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RESEARCH ARTICLE

Guidelines For Consumption Of Local Vegetables In The North For Health Promotion For Older Adults In Thailand

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ABSTRACT

This study employed a mixed methods approach to investigate dietary practices related to indigenous vegetables in Northern Thailand to ensure the nutritional adequacy of the older population in Mae Rim District, Chiang Mai Province. The study is divided into two phases. Phase 1 examines the consumption patterns of indigenous vegetables among older individuals, comprising a sample of 287 subjects. Phase 2 involved practical research activities to develop guidelines for consuming indigenous Northern Thai vegetables to promote the older population's health, utilizing a sample of 18 participants. Findings from the study revealed significant improvements in knowledge levels among participants regarding various aspects of indigenous vegetable consumption following training sessions, including knowledge about indigenous vegetable varieties, recipes, and harvesting techniques, all with a significance level of $p < .001$. After completing the research cycle, a set of dietary guidelines for older adults, known as the Northern Thai Indigenous Vegetable Handbook, was established to facilitate the selection of appropriate vegetables in suitable quantities to maintain optimal health while avoiding excessive nutrient intake. Data analysis concerning the suitability of the handbook indicated an overall high level of appropriateness among the users. User satisfaction with the handbook averaged a high level. Consequently, the Northern Thai Indigenous Vegetable Handbook is a valuable resource that enables older individuals to make informed choices regarding vegetable consumption, ensuring nutritional adequacy and proper dietary balance.

INTRODUCTION

Consuming vegetables among the older population plays a pivotal role in fortifying physical health and warding off detrimental diseases. As individuals age, their vegetable intake tends to decrease, with only 24.2% of those aged 60-69 years consuming an adequate amount (400 grams or five servings per day), as reported in the Thai National Health Examination Survey 2014. This percentage diminishes to 17.7% for those aged 70-79 and 11.4% for those aged 80 and above. Older adults often fall short of meeting their dietary requirements for essential nutrients, including energy, vitamins, and minerals, such as calcium, iron, vitamin A, vitamin B1, vitamin B2, and vitamin C. This nutritional inadequacy places older adults at risk of malnutrition and anemia, as stated by the Elderly Nutrition Promotion Group, Department of Health 2019.

Although vegetables offer substantial nutritional benefits and are considered vital for older adults, their consumption must be approached cautiously. Incorrect consumption patterns, particularly excessive intake of raw vegetables, may lead to adverse effects instead of reaping the intended

benefits. For instance, vegetables, such as cabbage, rich in vitamin C, may not provide the expected nutritional benefits when consumed raw. This was due to oxalates in cabbage, which were only eliminated when thoroughly cooked. Some vegetables may also contain toxins or high levels of certain minerals that can be harmful, especially in individuals with chronic illnesses. Thus, older individuals with chronic diseases should exercise caution when consuming specific vegetables to prevent potential harm (Health Promotion Office 2021).

In the Mae Rim district of Chiang Mai province, the utilization of indigenously grown vegetables as a primary ingredient in cooking is prevalent among the community. Some individuals cultivate specific varieties of indigenous vegetables in their household gardens, not only for personal consumption but also for supplementary income. Certain medium-sized shrubs are grown not only for dietary purposes but also to provide shade, making them an attractive choice for home gardens. The older population in this region needs guidance and support from relevant agencies to enhance the utilization of indigenously grown vegetables in their daily meals. Initiatives include community forest gardens and diversification of vegetable varieties to boost local income. Furthermore, knowledge-sharing efforts involve imparting traditional herbal wisdom to young individuals through school-based activities and establishing community spaces for intergenerational knowledge exchange, benefiting both older and interested community members (Jaitia, 2022; Rashid et al., 2023).

In conclusion, consuming indigenously grown vegetables is vital for the health of the older adults within communities. More older individuals are turning to locally sourced vegetables, particularly in their fresh form. Emphasizing the nutritional value and safe consumption of fresh vegetables is imperative. Therefore, it is essential to study the dietary behaviors of older adults and develop guidelines for appropriate vegetable consumption that aligns with their unique nutritional needs.

MATERIALS AND METHODS

Population and sample group

Phase 1 of the study examined the consumption of indigenously grown vegetables among older adults in Mae Rim district, Chiang Mai province. The study population included older adults who met the following inclusion criteria: 60 years and above of both genders, proficient in the Thai language for communication and understanding, willing to participate, and residing in the study area for at least six months before data collection. The sample size was calculated using Daniel's formula by Makham, J. (2021)., yielding a sample of 2,552 individuals. Subsequently, a random sample was drawn using stratified sampling, resulting in a final sample size of 287 individuals. Phase 2 involved practical operations to develop dietary guidelines for the consumption of indigenously grown Northern Thai vegetables to promote the health of older adults. The target groups were as follows: representatives of the older adults, caregivers of the older adults (2 individuals), volunteer community health workers (2 individuals), older adult representatives (10 individuals), community leaders (2 individuals), and academic representatives (2 individuals) with proficiency in reading and writing in the Thai language, ability to communicate and provide information, and willingness to participate in activities throughout the research.

Research tools

Quantitative research tools

Part 1 - Demographic characteristics of the older population

This section includes data on gender, age, educational level, marital status, occupation, average family

size, average income, duration of residence in the community, congenital disease, sources of indigenously grown vegetables, expenses on indigenously grown vegetables, places of vegetable procurement, and sources of knowledge regarding the utilization of indigenous grown vegetables.

Part 2 - Older adult knowledge regarding indigenous-grown vegetables

This section assesses knowledge of vegetable varieties, cooking recipes, harvesting techniques, and preservation methods of indigenously grown vegetables.

Qualitative research tools

Part 1 - *Participatory seminar record*

This part involves recording the proceedings and contributions during the participatory seminars.

Part 2 - Observation and recording of cooking processes

This includes observing and recording the steps and techniques of cooking indigenously grown vegetable dishes.

Ethical considerations

This study was certified and approved by the Research Ethics Committee of Mahasarakham University under reference number 291-231/2022, and ethical principles and standards were followed throughout the research process.

RESULTS

Quantitative data

The demographic characteristics of the older population in Mae Rim District, Chiang Mai Province, revealed that most of the older population is female, accounting for 61.67%. The average age was 71.28 years, with the majority (45.99 %) falling in the age range of 60-69 years. Most (56.79 %) had an educational level at the primary school level. Approximately 51.57% of participants were married. The most significant proportion of the older population is retirees or civil servants, accounting for 27.18%. The majority had 2-3 family members, accounting for 45.30%. Regarding income, most had a monthly income ranging from 1,000 to 5,000 baht, accounting for 62.37%. The majority (42.86 %) resided in the community for 60-69 years. The older had no chronic illnesses, accounting for 63.02% of the sample. Most obtain indigenously grown vegetables by cultivating them, accounting for 37.98%. The second most common source of indigenous-grown vegetables is the fresh market, accounting for 34.49%. Most spend between 1-100 Baht per week on purchasing indigenous-grown vegetables, accounting for 59.58%. The primary source of knowledge about using indigenously grown vegetables is the Internet, accounting for 35.54%, followed by community bulletin boards, accounting for 28.92%.

The results of the comprehensive knowledge assessment regarding indigenously grown vegetables among the older in Mae Rim District, Chiang Mai Province, indicate that most of them possess a low level of knowledge. Consequently, knowledge enhancement programs were conducted, and pre- and post-training knowledge assessments significantly increased understanding. Specifically, there was a statistically significant difference at the significance level of $p < 0.001$ ($t = -13.26$, $t = -5.54$, $t = -9.84$, and $t = -5.84$, respectively), as shown in Table 1.

Table 1. Comparative Analysis of the Average Indigenous Vegetable Knowledge Scores among the Older Population (n=287).

	Before		After		t-value	p-value
	$\overline{X}$	S.D.	$\overline{X}$	S.D.		
Knowledge About Indigenous Vegetables among the Older Population	44.25	6.48	56.94	2.74	-13.26	<0.001
Knowledge of the Varietal Diversity of Indigenous Vegetables	22.08	2.67	28.16	1.98	-5.54	<0.001
Knowledge of Culinary Preparation Methods for Indigenous Vegetables	11.12	10.34	24.48	3.96	-9.84	<0.001
Knowledge of Harvesting Practices of Indigenous Vegetables	18.04	4.64	24.12	2.67	-5.84	<0.001

Qualitative data

The study's findings on the dietary preferences for indigenous vegetables in Northern Thailand aimed at promoting older adults' health reflect the issues and potential areas for development derived from practical research processes. The results are summarized in Table 2.

Table 2. Summary of Issues in Exploring Guidelines for the Consumption of Indigenous Vegetables to Promote the Health of Older Adults through Participatory Processes.

Present Problematic Situation	**Desired Guidelines**
Older individuals lack awareness of the appropriate benefits and drawbacks relevant to their physical well-being.	A need for clearly defined dietary guidelines tailored to suit one's physical health when consuming indigenous vegetables.
Cooks or food preparers are unaware of cooking methods that preserve the nutritional content of indigenous vegetables.	Culinary guidelines or knowledge must be documented and passed down to households and subsequent generations.
Public health officials provide general training that lacks in-depth coverage of health-appropriate dietary practices.	A need for knowledge regarding indigenous vegetables that are regularly consumed, as there is an abundance of information available from various sources; however, there is currently a lack of knowledge dissemination about commonly consumed indigenous vegetables.
Unaware of the frequency at which each vegetable can be	It is desired that the development of guidelines be presented in tables or easily understandable recommendations rather

Present Problematic Situation	**Desired Guidelines**
consumed daily or how frequently it is permissible.	than complex manuals, focusing on appropriateness for older adults and local communities.

A handbook for northern indigenous vegetables was created based on the development of dietary guidelines for the consumption of indigenous vegetables in Northern Thailand to promote the health of older adults. The appropriateness of the Northern indigenous vegetable handbook was assessed through a survey involving 18 respondents, including 10 elderly individuals, five caregivers of older adults, and three experts. The findings revealed that the handbook was suitable regarding the content details of indigenous northern vegetables. The handbook provides appropriate guidance for its use. Furthermore, the developed handbook proved beneficial in promoting the health of older consumers of indigenous vegetables, and the content details of the handbook can serve as a suitable guideline for older individuals, as shown in Table 3.

Table 3. Analysis of Data Regarding the Suitability of the Northern Indigenous Vegetable Handbook (n=18).

Evaluation Checklist	$\overline{X}$	**S.D.**	**Level of Suitability**
The handbook provides appropriate instructions for its use.	4.60	0.50	Maximum
The handbook is suitable regarding the content details of Northern indigenous vegetables.	4.65	0.50	Maximum
The handbook developed proves beneficial for promoting the health of older consumers of indigenous vegetables.	4.55	0.51	Maximum
The content details of the handbook can be utilized as a suitable guideline for older individuals in making appropriate dietary choices.	4.55	0.51	Maximum
The arrangement of the headings is appropriate and comprehensive for practical utilization.	4.45	0.51	High
Mean	4.56	0.51	Maximum

The results of the user satisfaction assessment for the Northern indigenous vegetable handbook revealed that the mean scores for the questions related to the utility of the handbook were at a high level. Similarly, the average scores for the format and content of the handbook are also high, in that order, as shown in Table 4.

Table 4. User satisfaction assessment results for the northern indigenous vegetable handbook (n=18).

The Questions of Satisfaction Assessment Survey.	$\overline{X}$	**S.D.**	**Meaning**
The Handbook Content			
1. The manual has clear objectives.	4.34	0.46	High
2. The manual is easily comprehended, devoid of unnecessary complexity, and exhibits adaptability.	4.21	0.52	High

The Questions of Satisfaction Assessment Survey.	$\bar{X}$	**S.D.**	**Meaning**
3. The manual provides comprehensive content tailored to the users' needs.	4.24	0.45	High
4. The manual includes credible and reliable references.	4.32	0.48	High
Total	4.28	0.48	High
The Handbook Utility			
1. You can use this manual as a guideline for making appropriate vegetable consumption choices for your health.	4.46	0.52	High
2. Guide to mitigate excessive nutrient consumption from vegetable consumption.	4.31	0.46	High
3. Guide to fostering understanding of vegetable consumption for promoting the health of older adults.	4.45	0.50	High
4. Guide facilitating knowledge enhancement on northern indigenous vegetables.	4.48	0.52	High
Total	4.42	0.5	High
The Format of the Manual.			
1. User-friendly format.	4.31	0.48	High
2. Clear and easy-to-understand content organization.	4.25	0.45	High
Total	4.28	0.46	High
Mean	4.34	0.48	High

DISCUSSION

The study found that the level of knowledge regarding indigenous vegetables among older adults was generally low, which is consistent with the findings of Nusings and Thanapanyarachwang (2013). Their study investigated the knowledge of indigenous vegetable consumption among farmers in Phatthalung Province and found that farmers had limited knowledge about consuming indigenous vegetables. Most farmers use indigenous vegetables for fresh consumption or cooking, but they often lack an understanding of the nutritional value of these vegetables in terms of vitamins, minerals, and dietary fiber. Consequently, they may not be aware of the specific nutritional benefits of different types of indigenous vegetables. A study on dietary guidelines for the consumption of indigenous vegetables in the northern region to promote the health of older adults was conducted through collaborative learning between researchers and the community. Experts in cooking and nutritional analysis engaged in practical seminars to connect information for developing recipes for indigenous vegetables. This study aimed to understand the situation and create dietary guidelines for the consumption of indigenous vegetables in the northern region tailored to the nutritional needs of the older population.

This study identified four key issues that need to be addressed in the guidelines for the consumption of indigenous vegetables to promote the health of older adults. First, many older individuals rely on traditional knowledge passed down through generations, are accustomed to the taste of specific vegetables without understanding their nutritional value, and lack awareness among older adults about the benefits and potential drawbacks of consuming various indigenous vegetables. Secondly, there is a lack of information regarding how different vegetables could affect health and whether they contribute to specific health conditions, as well as limited knowledge about the nutritional content and potential health impacts of consuming specific indigenous vegetables. Older adults were unsure of the recommended quantities of vegetables to consume and how often they should include them in

their diet, with uncertainty about appropriate portion sizes and frequency of consumption. Thirdly, the study revealed that cooking methods in households are often based on tradition and personal preferences, without consideration of preserving the nutritional content of the vegetables and lack of awareness of proper cooking and preparation methods for indigenous vegetables. Finally, while there have been efforts to provide general nutrition education, there is a need for more targeted guidance on appropriate vegetable consumption given the diversity of indigenous vegetables available due to limited access to accurate health information and training for community health workers.

Based on these findings, this study aimed to bridge the knowledge gap and address these issues by developing practical dietary guidelines for older adults. These guidelines would provide information on the nutritional benefits and potential drawbacks of specific indigenous vegetables, recommend appropriate portion sizes and consumption frequency, and offer guidance on proper cooking and preparation methods. The ultimate goal was to empower the elderly population with knowledge about indigenous vegetables available in their community, enabling them to make informed choices to support their health. This study aligns with the approach advocated by previous studies, emphasizing the importance of local wisdom and community-specific knowledge in promoting a healthy lifestyle among older adults. The development of these dietary guidelines could contribute to the overall well-being of the older population in the northern region by leveraging the nutritional value of indigenous vegetables.

Through the development of dietary guidelines for the consumption of indigenous vegetables in the northern region to promote the health of older adults and the creation of a handbook on northern indigenous vegetables, it was found that the analysis of data regarding the appropriateness of the Northern indigenous vegetable handbook indicated the highest level of overall suitability.

Furthermore, the evaluation of user satisfaction with the Northern indigenous vegetable handbook revealed that the overall level of satisfaction was high. This aligns with the findings of a study conducted by Jaitia, S. (2022)., which stated that the effectiveness of a handbook was consistent with the criteria set for both learning outcomes and the content covered. In other words, learners who were instructed to use the handbook may have benefited from the advantages of various components included in the handbook.

CONCLUSION

Based on the findings of this study on dietary guidelines for the consumption of indigenous vegetables to promote the health of older adults and the development of the Northern Indigenous Vegetable Handbook, which serves as a guide for older adults to choose and consume vegetables that are suitable for their bodies while avoiding vegetables with excessive nutrients, several vital recommendations have emerged. First, there should be further research on locally specific indigenous vegetables to explore various aspects of their utilization, including cultural significance, consumption patterns, and household cultivation practices. This research contributes to a deeper understanding of how indigenous vegetables can be integrated into local diets and traditions. Secondly, efforts should be made to disseminate information about indigenous vegetables to the public, facilitating access to knowledge regarding their health benefits and usage. This could serve as an alternative approach to promoting health and well-being. Finally, the development of handbooks should consider adopting an infographic format to enhance accessibility and understanding, particularly for older adults. This format can significantly improve the effectiveness of educational materials, making them more user-friendly and understandable.

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Conflicts of interest

The author reported no potential for interest.

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