as hypertension and diabetes, which are key risk factors. CKD presents considerable challenges in disease management, including a reduced capacity for health behavior management and a need for complex medical care. According to the 2017 Global Burden of Disease Study, CKD ranked as the 12th leading cause of death globally, affecting 1 3 . 4 % of the population[1] in CKD stages 1–5 and 10.6% in stages 3–5.[2] The actual prevalence of CKD may be higher than reported, as it is often diagnosed incidentally. CKD is a silent disease that can progress to end-stage kidney disease (ESKD), leading to severe complications without obvious symptoms. By 2030, the prevalence of CKD is projected to increase by 16.7% among adults.[3] Furthermore, global epidemiological data indicate that 1.2 million individuals died from CKD in 2017, with this mortality rate rising by 41.5% from 1990 to 2017.[1]

These high prevalence and mortality rates are likely due to insufficient disease management and an aging population.[1] Often, kidney deterioration is subtle, potentially leading to ESKD, which carries high morbidity, mortality, and economic burden.[3] CKD progresses to ESKD when kidney function declines to the point where kidneys can no longer filter waste and excess fluid from the blood effectively. Factors that exacerbate the disease include high blood pressure, elevated blood sugar levels (especially in diabetic patients), smoking, a high-sodium diet, and lack of exercise. These factors increase strain on the kidneys, leading to

waste accumulation and increased internal pressure, accelerating kidney deterioration.[4] The growing prevalence of CKD underscores the need for prioritizing the development of interventions aimed at delaying or preventing disease progression,[5] making precautionary prevention a healthcare priority. Treatment of CKD focuses on preventing progression to ESKD, with self-management (SM) particularly important for older adults, as it can help slow disease progression. Behaviors such as dietary control to reduce salt and sugar intake, regular exercise, blood pressure management, and quitting smoking are essential to mitigating the risk of kidney deterioration.

Self-management can significantly enhance healthcare outcomes for older adults with CKD. However, older adults often face complex health issues that differ from those of younger individuals, such as physical limitations or multiple chronic conditions that can impact their confidence and ability to manage their health. Focusing on this group allows this study to address the unique challenges they encounter, which can help inform policies or healthcare approaches tailored specifically for older adults with CKD, potentially delaying disease progression and reducing comorbidity incidence. Evidence[6-8] indicates that patients with stage 1–5 CKD who participate in self-management programs experience reduced hospitalization rates. Effective self-management[9] requires a focus on the needs of the disease as well as sufficient knowledge, competencies, and confidence in medical matters.[10-11] Individuals with CKD should possess a strong understanding of their condition and basic health information to manage their disease effectively.[12] Self-management, defined as the active management by individuals of their treatment, symptoms, lifestyle, and the physical and psychological consequences

of living with a chronic condition, has become an established treatment approach for CKD in recent years.[13-18]

Self-management is central to managing many chronic conditions, serving as the gold standard of chronic care, with CKD being a prime example. Patients with CKD typically live with the condition for life, making the primary treatment goal centered on improving their quality of life through effective self-management. CKD patients should actively manage their health by managing sodium intake, engaging in appropriate physical activities, and adhering to prescribed medications. Chronic disease self-management refers to an individual's ability to manage various aspects of living with a chronic condition,[19-20] including the daily tasks necessary to control or mitigate the disease's impact on physical health.[21-22] Lifestyle-related risk factors that predispose individuals to CKD can directly affect its severity and progression but are modifiable through early detection and self-management practices. These risk factors, primarily determined by individual behavior, significantly shape treatment outcomes.

Considering these issues, the present study aims to investigate the proportion of self-management of health behaviors (SMHB) and identify factors influencing SMHB among older adults with CKD in Chiang Rai Province, Thailand. The researcher chose this province due to its higher proportion of older adults with CKD compared to other areas and the increasing number of CKD patients in this demographic. Effective self-management programs and projects, supported by the government or local health agencies, are already in place. Additionally, the region's cultural, social, and economic characteristics may influence CKD self-management methods, particularly among older adults. For instance, cultural dietary practices or traditional healthcare approaches could impact CKD control and

long-term health behaviors. The research findings will serve as a foundation for developing appropriate strategies to prevent and control CKD among older adults in the future.

## METHODS
Study Design and Population

This cross-sectional study was conducted in Chiang Rai Province, Thailand, using a systematic methodology. The initial step involved identifying regions inhabited by the older adult population within Chiang Rai Province, specifically the Phan District, known for its large older adult population. This district aligns well with the research target group and presents varying levels of economic development and access to public health services compared to other districts, which may impact the quality of life for older adults in the area. Additionally, the district also possesses distinctive social and cultural traits that can be analyzed. These characteristics could influence behaviors and factors relevant to the older adult population, making the district a representative choice for studying the context of Chiang Rai Province. Fifteen subdistricts within the Phan District were selected for data collection: Charoen Mueang, Doi Ngam, Sai Khao, Than Tawan, Than Thong, Pa Hung, Muang Kham, Mueang Phan, Mae Yen, Mae O, Wiang Hao, San Klang, Santi Suk, San Makhet, and Hua Ngom. Data were collected efficiently and accurately from April to June 2024.

Sample Size and Sampling Procedure

The target population for this study comprised 2,823 older adults. The sample size was calculated using the estimation formula for the population mean,[23-25] yielding a minimum sample size of 339. Adjusting for a 20% attrition rate, the sample size was set at 408 eligible participants. Data were collected using a

multi-stage sampling method, with Chiang Rai Province identified as the study area, specifically the Phan District. Subsequently, fifteen subdistricts within Phan District were divided into three zones: North, Central, and South. Subdistricts were chosen as the sampling units and were randomly selected independently using simple random sampling, resulting in five subdistricts from each zone, totaling fifteen sample subdistricts. Next, villages were chosen as the second sampling units. These were randomly selected independently using simple random sampling, resulting in twenty villages per subdistrict, totaling sixty sample villages. Finally, Thai older adults were selected as the ultimate

sampling unit through a lottery draw, resulting in the inclusion of the fifteen selected subdistricts, with the assistance of village healthcare volunteers (VHVs) responsible for communication with each household. The inclusion criteria for older adults included being aged $\geq$ 60 years, having been diagnosed with CKD by a doctor for more than three months, being on medication, having a medical history, not having impairments in hearing or vision and agreeing to participate in the study. The exclusion criteria included participants who were ill or suffering from complications during the study and/or were not present at the study site during data collection.
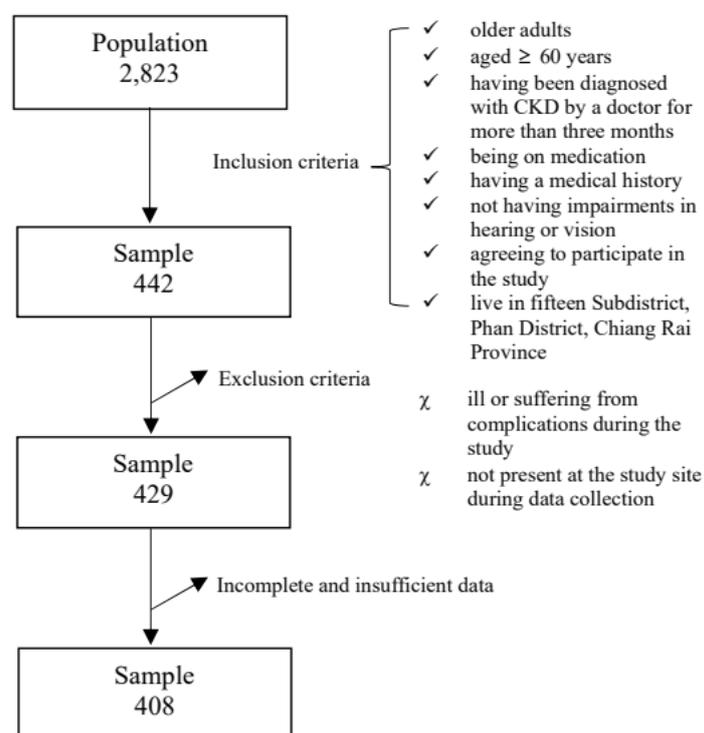
Figure 1. Flowchart of participants during the study enrolment.

Measurement Instruments

The interview form was developed based on a thorough review of relevant literature and consisted of six parts. The

first part collected general characteristics of the participants, including gender, age (years), body mass index (BMI) (kg/m²), marital status, education level, occupation,

income, underlying disease, eGFR (mL/min/1 . 7 3 m²), and number of medications used for treatment (tablets). The second part assessed health literacy related to self-care practices (HLSCP), which refers to an individual's ability to use health information to effectively manage and care for their own health, including necessary practices for the prevention and control of CKD. This section consisted of 10 questions (correct answers scored one point, incorrect answers scored zero), for example, "Eating very salty foods increases the risk of developing CKD." The third part focused on self-condition management for health promotion (SCMHP), which refers to the knowledge and skills required for continuous self-care to promote good health, reduce the risk of disease, and improve quality of life, including practices that help prevent illness or the exacerbation of CKD. This section consisted of five questions rated on a Likert scale (every time = 4; often = 3; sometimes = 2; rarely = 1; never = 0), such as, "How often do you review your self-care practices intended to promote your own health?" The fourth part addressed participation in social health activities (PSHA), which refers to participation in activities or programs that promote health and well-being in a social context, including group exercise, health information awareness, emotional support, enhancing health literacy, disease prevention, and health management. This section also consisted of five questions rated similarly, for instance, "Participating in activities to assess risk behaviors for various diseases in yourself and others." The fifth part concerned maintaining self-care for health (MSCH), which refers to ongoing actions to care for and protect one's health, including regular practices such as eating a healthy diet, exercising, getting adequate rest, managing stress, and undergoing appropriate health check-ups, all intended to promote overall health and prevent future diseases or health issues. This section consisted of 10 questions rated

in the same manner, including, "Always manage your problems with an optimistic outlook." Finally, the sixth part evaluated self-management of health behaviors (SMHB), which refers to an individual's ability to effectively control and engage in self-directed health-promoting activities, including setting goals, monitoring progress, and adjusting behaviors such as healthy eating, exercising, managing stress, avoiding smoking and alcohol consumption, and maintaining overall health to prevent or alleviate CKD. This section consisted of 25 questions rated similarly, such as, "You control your intake of salt- or potassium-rich foods to reduce the burden on your kidneys," "You avoid activities that may increase blood pressure or cause stress that could affect your kidneys," "You go for health check-ups or blood tests as recommended by your doctor," and "You strictly follow the doctor's instructions for taking your medication." The second part of the questionnaire was assessed using Bloom's[26] cut-off point and simplified into two groups: good (80%–100%) and not good (< 80%). Parts 3–6 were assessed using Best's[27] cut- off point and also simplified into two groups: good (80%–100%) and not good (< 80%).

The researcher conducted a quality check of the interview protocol. This interview, involving a sample group of 30 participants with characteristics similar to those of the main study, was tested for content validity and reliability. Each part of the interview achieved a Cronbach's alpha ranging from 0.79 to 0.91.

Data Collection

Following IRB approval, all participants were informed of the study's purposes. Participation was voluntary, and participants could withdraw from the study at any time without negative consequences. All information was kept secure and confidential. Eligible participants who agreed to participate read and signed an

informed consent form along with a semi-structured questionnaire before the interview commenced. Data were collected with the support and cooperation of the Public Health Office of Phan District, Phan Hospital, Subdistrict Health Promoting Hospital Mae Yen and VHVs.

Data Analysis

The data collected in this study were meticulously organized and analyzed using IBM SPSS Statistics software, version 29.0 (SPSS Inc., Chicago, IL, USA). Descriptive statistics were used to analyze demographic data and self-management of health behaviors (SMHB) pertaining to older adults with chronic kidney disease (CKD). Pearson's product-moment correlation, Spearman's rank correlation coefficient, and simple linear regression were conducted, as appropriate, to evaluate the associations, with a significance level set at 0.05, presenting a correlation matrix of correlation coefficients and standardized beta coefficients (β_s).

Prior to analysis, assumptions for multiple regression were tested, ensuring independence of errors, linearity of continuous variables in the logit, absence of multicollinearity, and no influential outliers, all of which were satisfactorily met. Stepwise multiple regression analyses identified statistically significant factors associated with SMHB at a significance level of 0.05, while also considering variables with p-values < 0.329[28] to allow comprehensive variable selection in the initial analysis phase. These factors included age, BMI, occupation, income, HLSC, SCMHP, PSHA, MSCH, and SMHB.

RESULTS

General Characteristics of the Participants

A total of 408 participants were included in the study. The majority were female, comprising 60.3% of the total, while males accounted for 39.7%. The average age of the participants was 70.0 ± 6.7 years. More than one-third (45.1%) reported a normal BMI, and over half (67.4%) were married. Two-thirds (94.9%) of participants had completed elementary school or lower. By profession, 45.1% were unemployed, and 54.9% were engaged in general work. The average income of participants was 2242.4 ± 2645.4 baht. All participants (100.0%) reported having CKD, with more than one-third (38.5%) at CKD stage 2 and 32.4% at stage 1, the stage of CKD is based on laboratory test results from Phan Hospital in Chiang Rai Province. The average number of medications used for treatment was 2.9 ± 1.7 tablets (Table 1).

Table 1. Baseline characteristics of participants (n = 408)

Demographic characteristics	n (%)
Gender	
Male	162 (39.7)
Female	246 (60.3)
Age (years)	
Mean ± SD	70.0 ± 6.7
Median (Min-Max)	69 (60-95)
Body mass index (kg/m²)	
Underweight (< 18.5)	24 (5.9)
Normal (18.5–22.9)	184 (45.1)

Demographic characteristics	n (%)
Overweight (23.0–24.9)	94 (23.0)
Obese (> 24.9)	106 (26.0)
Marital status	
Single	23 (5.6)
Married	275 (67.4)
Widowed/divorced/separated	110 (27.0)
Education level	
Elementary school and lower	387 (94.9)
High school	17 (4.2)
Diploma /High vocational certificate	3 (0.7)
Bachelor's degrees and above	1 (0.2)
Occupation	
No occupation	184 (45.1)
General workers	224 (54.9)
Income (baht)	
Mean ± SD	2242.4 ± 2645.4
Median (Min-Max)	1500 (600-25000)
Underlying disease	
Chronic kidney disease	408 (100.0)
Hypertension	329 (80.6)
Diabetes	225 (55.1)
Hyperlipidaemia	174 (42.6)
Heart disease	31 (7.6)
Stroke	14 (3.4)
Emphysema	9 (2.2)
eGFR (mL/min/1.73 m²)	
CKD Stage 1 (≤ 90)	132 (32.4)
CKD Stage 2 (60–89)	157 (38.5)
CKD Stage 3 (30–59)	90 (22.1)
CKD Stage 4 (15–29)	17 (4.1)
CKD Stage 5 (< 15)	12 (2.9)
Number of medications used for treatment (tablets)	
Mean ± SD	2.9 ± 1.7
Median (Min-Max)	3 (1-12)

Levels of HLSCP, SCMHP, PSHA, MSCH and SMHB among older adults with CKD in Chiang Rai Province

Overall, levels of HLSCP and SMHB among older adults with CKD were rated as good (73.0% and 79.4%), with an average score of 6.5 ± 2.0 and 44.0 ± 12.8, respectively. Conversely, levels of SCMHP, PSHA and MSCH were rated as not good (63.5%, 57.8% and 98.8%) with an average score of 11.0 ± 4.5, 11.5 ± 5.2 and 13.1 ± 5.1, respectively (Table 2).

Table 2. Mean, standard deviation and levels of HLSCP, SCMHP, PSHA, MSCH and SMHB of the older adults with CKD in Chiang Rai Province (n = 408)

Variables	n (%)
HLSCP	
Not good	110 (27.0)
Good	298 (73.0)
Mean = 6.5, SD = 2.0, Min = 1, Max = 10	
SCMHP	
Not good	259 (63.5)
Good	149 (36.5)
Mean = 11.0, SD = 4.5, Min = 0, Max = 20	
PSHA	
Not good	236 (57.8)
Good	172 (42.2)
Mean = 11.5, SD = 5.2, Min = 0, Max = 20	
MSCH	
Not good	403 (98.8)
Good	5 (1.2)
Mean = 13.1, SD = 5.1, Min = 0, Max = 32	
SMHB	
Not good	84 (20.6)
Good	324 (79.4)
Mean = 44.0, SD = 12.8, Min = 10, Max = 81	

Correlation coefficients with SMHB among older adults with CKD in Chiang Rai Province

The results indicated that age (r_s = -0.191, $p < 0.001$) and HLSCP (r_s = -0.185, $p < 0.001$) were negatively and significantly related to SMHB. On the other hand, BMI (r_s = 0.103, $p = 0.038$), occupation (β_s = 0.266, $p < 0.001$), income (r_s = 0.153, $p = 0.002$), SCMHP (r_s = 0.682, $p < 0.001$), PSHA (r_s = 0.620, $p < 0.001$) and MSCH (r_s = 0.573, $p < 0.001$) were positively and significantly related to SMHB, according to Pearson's product-moment correlation, Spearman's rank correlation coefficient, and simple linear regression (Table 3).

Table 3. Correlation coefficients with SMHB among older adults with CKD in Chiang Rai Province

Variables	1	2	3	4	5	6	7	8	9
1. Age	1.000								
2. BMI	-0.206**	1.000							
3. Occupation	-0.475**	0.097*	1.000						
4. Income	-0.155**	0.104*	0.377**	1.000					
5. HLSCP	0.078	-0.081	0.023	0.183**	1.000				
6. SCMHP	-0.137**	0.075	0.173**	0.099*	-0.100*	1.000			
7. PSHA	-0.117*	0.044	0.142*	0.084	-0.057	0.610**	1.000		
8. MSCH	-0.162**	0.034	0.209**	0.169**	-0.122*	0.504**	0.433**	1.000	
9. SMHB	-0.191**	0.103*	0.266**	0.153**	-0.185**	0.682**	0.620**	0.573**	1.000

$*p < 0.05$, $**p < 0.001$

Predictors of SMHB of the older adults of CKD in Chiang Rai Province

The present study employed stepwise multiple regression to analyse factors predicting SMHB among older adults with CKD in Chiang Rai Province. Five variables demonstrating moderate correlation based on the correlation study—SCMHP, MSCH, PSHA, HLSCP, and occupation—were identified as predictors of SMHB, accounting for 61.4% of the variance with statistical significance ($p < 0.001$), as illustrated in Table 4. The regression equation to explain SMHB in raw scores can be expressed as follows: SMHB of older adults with CKD = 17.108 + 1.155 (SCMHP) + 0.709 (MSCH) + 0.496 (PSHA) - 0.818 (HLSCP) + 2.898 (Occupation).

Table 4: Multiple regression analysis of factors predicting SMHB among older adults of CKD in Chiang Rai Province

Predictive variables	b	S.E.	Beta (β)	t	*p*-value
Constant	17.108	2.118		8.079	< 0.001
SCMHP	1.155	0.118	0.403	9.753	< 0.001
MSCH	0.709	0.092	0.279	7.661	< 0.001
PSHA	0.496	0.097	0.201	5.132	< 0.001
HLSCP	-0.818	0.202	-0.126	-4.044	< 0.001
Occupation	2.898	0.815	0.113	3.555	< 0.001
Constant (a) = 17.108, $R = 0.787$, $R^2 = 0.619$, Adjusted $R^2 = 0.614$, $p < 0.001$					

DISCUSSION

The present study provides primary evidence that the proportion of SMHB among older adults with CKD was relatively good, with an average SMHB score of 44.0 ± 12.8. This finding aligns with previous studies, indicating that older adults with CKD generally manage their health effectively in areas such as dietary control, physical activity, stress management, medication adherence and abstaining from smoking and alcohol consumption, all of which are key factors in slowing disease progression and enhancing the quality of life. For instance, a study examining factors influencing SM among non-dialysis CKD patients reported a high level of SMHB at 76.9 ± 13.3.[29]

Correlation coefficient analysis with SMHB among older adults with CKD in Chiang Rai Province showed that age was negatively related to SMHB, with statistical significance. This finding suggested that with advancing age, the ability to manage SMHB tends to decline, indicating a small negative correlation. This phenomenon is in line with a previous study that noted a decline in older adults' ability to manage their health behaviours as they age, influenced by various factors. As physical and cognitive capabilities diminish, older adults face greater challenges in adhering to treatment plans for chronic conditions such as hypertension, diabetes and CKD. Those who regularly practice and reinforce their SM abilities can better cope with physical and cognitive declines. Conversely, individuals lacking social support and training in self-care are more likely to experience increased difficulties in SM as they age.[30] Moreover, promoting health behaviours such as exercise and improved dietary habits play a crucial role in reducing health deterioration risks, which in turn help older adults maintain their SM abilities for longer periods.[31] Therefore, providing social support, encouraging continuous SM practices and promoting health education

and behavioural training are critical strategies for enhancing older adults' capacity to manage their health.

Body mass index (BMI) was positively related to self-management of health behaviors (SMHB), with statistical significance indicating that as BMI increases, the ability to manage SMHB also tends to improve, albeit with a small relationship. This finding aligns with previous studies that explore the relationship between BMI and SMHB in older adults, suggesting that these two factors are interconnected through diet, physical activity, and self-regulation skills. Research indicates that older adults who actively manage their dietary intake and engage in regular exercise tend to maintain or reduce their BMI, leading to better overall health outcomes and quality of life.[32] A study in adolescents showed that health-promoting behaviors, such as adherence to a balanced diet and consistent physical activity, play a role in sustaining functional capacity and controlling BMI in older adults, suggesting that self-management in these areas mitigates some negative health impacts associated with a high BMI. Additionally, predictors like self-efficacy in managing health practices, particularly regarding diet, contribute positively to maintaining a healthy BMI and overall wellness among older adults.[33] These findings suggest that tailored health strategies focusing on strengthening SMHB could be beneficial for older individuals with higher BMI, helping them manage weight effectively and promoting healthier aging.

Occupation was positively related to SMHB, with statistical significance, indicating that individuals with occupations tend to exhibit better SMHB, reflecting a moderate positive correlation. This finding aligns with previous research that explores how factors such as job autonomy and job crafting contribute to overall workplace

well-being, including health behaviors. Job autonomy, which allows employees to manage their tasks independently, is closely linked to self-efficacy and health behaviors, reinforcing the notion that occupational settings can directly influence personal health management.[34] Studies suggest that various dimensions of one's occupation— whether through autonomy, job crafting, or role engagement—significantly enhance one's ability to manage health behaviors effectively. Occupations associated with better health behaviors generally include those that are autonomous, flexible, and physically active. Conversely, jobs often linked to poorer health behaviors include high-stress jobs, prolonged sedentary positions, and jobs with irregular hours. Incorporating these insights can strengthen the discussion on how occupation contributes to SMHB.

Income was positively related to SMHB, with statistical significance, indicating that as income increases, the ability to manage SMHB tends to improve, although the relationship is relatively small. This finding is consistent with previous studies linking higher income to better self-rated health and improved SMHB. Individuals with higher incomes typically have greater access to healthcare resources, healthier lifestyles and better living conditions, all of which foster improved health behaviours. For instance, a systematic review of longitudinal studies found a statistically significant positive correlation between income and self-rated health, although the strength of the association may vary depending on the data collection method.[35] These studies support the idea that income positively influences SMHB, reinforcing the argument that economic stability plays a crucial role in maintaining and improving personal health.

Health literacy related to self-care practices (HLSCP) was negatively related to SMHB, with statistical significance,

indicating that higher levels of HLSCP are associated with lower SMHB, reflecting a small negative relationship. While high health literacy generally leads to healthier behaviors, older adults may struggle to utilize this knowledge effectively due to physical limitations, the complexity of chronic health conditions, and barriers to accessing proper support. This finding aligns with the Self-efficacy Theory, which helps explain this observation. The theory suggests that individuals who believe in their ability to manage their own health are more likely to exhibit healthy behaviors. However, older adults with CKD, even with high health literacy, might experience reduced confidence in managing their health due to complex health issues or physical limitations. This reduced self-efficacy could hinder their ability to apply health knowledge effectively, resulting in poorer SMHB.[36-37] Additionally, the theory of the Knowledge-Behavior Gap suggests that knowledge alone is not always sufficient to promote healthy behaviors, particularly among older adults who may lack the necessary skills or supportive environments. This gap between health knowledge and its practical application highlights the challenges older adults face in translating what they know into action.[38] However, when older adults possess high health literacy but still struggle with SMHB, it indicates that other factors may obstruct the application of this knowledge.

Self-condition management for health promotion (SCMHP) was positively related to SMHB, with statistical significance, indicating that better SCMHP improves SMHB, showing a strong positive correlation. This finding is consistent with previous studies demonstrating that SM programmes positively impact health behaviours such as physical activity and diet. These programmes empower patients to manage their health conditions more effectively and promote positive health behaviour changes, aligning well with the current findings.[39] This underscores the importance of effective SM in improving health behaviours and outcomes.

Participation in social health activities (PSHA) was positively related to SMHB, with statistical significance, indicating that greater PSHA is associated with better SMHB, reflecting a fairly strong positive relationship. This finding is consistent with previous studies indicating that engagement in social activities, such as community group events and support from social networks, can enhance individuals' ability to manage their health behaviours. Social involvement provides emotional support and knowledge sharing, leading to stress reduction and improved quality of life.[40] Social support alleviates self-regulatory fatigue and promotes better health behaviours, such as regular exercise and proper diet management.[41] These studies highlight the importance of social participation in enhancing SM abilities and promoting healthier behaviours.

Maintaining self-care for health (MSCH) was positively related to SMHB, with statistical significance. This finding indicated that better MSCH is associated with improved SMHB, reflecting a moderately strong positive relationship. Our results are consistent with previous studies demonstrating that self-care behaviours, such as regular exercise, a balanced diet and routine health monitoring, are essential for effective SMHB. These practices significantly enhance an individual's ability to manage chronic conditions like hypertension and diabetes.[42] Additionally, resilience and self-care behaviours have been shown to positively impact the quality of life in individuals with chronic conditions, such as breast cancer. Self-care behaviours were found to partially mediate the relationship between resilience and improved well-being.[43] These studies underscore the critical role of self-care in fostering better health outcomes through improved SMHB.

The current study utilised stepwise multiple regression analysis to examine the

predictors of SMHB among older adults with CKD in Chiang Rai Province. Following correlation analysis, five variables—SCMHP, MSCH, PSHA, HLSCP and occupation—demonstrated moderate correlations and were included in the regression model. Together, these variables significantly predicted SMHB, accounting for 61.4% of the variance (Adjusted R^2 = 0.614, p < 0.001). This result is consistent with findings from previous studies indicating that SM interventions focused on lifestyle modifications, such as diet and exercise, can significantly improve CKD management and reduce the risk of complications.[44] Effective self-management enhances quality of life and reduces CKD progression, with PCSM playing a crucial role in managing CKD. This approach empowers patients to make informed health decisions, ultimately preventing disease progression.[45] Together, these studies affirm the importance of effective SMHB, influenced by patient engagement and support through HL.

LIMITATIONS OF THE STUDY

The study's focus on a single location may not capture the diversity of the population in other areas, limiting its ability to reflect the broader population. Language and communication during the research interviews required the involvement of VHVs, necessitating training and instructions on the interview format prior to data collection.

CONCLUSION

This study identifies factors influencing self-management of health behaviors (SMHB) among older adults with chronic kidney disease (CKD) in Chiang Rai Province, Thailand. The proportion of SMHB among older adults with CKD in this region was found to be good. Multiple regression analysis revealed that self-condition management for health promotion (SCMHP), maintaining self-care for health (MSCH), participation in social health activities (PSHA), health literacy related to self-care practices (HLSCP), and occupation are significant predictors of SMHB, collectively explaining over half of the variance in SMHB levels. The study suggests that promoting sustainable SMHB among older adults with CKD should be prioritized in healthcare strategies for the precautionary prevention of the disease. Such strategies may include programs promoting exercise, good nutrition, meditation training, or yoga, which help enhance the balance between body and mind for older adults. Additionally, encouraging older adults to receive annual vaccinations for influenza and pneumonia can help prevent infections that could severely impact their health. Establishing community support groups for older adults can also provide opportunities for them to meet and engage in activities together, reducing loneliness and promoting mental health.

AUTHORS' CONTRIBUTIONS

MM, WD, NP and NP designed the study, analysed the data, served as the lead author and revised the manuscript. MM, WD, NP, and NP assisted in data analysis and primarily wrote the manuscript. MM, WD, TS, NP, NP, and PS designed and supervised the study, contributed to the local implementation of the study, assisted in the analysis and interpretation of the data and revised the manuscript. All authors read and approved of the final manuscript.

ETHICAL CONSIDERATION

The ethics of this study complied with the Declaration of Helsinki. Approval

and ethical clearance were obtained from the Phayao Human Ethics Committee at the University of Phayao, with the assigned Institutional Review Board (IRB) approval reference number HREC-UP-HSST 1.2/050/67, dated March 4, 2024.

CONFLICTS OF INTEREST

The authors declare no conflicts of interest.

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