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INDIGENOUS VEGETABLE CONSUMPTION SITUATION AMONG OLDER ADULTS IN MAE RIM DISTRICT, CHIANG MAI PROVINCE, THAILAND

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ABSTRACT:

The objectives of this cross-sectional survey were to investigate the consumption of indigenous vegetables among older adults in Mae Rim district, Chiang Mai province, and to examine the nutritional value of these vegetables. A questionnaire was used to collect the data, and documentary research on nutritional values was conducted. The results revealed that the factors related to the practice of consuming vegetables by older adults, with statistical significance at the level of 0.05, were those related to the overall practices, which included knowledge about all indigenous vegetables and cooking methods, which were negatively related. When the aspects were considered, it was found that the factors related to conservation and transference of wisdom had three factors: knowledge about all indigenous vegetables, being negatively related, knowledge about the vegetables on cooking methods, being negatively related, and occupation. There were two factors related to cooking practices: age and number of family members. The factor associated with seeking knowledge about indigenous vegetables and cooking methods was negatively related. When the classification of the northern indigenous vegetables was conducted, it was found that there were 21 species divided into five groups: low energy, high vitamin A, having antioxidants (phenolic, flavonoid, and isoflavone compounds), high minerals, and high fibers/better excretory system. It is advisable that older adults consume appropriate amounts of vegetables suitable for their physical conditions and avoid those with nutrients more than what is needed.

Keywords: eating habits, indigenous vegetables, older adults, nutritional values

1. INTRODUCTION

Indigenous vegetables are generally local varieties cultivated in the region for a long time and adapted well to local conditions. The northern area of Thailand is fertile, surrounded by

mountains, forests, rivers, and creeks, with fertile soil and a cool climate. Agricultural produce, both cultivated and naturally grown like bamboo, mushrooms, and vegetables, is abundant. Residents in the north use naturally grown vegetables for food, medicine, and ceremonial purposes. A study on indigenous vegetables in Chiang Mai and Lampang provinces found over fifty varieties with different characteristics and blooming seasons throughout the year. Another study on fruits revealed over thirty edible fruits, some of which are consumed on special occasions or festivals (Khamluang, 2017).

A study on the diversity of indigenous vegetables in Phayao province identified 126 species in 48 families and 100 genera. The most exploited variety belonged to the bean family, with the young tops or leaves being the most used part for food. Boiling and making curries were the most popular cooking methods. These vegetables reflect local wisdom passed down through generations, guiding their selection, utilization, and cooking methods (Janwijit & Srimuang, 2022).

Research on indigenous vegetables in Mae Puem Forest highlighted the cultural significance of the relationship between humans and nature. It represents wisdom passed down through generations on sustainable forest exploitation and management, demonstrating love, commitment, and respect for nature (Mekong Community Institute, 2018).

Indigenous vegetables are rich in minerals and vitamins essential for normal bodily functions. They also provide fiber that helps absorb fat, reduce cholesterol levels, promote normal digestive function, prevent constipation, and reduce the risk of hemorrhoids and colon cancer. While these vegetables benefit adults and older adults, proper knowledge of their benefits, risks, and cooking methods is crucial to avoid potential harm. Some vegetables may have toxic properties, which can be minimized through correct cooking methods while preserving their nutritional value. Individuals with chronic conditions should be cautious about consuming certain vegetables high in specific minerals. Selective consumption of vegetables ensures safe and beneficial intake for people of all ages (Health Promotion Office, 2021).

The northern region boasts a variety of indigenous vegetables, some of which remain understudied for their health benefits and potential risks. Despite limited research, these vegetables have been traditionally consumed and passed down through generations, emphasizing the importance of preserving and utilizing local knowledge.

Mae Rim district, Chiang Mai province, is where indigenous vegetables are mainly used as raw materials. Residents grow in kitchen gardens for convenience. Surpluses can be sold to generate a higher household income. Some of the vegetables are medium-sized bushes. In addition to using them as food, they can provide cool shade in their gardens. The older adults have required promotion from concerned agencies about the development of using indigenous vegetables for cooking by cultivating them in their community forests. The produce can be processed diversely to generate community income. Furthermore, a space could be created to share experiences between older adults and the interested public (Jaitia et al., 2018).

Consumption of indigenous vegetables is essential and adversely affects the health of older adults in communities. Presently, older adults consume more indigenous vegetables, particularly raw vegetables. Therefore, focusing on these vegetables' nutritional value and safety is crucial. In the Saluang-Khilek communities in Mae Rim district, there are large swaths of forest and indigenous vegetable sources, which are grown and looked after by older adults in the communities. Consequently, there should be an investigation into consuming indigenous vegetables that are suitable for the health of older adults with different needs. The promotion should emphasize vegetable consumption with correct or appropriate cooking methods to avoid bodily harm and obtain sufficient nutritional values with the right amount so that older adults can look after their health and consume those vegetables appropriately. It is an alternative that should be developed explicitly for sustainable elderly care in an age of new and good health. Therefore, this present study aims to investigate the situations of indigenous vegetable

consumption among older adults in Mae Rim district, Chiang Mai province, and to examine the nutritional values of indigenous vegetables in the study area.

2. METHODS AND MATERIALS

This cross-sectional was designed to cover the eating habits of northern local food and the nutritional values of indigenous vegetables in Mae Rim district, Chiang Mai province. The total population was 2,492 older people, household caretakers, public health volunteers, care volunteers, and community leaders in 16 villages in the Saluang-Khilek area. A stratified random sampling method was applied to select the sample group from seven villages. For sample group selection, stratified draw lots were used to select 287 samples aged 60 years and over. The investigation was conducted for 12 months, from April 2022 to March 2023.

Statistical analysis

Data on the personal information of the sample group, their knowledge about and practices of indigenous vegetable consumption, and their health information were statistically analyzed for frequency, percentage, mean, and standard deviation. For the data on the relationship of factors affecting indigenous vegetable consumption habits, Spearman's rank correlation was used for the ordinal scale variables, and the Chi-square was used for categorical data variables.

3. RESULTS

Results of investigating the indigenous vegetable consumption situations among the older adults in the study area revealed that the factors related to consumption, overall and by aspect, are illustrated in the following tables.

Table 1 Factors related to the consumption of indigenous vegetables by totality using Spearman's rank correlation

Basic factor data	Spearman's Rho	P Value
Age	-0.09	0.12
Number of family members (person)	0.01	0.82
Average monthly income (baht)	0.06	0.32
Duration of residence in community (year)	-0.03	0.62
Expenses for purchasing indigenous vegetables	0.05	0.43
Knowledge about all indigenous vegetables	-0.12	0.02*
Knowledge about indigenous vegetables by species	-0.08	0.17
Knowledge about indigenous vegetables by cooking methods	-0.16	0.01*
Knowledge about indigenous vegetables by their harvest	-0.11	0.07

*Statistical significance at the 0.05 level

Table 2 Factors related to the consumption of indigenous vegetables by totality using Chi-square

Factors	Practice levels		x^2	df	p-value
	Low	High			
	Number (Percentage)	Number (Percentage)			
Gender					
Male	60	50	0.02	1	0.89

Factors	Practice levels		χ^2	df	p-value
	Low	High			
	Number (Percentage)	Number (Percentage)			
	(54.50)	(45.50)			
Female	98 (55.40)	79 (44.60)			
Education levels					
Primary and secondary education	149 (55.60)	119 (44.40)	0.49	1	0.49
Diploma and undergraduate	9 (47.40)	10 (52.600)			
Marital status					
Single, widowed, and divorced	75 (54.00)	64 (46.00)	0.13	1	0.72
Married	83 (56.10)	65 (390)			
Occupations					
Unemployed and housework	68 (65.40)	36 (34.60)	7.04	1	0.001*
Pensioners, farmers, and self-employed	90 (49.20)	93 (50.80)			
Personal ailments					
No	52 (49.50)	53 (50.50)	2.05	1	0.15
Yes	106 (58.20)	76 (41.80)			
Derivation of indigenous vegetables					
Cultivation and in-community	99 (52.70)	89 (47.30)	1.26	1	0.26
In the market or supermarket	59 (59.60)	40 (40.40)			
Learning sources on the utilization of indigenous vegetables					
The internet, village broadcasting tower, and newspapers	103 (55.70)	82 (44.30)	0.08	1	0.78
Village public health volunteers and public health officers	55 (53.90)	47 (46.10)			

*Statistical significance at the 0.05 level

Table 3 Factors related to the consumption of indigenous vegetables by seeking using Spearman's rank correlation

Basic factor data	Spearman's Rho	P Value
Age	-0.01	0.92
Number of family members (person)	-0.04	0.53
Average monthly income (baht)	0.06	0.32
Duration of residence in community (year)	0.02	0.74

Expenses for purchasing indigenous vegetables	0.08	0.16
Knowledge about all indigenous vegetables	-0.11	0.08
Knowledge about Indigenous vegetables by species	-0.10	0.10
Knowledge about indigenous vegetables by cooking methods	-0.18	0.003*
Knowledge about indigenous vegetables by their harvest	-0.04	0.53

* Statistical significance at the 0.05 level

Table 4 Factors related to the consumption of indigenous vegetables by seeking using Chi-square

Factors	Practice levels		χ^2	df	p-value
	Low	High			
	Number (Percentage)	Number (Percentage)			
Gender					
Male	60 (54.5)	50 (45.50)	0.02	1	0.89
Female	98 (55.40)	79 (44.60)			
Education levels					
Primary and secondary education	148 (55.20)	120 (44.80)	0.05	1	0.83
Diploma and undergraduate	10 (52.60)	9 (47.70)			
Marital status					
Single, widowed, and divorced	79 (56.80)	60 (43.20)	0.35	1	0.56
Married	79 (53.40)	69 (46.60)			
Occupations					
Unemployed and housework	65 (62.50)	39 (37.50)	3.66	1	0.06
Pensioners, farmers, and self-employed	93 (50.80)	90 (49.20)			
Personal ailments					
No	55 (52.40)	50 (47.60)	0.48	1	0.49
Yes	103 (56.60)	79 (43.40)			

*Statistical significance at the 0.05 level

Table 5 Factors related to the consumption of indigenous vegetables by cooking methods using Spearman's rank correlation

Basic factor data	Spearman's Rho	P Value
Age	-0.13	0.02*
Number of family members (person)	0.13	0.03*

Derivation of indigenous vegetables					
Cultivation and in-community	104 (55.30)	84 (44.70)	0.02	1	0.90
In the market or supermarket	54 (54.50)	45 (45.50)			
Learning sources on the utilization of indigenous vegetables					
The internet, village broadcasting tower, and newspapers	99 (53.50)	86 (46.50)	0.5	1	0.48
Village public health volunteers and public health officers	59 (57.80)	43 (42.20)			
Basic factor data		Spearman's Rho		P Value	
Average monthly income (baht)		-0.002		0.98	
Duration of residence in community (year)		-0.11		0.06	
Expenses for purchasing indigenous vegetables		-0.04		0.51	
Knowledge about all indigenous vegetables		-0.04		0.55	
Knowledge about indigenous vegetables by species		0.06		0.29	
Knowledge about indigenous vegetables by cooking methods		-0.05		0.37	
Knowledge about indigenous vegetables by their harvest		-0.03		0.67	

*Statistical significance at the 0.05 level

Table 6 Factors related to the consumption of indigenous vegetables by cooking methods using Chi-square

Factors	Practice levels		χ^2	df	p-value
	Low	High			
	Number (Percentage)	Number (Percentage)			
Gender					
Male	57 (51.80)	53 (48.20)	1.55	1	0.21
Female	105 (59.30)	72 (40.70)			
Education levels					
Primary and secondary education	153 (57.10)	115 (42.90)	0.68	1	0.41
Diploma and undergraduate	9 (47.40)	10 (52.60)			
Marital status					
Single, widowed, and divorced	82 (59.00)	57 (41.00)	0.71	1	0.40
Married	80 (54.10)	68 (45.90)			
Occupations					
Unemployed and housework	60 (57.70)	44 (42.30)	0.10	1	0.75

Factors	Practice levels		x^2	df	p-value
	Low	High			
	Number (Percentage)	Number (Percentage)			
Pensioners, farmers, and self-employed	102 (55.70)	81 (44.30)			
Personal ailments					
No	54 (51.40)	51 (48.60)	1.70	1	0.19
Yes	108 (59.30)	74 (40.70)			
Derivation of indigenous vegetables					
Cultivation and in-community	106 (56.40)	82 (43.60)	0.001	1	0.98
In the market or supermarket	56 (56.60)	43 (43.40)			
Learning sources about the utilization of Indigenous vegetables					
The internet, village broadcasting tower, and newspapers	110(59.50)	75(40.50)	1.92	1	0.17
Village public health volunteers and public health officers	52(51.00)	50(49.00)			

*Statistical significance at the 0.05 level

Table 7 Factors related to the consumption of indigenous vegetables by conservation using Spearman's rank correlation

Basic factor data	Spearman's Rho	p-value
Age	-0.11	0.08
Number of family members (person)	-0.03	0.57
Average monthly income (baht)	0.11	0.06
Duration of residence in community (year)	-0.02	0.61
Expenses for purchasing indigenous vegetables	0.08	0.16
Knowledge about all indigenous vegetables	-0.18	0.002*
Knowledge about indigenous vegetables by species	-0.10	0.10
Knowledge about indigenous vegetables by cooking methods	-0.03	≤0.001*
Knowledge about indigenous vegetables by their harvest	-0.11	0.05

* Statistical significance at the 0.05 level

Table 8 Factors related to the consumption of indigenous vegetables by conservation using Chi-square

Factors	Practice levels		x^2	df	p-value
	Low	High			
	Number (Percentage)	Number (Percentage)			
Gender					
Male	56	54	0.32	1	0.57

Factors	Practice levels		x^2	df	p-value
	Low	High			
	Number (Percentage)	Number (Percentage)			
	(50.90)	(49.10)			
Female	84 (47.50)	93 (52.50)			
Education levels					
Primary and secondary education	132 (49.30)	136 (50.70)	0.36	1	0.55
Diploma and undergraduate	8 (42.10)	11 (57.90)			
Marital status					
Single, widowed, and divorced	70 (50.40)	69 (49.60)	0.27	1	0.60
Married	70 (47.30)	78 (52.70)			
Occupations					
Unemployed and housework	67 (64.40)	37 (35.60)	15.97	1	<0.001*
Pensioners, farmers, and self-employed	73 (39.90)	110 (60.10)			
Personal ailments					
No	45 (42.90)	60 (57.10)	2.33	1	0.13
Yes	95 (52.20)	87 (47.80)			
Derivation of indigenous vegetables					
Cultivation and in-community	106 (56.40)	82 (43.60)	0.001	1	0.98
In the market or supermarket	56 (56.60)	43 (43.40)			
Learning sources on the utilization of indigenous vegetables					
The internet, village broadcasting tower, and newspapers	110(59.50)	75(40.50)	1.92	1	0.17
Village public health volunteers and public health officers	52(51.00)	50(49.00)			

*Statistical significance at the 0.05 level

Study results on nutritional values of indigenous vegetables in the North

The results from the documentary research and interviews with older adults about indigenous vegetables in the study area revealed the following basic data about the consumption of vegetables for the health promotion of older adults.

Table 9 Indigenous vegetable data

No.	Scientific name	Family	Thai name	Local name	References
1	<i>Caesalpinia mimosoides</i> Lamk.	FABACEAE	Phak Puya	Phak Puya, Nam Puya, Tha Nao Song	(Chaichana, 2020)
2	<i>Paederia pilifera</i> Hook. f.	Rubiaceae	Kraphan g Hom	Ya Tot Ma, YanPhaHom	(Khropratya, 2017)
3	<i>Schleichera oleosa</i> (Lour.) Merr.	SAPINDACEAE	Ta Khro	Ma Chok	(Thailand Institute of Scientific & Technological Research, n.d.)
4	<i>Selaginella argentea</i> (Wall ex. Hook & Grew) Spring	SELAGINELLACEAE	Phokha Ti Mia	Phak Po Ka Ti Mia, Phak Kap Kae	(Boonjung, 2020)
5	<i>Amorphophallus brevispathus</i> Gagnep. <i>brevispathus</i> Gagnep.	ARACEAE	I Rok	Dok Kan	(Highland Research & Development Institute, n.d.)
6	<i>Antidesma ghaesembilla</i> Gaertn	Euphorbiaceae	Ma Mao	Ba Mao, Mak Mao	(Buseng, 2007)
7	<i>Millettia brandisiana</i> Kurz	FABACEAE	Kraphi Chan	Pi Chan	(Pancharoen <i>et al.</i> , 2008)
8	<i>Irvingia malayana</i> Oliv. ex. A. W. Benn.	Irvingiaceae	Kra Bok	Mamuen, Muen	(Laohawinit, 1989)
9	<i>Garcinia cowa</i> Roxb. ex Choisy	Clusiaceae	Cha Muang	Som Plong	(Bureau of Nutrition, Department of Health, 1992)
10	<i>Amorphophallus paeoniifolius</i> (Dennst.) Nicolson.	Araceae	Buk	Buk	(Plant Protection Bureau, Department of Agriculture, 2019)
11	<i>Phoenix loureiroi</i> Kunth	ARECACEAE (PALMAE)	Mak Peng	Mak Peng, Pum Peng, Tum Peng	(Jeevani <i>et al.</i> , 2023)
12	<i>Cheilocostus speciosus</i> (J.Koenig) C.D.Specht	COSTACEAE	Ueang May na	Ueang Din	(Khupithayana n, 2011)

No.	Scientific name	Family	Thai name	Local name	References
13	<i>Tiliacora triandra</i> (Colebr.) Diels	MENISPERMACEAE	Yanang	Bai Yanang, Choi Nang	(Boonthim, 2023)
14	<i>Parabaena sagittata</i> Miers ex Hook. F. & Thomson	MENISPERMACEAE	Kracho m	Phak Nang	(Borikhut, 2019)
15	<i>Terminalia chebula</i> Retz.	COMBRETACEAE	Samo Thai	Ma Na, Ma Nae	(Soralum, 2010)
16	<i>Melientha suavis</i> Pierre	OPILIACEAE	PhakWan Pa	PhakWan Pa	(Department of Agricultural Extension, n.d.)
17	<i>Bambusa spp.</i>	Poaceae	Nomai	Nomai	(Ariyaphuthar at, 2021)
18	<i>Piper interruptum</i> Opiz	Piperaceae	Sa Khan	Cha Khan	(Ruangrangsi, 2013)
19	<i>Curcuma sessilis</i> Gage.	Zingiberaceae	Kra Chiao Daeng	Dok Ao, Ao Khao	(Thai Traditional Medical Council, 2016)
20	<i>Cratoxylum formosum</i> (Jack) Dyer	HYPERICACEAE	Tio Khao	Phak Tio	(Bureau of Nutrition, Department of Health, 2020)
21	<i>Acacia concinna</i> (Willd.) DC.	Leguminosae-Mimosoideae	Sompoi	Sompoi	(Department of Agriculture, n.d.)

Table 10 Classification of the 21 northern indigenous vegetables

Low-calorie group	High Vitamin A group	Antioxidant group (Phenolic, flavonoid, and isoflavone compounds)	High mineral group	High fiber group/better excretory system
- <i>Amorphophallus paeoniifolius</i> (Dennst.) Nicolson.	- <i>Garcinia cowa</i> Roxb. ex Choisy	- <i>Selaginella argentea</i> (Wall ex. Hook & Grew) Spring	- <i>Schleichera oleosa</i> (Lour.) Merr.*	- <i>Caesalpinia mimosoides</i> Lamk.
- <i>Bambusa spp.</i>	- <i>Tiliacora triandra</i> (Colebr.) Diels	- <i>Millettia brandisiana</i> Kurz	- <i>Antidesma ghaesembilla</i> Gaertn *	- <i>Paederia pilifera</i> Hook. f. <i>Paederia pilifera</i> Hook. f.
- <i>Curcuma sessilis</i> Gage.	- <i>Terminalia</i>	- <i>Phoenix loureiroi</i> Kunth	- <i>Iringia malayana</i>	- <i>Amorphophallus brevispathus</i>

	<i>chebula</i> Retz.		Oliv. ex. A. W. Benn.**	<i>Gagnep.brevispathus</i> <i>Gagnep.</i>
	- <i>Melientha</i> <i>suavis</i> Pierre	- <i>Parabaena</i> <i>sagittata</i> Miers ex Hook. F. & Thomson	- <i>Cheilocostus</i> <i>speciosus</i> (J.Koenig) C.D.Specht *	
	- <i>Cratoxylum</i> <i>formosum</i> (Jack) Dyer	- <i>Piper</i> <i>interruptum</i> Opiz		
	- <i>Acacia</i> <i>concinna</i> (Willd.) DC.			

Remarks: *Calcium, ** Iron

4. CONCLUSION

For the consumption of indigenous vegetables among older adults, it was revealed that the vegetables were eaten raw the most. This is because their knowledge about the vegetables was relatively low. Moreover, this eating habit has been passed down from generation to generation, making their consumption regardless of their age, which must be taken care of in terms of nutrition. They should regularly consume various types of vegetables. Vegetables should be steamed or fully cooked because raw vegetables are difficult to digest, which can lead to bloating. Fruits should be eaten daily to obtain vitamin C and fiber and be soft and easy to chew. It was found from the investigation that *Melientha suavis Pierre*, locally called Phak Wan Pa, was the most consumed. This is because vegetables are available only in summer. It tastes sweet and delicious and can be cooked in many different ways. However, it is difficult to obtain; it is worth having it. More importantly, it is beneficial for the excretory system without constipation.

The consumption of indigenous vegetables is mainly seasonal, and vegetables are readily available in homes or community forests. Furthermore, they are pesticide-free and contain nutrients beneficial for the body's normal functioning. They are not administered growth hormones and are chemically free. They are fresher, cheaper, more readily available, crispier, and naturally more tastier. This is consistent with Khamluang and Samphaothong (2018), who revealed that eating seasonal vegetables is safe without contamination. They are flavorful and can prevent seasonal ailments.

A study on the factors related to older adults' consumption of indigenous vegetables with statistical significance at the 0.05 level revealed that knowledge about indigenous vegetables and their cooking methods was negatively related. When these aspects were considered, it was found that the factors related to the conservation practices and transference of wisdom, such as knowledge about all indigenous vegetables, were negatively related. Knowledge of cooking methods for vegetables is also negatively related. The factors related to cooking practices were age, which was negatively related, and the number of family members, which was positively related. The factor related to the practice of seeking, which was knowledge of cooking methods for vegetables, was negatively related. Social and environmental development may have improved. This has helped equip older adults to become knowledgeable about eating a greater

variety of food. However, there are no specific guidelines or knowledge aspects. This is in line with Mekwimon (2022), revealing that knowledge about eating is a factor related to the eating habits of older adults in Samut Songkhram Province. Green (1980) stated that knowledge about specific behaviors and practices must be based on satisfaction or knowledge from long experiences, which are basic human factors. These factors can both positively and negatively affect their practices. For older adults, age is negatively related to eating habits in indigenous vegetables. This may be because increasing age brings about more problems, especially health problems. Thus, most still depend mainly on foods provided by family members rather than themselves selecting, seeking, or cooking. Most of the food was not local, with raw materials available in the market that were convenient to cook. Some families prefer ready-cooked food. This is consistent with Suksithong (2017), who revealed that age is a factor for health problems in older adults. Therefore, their children would seek modern medical treatment. The number of family members was positively related to the consumption of indigenous vegetables and cooking methods. This might be because older adults intended to pass on conventional cooking methods to other family members. Thus, they were given an opportunity to use indigenous vegetables as the main raw materials with changes in some cooking or seasoning steps initiated by other family members, resulting in the use of various indigenous vegetables. This is consistent with Katudom (2018), who revealed that family played an essential role in caring for and responding to changes and needs of older adults, particularly in the need for food, so that older adults could lead a good and balanced life.

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Ethical considerations

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

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Conflicts of interest

There are no conflicts of interest.