

# Low-Salt Dietary Practices of Hypertensive Older People in Southeast Asia: A Scoping Review

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## ABSTRACT

**Background:** In Southeast Asia (SEA), the incidence of hypertension is the third highest in the world, including among older people. The Joint National Committee VIII (JNC VIII) recommends managing hypertension through lifestyle modifications, including adopting a low-salt diet.

**Objective:** This scoping review summarized information on low-salt diet practices in SEA.

**Methods:** This scoping review followed the scoping review methodological framework, comprising five steps. A focused search of relevant literature was conducted across several databases, including English- and Indonesian-language publications, from 2013 to 2023.

**Results:** A total of 31 studies were reviewed. Most of the studies in this research, specifically 17, found that the low-salt diet practice involved reducing or regulating the amount of salt used in cooking. Challenges and opportunities related to low-salt dietary practices were identified and categorized into four factors: individual, environmental, social, and spiritual.

**Conclusion:** Hypertensive older people in SEA still demonstrate poor adherence to a low-salt diet. More research is needed to determine effective interventions that can improve compliance with a low-salt diet among hypertensive older adults in SEA. Such interventions should take cultural aspects into account and involve families in implementing the practice.

**Keywords:** *Low-salt diet, older people, hypertension, Southeast Asia, scoping review.*

## INTRODUCTION

Hypertension is a medical condition where a person's systolic blood pressure is  $\geq 140$  mmHg and diastolic blood pressure is  $\geq 90$  mmHg [1]. The prevalence of hypertension remains relatively high globally, and the incidence rate increases with age. [2]. Two of the most common complications of hypertension are coronary heart disease (CHD), renal failure, and stroke, which cause approximately 51 percent and 62 percent of global deaths, respectively [3, 4]. In Southeast Asia (SEA), the incidence of hypertension is the third highest in the world at 25 percent [5]. This highlights the need for appropriate management of hypertension, especially in older individuals, both globally and in SEA.

The Joint National Committee VIII (JNC VIII) recommends managing hypertension by making lifestyle modifications, including adopting a low-salt diet [6, 7]. The incidence of hypertension and its complications is closely related to poor dietary habits, particularly the excessive consumption of salt [8, 9]. This can lead to increased blood pressure, resulting in hypertension, and can increase complications and mortality rates [10, 11]. Furthermore, high salt intake can diminish

the effectiveness of antihypertensive drugs [12]. This highlights the importance of reducing salt intake among older persons with hypertension.

According to the WHO, adults should consume less than 5 grams (2 grams of sodium) daily [13]. However, a 2017 study [9] found that the global average intake was about 15.24 g (6 g of sodium) per day. Salt intake was even higher in Asian countries, particularly in SEA, where it ranged from 3.17 grams to 10.80 grams per day [14]. Previous reviews suggest that the SEA countries still rely heavily on consuming salty, oily, and coconut milk-based foods [15]. Additionally, older individuals tend to consume more salt due to a decline in their ability to taste and smell, leading them to prefer saltier foods [16]. Therefore, it can be concluded that the aging population in SEA and cultural factors hinder the adoption of low-salt dietary practices, leading to high salt consumption in the region.

It is essential to obtain scientific evidence on the effectiveness of low-salt diets in lowering blood pressure [7]. Previous reviews have primarily focused on hypertension management in general, with some scoping reviews addressing self-care management in hypertensive patients in SEA [15, 17]. There have been some systematic reviews on low-salt diets, but these have only focused on patients with heart failure [18]. Additionally, there have been systematic reviews of low-salt diets in rural areas [19] and a scoping review

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summarizing sodium-reduction strategies in the diet [20]. However, there is a lack of studies examining how hypertensive older adults in SEA implement low-salt dietary practices. To develop effective intervention strategies, it is crucial to have an in-depth understanding of low-salt dietary practices among hypertensive older adults in SEA.

### METHODS

This scoping review aimed to summarize information from previous studies, provide an overview of low-salt dietary practices, and identify the challenges and opportunities of low-salt diets among hypertensive older adults to improve these practices in the future. The review followed the methodological framework proposed by Arksey and O'Malley [21]. It was designed using the Preferred Reporting Items for Systematic Reviews and Meta-Analyses Extension for Scoping Reviews (PRISMA-ScR) [22]. It has been registered with the Open Science Framework ([https://osf.io/x8kur\\_v1](https://osf.io/x8kur_v1)).

The research questions in this scoping review are: How do older adults with hypertension in SEA practice low-salt dietary habits? SEA countries include Brunei, Malaysia, Indonesia, Thailand, Singapore, the Philippines, Vietnam, Laos, Cambodia, Myanmar, and East Timor (Timor Leste).

#### Search Strategy

This review aimed to investigate low-salt diets among hypertensive older adults in SEA. This study examined how older adults in the region practice low-salt dietary

habits and identified the challenges and opportunities of low-salt diets among this population. To gather relevant documents, a search was conducted on several databases, including PubMed, ScienceDirect, Cochrane, EBSCO, Wiley, Global Index Medicus, Garuda, and Google Scholar. The keywords used in this study are listed in Table 1.

In addition, we conducted a Google Scholar search to identify additional references relevant to this review that may have been overlooked in the previous database search. Initially, we retrieved titles, abstracts, and content to determine terms and other keywords, including alternative contextually and culturally appropriate options.

#### Inclusion and Exclusion Criteria

The inclusion and exclusion criteria for this review were based on the Population of Context Concepts (PCC) model as seen in Table 2 [23]. The population in this review is older people diagnosed with hypertension according to the age limit specified in the country where the study was conducted. The concept is low-salt diet practices, and the study was conducted in Southeast Asia countries.

For this review, we included qualitative and quantitative studies conducted in the SEA region, studies conducted elsewhere, studies that addressed complications of other diseases, studies that included children and young adults, studies that included pregnant women, and literature reviews. The search for articles was limited

**Table 1:** The keywords used in this search.

No.	Database	Keywords	Date of Access
1.	PubMed	((((((low salt diets[Title/Abstract]) AND (elderly[MeSH Terms])) OR (older people[Title/Abstract]) OR (older person[Title/Abstract])) AND (high blood pressure[MeSH Terms])) OR (hypertension[Title/Abstract])) AND (((((((((((asia,southeastern[MeSH Terms]) OR (southeast asia[MeSH Terms])) OR (southeastern asia[MeSH Terms])) OR (brunei[MeSH Terms])) OR (malaysia[MeSH Terms])) OR (indonesia[MeSH Terms])) OR (thailand[MeSH Terms])) OR (singapore[MeSH Terms])) OR (philippines[MeSH Terms])) OR (Vietnam[Title/Abstract])) OR (laos[MeSH Terms])) OR (cambodia[MeSH Terms])) OR (myanmar[MeSH Terms])) OR (east timor[MeSH Terms]))	September 4, 2023
2.	Science Direct	low salt diet practice OR salt reduction strategy AND elderly OR older person OR older people AND hypertension OR high blood pressure AND southeast Asia	September 4, 2023
3.	Cochrane	Low salt diet practices OR Strategies for implementing low salt diet AND older people AND hypertension AND Southeast Asia	September 4, 2023
4.	EBSCO	(low salt diet practice and hypertension) AND (elderly or aged or older or elder or geriatric) AND southeast asia OR (indonesia or indonesian) OR vietnam	August 5, 2023
5.	Wiley	low salt diet OR salt reduced practices AND elderly OR older people AND hypertension OR high blood pressure AND South East Asia OR Indonesia OR philippines OR Laos OR Vietnam OR Cambodia OR Brunei OR Singapore OR Malaysia	September 6, 2023
6.	Global Index Medicus	(tw:(low salt diet)) OR (tw:(reduced sodium)) AND (tw:(hypertension)) OR (tw:(high blood pressure)) AND (tw:(elderly)) OR (tw:(older people))	September 6, 2023
7.	Garuda	Low Salt Diet AND elderly hypertension	September 4, 2023
8.	Google Scholar	Low salt dietary practices of hypertensive elderly in Southeast Asia	September 6, 2023

**Table 2:** List of population concept context (PCC) model.

Criteria	Description of PCC Model Component
Population	Older people diagnosed with hypertension according to the age limit specified in the country where the study was conducted.
Concept	Low-salt diet practices
Context	The study was conducted in Southeast Asian countries: Indonesia, Malaysia, Philippines, Singapore, Thailand, Brunei, Vietnam, Laos, Cambodia, Myanmar, Timor Leste [1].

to full articles published in English and Indonesian between 2013 and 2023, as hypertension incidence has increased over the last 10 years.

**Data Extraction and Analysis**

All results from the articles were entered into Mendeley, the reference manager used during the preparation of this research. Afterwards, a duplicate check was performed on the application to ensure the same article was not used. The search results were exported to the Rayyan software program, and a duplicate check was conducted again. To ensure the validity of the articles, they were re-screened using the predetermined exclusion and inclusion criteria. For sampling the title, abstract, and full text, 25 articles were randomly selected (AMI and IAP) using the JBI Manual method [23]. During the sampling stage, 8 percent of the articles were in disagreement, and a reviewer discussion was held to achieve 100 percent agreement.

We extracted data about the characteristics of the journal articles relevant to our research topic. Specifically, we identified the year and country where the research was conducted, the study’s purpose, the population studied, and whether the study examined a connection to the practice of a low-salt diet in hypertensive older individuals. Additionally, we looked at the challenges and opportunities associated with low-salt diet practices. Our goal was to simplify the process of extracting necessary data for our research preparation.

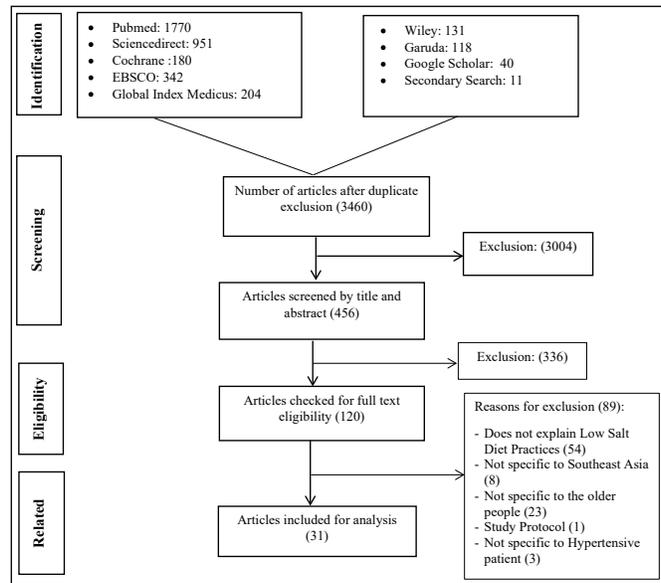
To identify relevant results, the literature was scanned for specific keywords. For this review, all articles were thoroughly analyzed based on their titles, abstracts, and full texts and checked for discrepancies and duplication. The analyzed articles contained information on low-salt dietary practices among older adults with hypertension in SEA.

**RESULTS**

To briefly explain the research process, we started by filtering through titles that matched the research question.

**Table 3:** Low-salt diet practices in hypertensive older people (Quantitative Study).

No	Author, Year, Country	Objective	Sample (n, Age Range) and Setting	Findings	Low-Salt Diet Practices
1	Mizutani <i>et al.</i> [24] (2023) Indonesia	To describe self-reported salt reduction practices among middle-aged Muslims	N= 447 Age: ≥60 years Rural	- Participants who reduced salt intake were 45% and those who never tried to reduce salt intake were 12.8%.	- Reduce consumption of salty foods - Reduce the amount of salt when cooking
2	Rusmevichientong <i>et al.</i> [25] (2021) Thailand	To explore hypertension-related food choices in hypertensive and normotensive patients	N=403 Age ≥ 60 years Rural	- Food choices based on the amount of salt in the diet for the Hypertension group 54.52% and Normotension group 50.55% - Food choice based on taste. Hypertension group 1.21% and Normotension group 1.53% - Food choices based on food model. Hypertension group 43.09% and Normotension group 47.14%	- Cooking own food at home and controlling the amount of salt used when cooking



**Fig. (1):** PRISMA flowchart.

This resulted in 3460 articles for further screening. We further filtered the articles, resulting in 456 screened by title and abstract. Out of these, 120 articles were eligible for full-text screening. We excluded articles that did not fit the criteria for hypertension, were not related to low-salt diet practices, were not conducted within the SEA region, or were literature reviews. Our selection process resulted in the final inclusion of 31 articles for analysis. The entire search process, article filtering results, and script extraction criteria after the initial search are shown in Fig. (1).

**Descriptive and Methodological Characteristics**

We examined 31 studies from 8 countries, including 11 conducted in Thailand, 10 in Indonesia, 4 in Malaysia, 2 in Myanmar, and 1 each in Cambodia, Singapore, Vietnam, and Timor Leste. However, no relevant articles were found for the Philippines, Laos, and Brunei. Table 3 illustrates 23 studies on low-salt diet practices using quantitative methods, comprising 12 observational

No	Author, Year, Country	Objective	Sample (n, Age Range) and Setting	Findings	Low-Salt Diet Practices
3	Taufandas & Hermawati [26] (2021) Indonesia	To see the relationship between family support and hypertension diet compliance in older people	N= 35 Age: 60-70 years old Rural	- Older people who were not compliant with the hypertension diet were 25.7%, those who were moderately compliant were 34.3%, and those who were not compliant were 40%	- Avoid consumption of foods that are high in salt
4	Maghfiroh [27] (2018) Indonesia	To determine the relationship between family support and a low-salt diet for older people with hypertension	N= 30 Age: ≥60 years Rural	- Low-salt diet poor 73.3%, low-salt diet good 26.7%	- Regulate the use of salt by a quarter to half a teaspoon when cooking - Not adding salt with meals - Avoiding foods high in salt
5	Puspita [28] (2022) Indonesia	To analyze the relationship between family support and hypertension diet compliance in older people	N= 54 Age: ≥60 years Urban	- Older people who adhered to a low-salt diet were 68.5% and those who did not adhere to a low-salt diet were 31.5%	- Avoiding consumption of foods that are high in salt
6	Anonyma [29] (2022) Indonesia	To determine the relationship between hypertension diet compliance and older people gymnastics with blood pressure reduction in hypertensive older people	N= 52 Age: 55-70 years old Rural	- Older people with hypertension who adhered to the diet were 44% and those who did not adhere to the diet were 56%	- Limiting consumption of salty foods
7	Alvita [30] (2018) Indonesia	To determine the relationship between dietary patterns and the history of hypertension in older people	N= 41 Age: ≥60 years Rural	- The pattern of less is 29.3% and the pattern of good diet is 70.7%	- Limiting the use of salt in cooking every day
8	Apidechkul <i>et al.</i> [31] (2022) Thailand	To collect information on some risk behaviors related to hypertension in mountain tribesmen	N= 2552 Age: 50-69 years old Rural	- Hypertensive patients with underweight were 7.7%, normal 31.6% and overweight 60.7% - Patients with high cholesterol were 44.3%, and normal cholesterol was 55.7%	- Reduce salt consumption in food - Reduce consumption of fried foods
9	Srikan <i>et al.</i> [32] (2017) Thailand	To understand what factors influence individuals to start considering changing harmful behavior to harmless behavior	N= 312 Age: ≥45 years Rural and Urban	- Self-care agents, knowledge, self-care behavior, rural/urban location and education accounted for 61% of sodium excretion	- Reduce consumption of salty foods - Replace high-salt snacks with fruits
10	Buranakitjaroen [33] (2013) Thailand	To study the correlation between various factors and daily salt intake in hypertensive older people	N= 320 Age: 45-92 years old Urban	- About three-quarters of the participants (76.3%) were aware of the adverse effects of consuming high-salt foods, but still consumed these foods	- Reduce the use of salt in cooked food - Replacing sodium salt with potassium salt. Avoid instant food
11	Chailimpamontree <i>et al.</i> [34] (2021) Thailand	To understand the level of sodium and potassium consumption in Thailand and its association with hypertension	N= 1599 Age: ≥45 years Urban and rural	- The average urinary sodium excretion calculated in all samples was 3,305 mg - Sodium excretion was highest in the southern region at 4,107 mg - The average sodium intake in Thai adults is 3,636 mg/day (twice as high as the WHO recommendation)	- Limiting fast food consumption - Cooking at home and managing the amount of salt used in dishes - Using other spices to flavor food. - Read nutrition labels on packaged foods and choose low-sodium products
12	Rusmevichientong <i>et al.</i> [35] (2021) Thailand	To determine the knowledge, attitudes and habits related to the use of salt in the diet and its relationship with hypertension	N= 376 Age: ≥45 years Urban and rural	- Subjects who always taste the food before adding salt to the food and read the amount of salt on the nutrition label were 50% - Subjects who always buy ready-to-eat food as much as 66% - Subjects who ate outside food during the past three months were 40%	- Tasting food while cooking and not adding salt or fish sauce to food - Read nutrition labels and buy foods that have low-sodium content - Reduce consumption of ready-to-eat foods

No	Author, Year, Country	Objective	Sample (n, Age Range) and Setting	Findings	Low-Salt Diet Practices
13	Cho <i>et al.</i> [36] (2016) Myanmar	To compare parameters associated with salt intake in adults in Myanmar	N=131 Age: ≥50 Years Rural	<ul style="list-style-type: none"> <li>- The prevalence of hypertension in Myanmar is still quite high, at around 47%</li> <li>- The percentage of people with hypertension who regularly take antihypertensive drugs is still quite low at 33%</li> </ul>	<ul style="list-style-type: none"> <li>- Reduce the use of salt when cooking</li> <li>- Choosing foods labeled as “low-salt” or “no salt added”</li> </ul>
14	Karupiah [37] (2015) Malaysia	To evaluate adherence to recommended behaviors in CORFIS patients with hypertension	N= 209 Age: ≥50 years Urban	<ul style="list-style-type: none"> <li>- Participants who were not compliant with reducing salt were 11 people, less compliant were 61 people and those who were compliant were 137 people</li> <li>- Participants who were not compliant with increasing fruit and vegetable consumption were 11 people, the newly compliant were 52 people and the compliant were 146 people</li> </ul>	<ul style="list-style-type: none"> <li>- Reduce daily salt intake by choosing low-sodium foods</li> </ul>
15	Haron <i>et al.</i> [38] attitudes and practices (KAP) (2020) Malaysia	To understand and assess factors influencing knowledge, attitudes and practices on salt intake	N= 94 Age: 60-81 years old Urban and rural	<ul style="list-style-type: none"> <li>- The older population who have a positive attitude towards reducing salt intake is 75.5%.</li> <li>- Older people who have bad practices related to salt intake are 48.9%</li> <li>- Older people who have good knowledge, attitudes and practices related to salt intake are 30.9%</li> </ul>	<ul style="list-style-type: none"> <li>- Reduce the use of salt in cooking every day</li> </ul>
16	Mansor <i>et al.</i> [39] (2021) Malaysia	To determine the prevalence of hypertension among adults in FELDA housing estate in Terengganu, as well as knowledge, attitude and practice towards salt intake	N= 94 Age: ≥45 years Rural	<ul style="list-style-type: none"> <li>- There were 70.3% of participants with good salt reduction attitudes</li> <li>- There were 56.8% of participants who had poor practices</li> <li>- The prevalence of hypertension in the FELDA area is still quite high, at around 39.4%</li> </ul>	<ul style="list-style-type: none"> <li>- Not adding salt to dishes</li> <li>- Not putting table salt on the dining table</li> </ul>
17	Thuong <i>et al.</i> [40] (2022) Vietnam	To determine adherence to treatment in older people with hypertension	N= 537 Age: 60-70 years old Urban	<ul style="list-style-type: none"> <li>- More than 90% of participants still consume excessive salt</li> <li>- Physical activity compliance 64.3%</li> <li>- No smoking 93.5%</li> <li>- Limiting alcohol intake 92.9%</li> <li>- Medication adherence is only 11.7%</li> </ul>	<ul style="list-style-type: none"> <li>- Reduce the use of salt in daily meals</li> </ul>
18	Pinto <i>et al.</i> [41] (2022) Timor Leste	To understand more about the effect of stress, salt consumption and alcohol consumption on the incidence of hypertension	N= 101 Age: 45-90 years old Urban	<ul style="list-style-type: none"> <li>- Participants with normal stress level were 27.7%, mild 41%, moderate 26.7% and severe 5%</li> <li>- Moderate salt consumption pattern 28.7%, excess 71.3%</li> <li>- Low alcohol consumption 40.60%, moderate 34.70% and excess 24.70%</li> </ul>	<ul style="list-style-type: none"> <li>- Avoid salty/high salt foods</li> </ul>
19	Nohan <i>et al.</i> [42] (2020) Malaysia	To obtain a description of diet quality and factors associated with diet quality among community-dwelling older people	N= 138 Age: 60-84 years old Rural	<ul style="list-style-type: none"> <li>- Good dietary pattern 74.6%, poor dietary pattern even bad 25.6%</li> </ul>	<ul style="list-style-type: none"> <li>- Reduce consumption of salty foods and condiments</li> <li>- Choose and prepare foods with less salt and sauces</li> </ul>
20	Htun <i>et al.</i> [43] (2016) Myanmar	To determine the prevalence, awareness, and risk factors of hypertension in Hmawbi Cantonment area, Yangon Region, Myanmar	N= 210 Age: ≥45 years Rural	<ul style="list-style-type: none"> <li>- Good awareness of hypertension 55.7%</li> <li>- Active smoker (16.7%), regular exercise (67.1%), stressful conditions (29.5%), overweight (32.9%) and obesity (19.5%)</li> <li>- Consumption of food sources such as fish, salt sources and fish sauce (55.2%), and MSG (61.9%)</li> </ul>	<ul style="list-style-type: none"> <li>- Reduce the use of MSG in daily cooking</li> </ul>
21	Barkah [44] (2022) Indonesia	To determine the relationship between dietary compliance and the incidence of hypertension in older people	N=30 Age ≥60 years Rural	<ul style="list-style-type: none"> <li>- Respondents who adhered to the diet were 43.4%, 56.6% did not adhere to the diet</li> </ul>	<ul style="list-style-type: none"> <li>- Avoiding consumption of ready-to-eat foods</li> <li>- Reduce the use of food flavorings</li> </ul>
22	Da costa nunes <i>et al.</i> [45] (2022) Indonesia	To determine the effect of hypertension diet on the incidence of hypertension in older people	N=30 Age: 55-65 years old Rural	<ul style="list-style-type: none"> <li>- Good dietary pattern (46.7%), poor dietary pattern (53.3%)</li> </ul>	<ul style="list-style-type: none"> <li>- Eating foods or spices that can control blood pressure</li> <li>- Reduce the use of salt in cooking</li> <li>- Avoiding consumption of ready-to-eat foods</li> </ul>
23	Safutri <i>et al.</i> [46] (2022) Indonesia	To determine the association of hypertension diet adherence with the incidence of hypertension	N=30 Age ≥ 60 years Rural	<ul style="list-style-type: none"> <li>- There were 13 (43.4%) who adhered to the diet and 17 (56.6%) who did not</li> </ul>	<ul style="list-style-type: none"> <li>- Not eating salty foods</li> <li>- Reduce the use of salt in cooking</li> </ul>

**Table 4:** Low-salt diet practices in hypertensive older people (Qualitative Study).

Author, Year, Country	Objective	Sample (n, M Age, range and setting)	Findings	Low-salt diet practices
Suharto [47] (2018) Indonesia	To see the real picture of the experience of self-efficacy of older women with hypertension in implementing a diet	N=6 Age: 65-78 years old Rural	<ul style="list-style-type: none"> <li>- Many participants did not realize they were diagnosed with hypertension</li> <li>- Difficult to control appetite while on a diet</li> <li>- Participants started the diet due to information about complications of hypertension, family support, and concerns about their health</li> <li>- The challenge is high-salt eating habits</li> <li>- It is still difficult to implement low-salt diet practices due to eating the same food as households</li> </ul>	Abstain from eating foods that are high in salt
Steinman <i>et al.</i> [48] (2020) Cambodia	To examine understanding the facilitators and barriers to chronic disease management as well as the acceptability, suitability and feasibility of mHealth in supporting chronic disease management	N= 59 Years ≥56 years Urban	<ul style="list-style-type: none"> <li>- Family and peer support are important cultural norms that facilitate chronic disease management</li> <li>- The older, the poor and those living in rural areas have less access to telephones.</li> <li>- Frequent changes in patient phone numbers</li> <li>- mHealth helps supplement information and motivates older people to manage their disease</li> </ul>	Reduce consumption of foods that are high in salt
Chantakeeree <i>et al.</i> [49] (2022) Thailand	To understand health-promoting behaviors among older people	N= 40 Age: 63-89 years old Urban and rural	<ul style="list-style-type: none"> <li>- It is everyone's responsibility to keep blood pressure under control</li> <li>- Individuals are always working towards a healthier lifestyle</li> <li>- No major differences in health-promoting behaviors between rural and urban participants</li> </ul>	Limiting the intake of salt used in daily meals
Tan <i>et al.</i> [50] (2019) Singapore	To explore the social determinants of chronic disease management, particularly hypertension among older people from low socioeconomic backgrounds	N= 20 Age: ≥55 years Urban	<ul style="list-style-type: none"> <li>- Information on dietary needs to manage hypertension condition obtained from health professionals</li> <li>- Most of the participants claimed that they cooked at home and intentionally reduced their salt intake</li> <li>- They take occasional breaks from dieting to satisfy their cravings</li> </ul>	Reduce the use of salt in daily meals
Sutipan [51] (2017) Thailand	To identify healthy lifestyle needs in hypertensive older people and explore patient perspectives with respect to barriers and facilitators associated with healthy lifestyle behaviors	N= 10 Age: 60-75 years old Rural	<ul style="list-style-type: none"> <li>- Participants identified barriers that included lack of attention to health services, lack of motivation, poor physical and mental health, and inadequate community resources</li> <li>- Knowledge is an important facilitator for maintaining their blood pressure, and the family support system is very important</li> </ul>	Reduce the use of flavor enhancers such as fish sauce, soy sauce, and MSG
Woodham <i>et al.</i> [52] (2018) Thailand	To gain a better understanding from hypertensive older patients about their perspectives and knowledge towards hypertension and its treatment	N= 30 Age: 60-79 years old Rural	<ul style="list-style-type: none"> <li>- Respondents still largely misunderstood what a low-salt diet entailed. They only focus on reducing salt, but not other salt products</li> <li>- All respondents manage their own medication</li> <li>- Most respondents take care of themselves at home</li> <li>- Most respondents did not know what causes hypertension</li> </ul>	Reduce the use of salt in food
Udompittayason <i>et al.</i> [53] (2015) Thailand	To determine the perception of hypertension in older people	N= 7 Age: ≥60 years Rural	<ul style="list-style-type: none"> <li>- Some participants perceived that suffering from high blood pressure was a common disease</li> <li>- All respondents believe that high blood pressure is caused by poor flow of "Leard" (blood) and "Lom" (Wind)</li> </ul>	Avoid salty foods
Jayasvati <i>et al.</i> [54] (2021) Thailand	To determine the views of prediabetic and prehypertensive older patients living in the vicinity of the temple, on long-term self-management	N= 46 Age: 50-65 years old Rural	<ul style="list-style-type: none"> <li>- Two-thirds of participants still eat a high-salt, high-sugar diet</li> <li>- More than half of the participants felt they had never had any health problems</li> </ul>	Choose and eat foods that are low in salt

**Table 5:** Low-salt diet challenges and opportunities.

Theme	Factors	Associated Challenges	Source	Quotation
Challenge	Individuals	Eating habits that are difficult to change	Suharto <i>et al.</i> [47], Sutipan <i>et al.</i> [51], Jayasvati <i>et al.</i> [54]	"... it is very difficult to accept the taste on the tongue, eating feels bland no salty salt or coconut milk curry..." [47] (p. 7). "I like to eat fried fish with spicy shrimp paste sauce..." [54] (p.7). ".... I prefer only my favorite foods like ....., fermented fish, fermented pork, and spicy food." [51] (p.6)
		Long-standing preference for salty flavors	Suharto <i>et al.</i> [47] Jayasvati <i>et al.</i> [54]	"I really like salty foods like salted fish, crackers, and canned food for more than a year now..." [47] (p.5) "I like sour, sweet and salty foods..." [54] (p.7)
		Inability to prepare their own food	Chantakeeree <i>et al.</i> [49]	"I usually buy food and rarely cook myself" [49] (p.6)
		Decreased cognitive ability	Steinman <i>et al.</i> [48]	"My problem is that I'm mostly absent-minded..." [48] (p.7)
	Environment	Difficult access to healthy food	Chantakeeree <i>et al.</i> [49]	"I should eat more fish, but there is no fish to eat" [49] (p.6)
		Influence of local culture	Udompittayason <i>et al.</i> [53] Jayasvati <i>et al.</i> [54]	"...for me, I think hypertension is caused by bad blood..." [53] (p.8) "I love Thai desserts that contain coconut milk..." [54] (p.7)
	Social	Misperceptions about low-salt diets	Woodham <i>et al.</i> [52]	"My daughter is worried that I have hypertension, so she doesn't add salt to her food. She mostly uses fish sauce and roddae" [52] (p.3)
		Dietary patterns that are not culturally adapted	Tan <i>et al.</i> [50]	"They suggest taking these like.... Oats, green vegetables. Chinese people like to eat soup, steamed fish....we Malays can't eat like that.... You know Malays must eat with chili, without chili we can't eat right?"
Opportunities	Individuals	Motivation to stay healthy	Chantakeeree <i>et al.</i> [49] Suharto <i>et al.</i> [47]	"I want to keep myself healthy so I can live longer..." [49] (p.6). ".... I want to get rid of my high blood pressure quickly by not taking medicine anymore... ,,, I want to eat a diet that is balanced..." [47] (p.7)
		Presence of recurrent physiological problems	Suharto <i>et al.</i> [47]	".... tingling hands, palpitations, anxiety and headaches until the head wants to break...." [47] (p.8)
	Social	Support from family	Suharto <i>et al.</i> [47]	"...separated the special menu for hypertension for me to eat and almost every day is done by the family at home..." [47] (p.7) "...at home my son is the one who often tells me, abstain from eating so that my blood pressure does not rise... you can be sure." [47] (p.8)
		Peer support	Chantakeeree <i>et al.</i> [49] Suharto <i>et al.</i> [47]	".... I have good friends who I can talk to about healthy living because they suffer from hypertension like me...." [49] (p.7) "...my recitation friends motivate me to recover, in addition to praying and praying to surrender to God through prayer..." [47] (p.9)
		Support from health care providers	Woodham <i>et al.</i> [52] Citation <i>et al.</i> [51],	"While waiting for the doctor at the hospital, there was a nurse who gave us information about hypertension and diabetes"[52] (p.3) "After attending a hypertension program at a local hospital, I learned about how to change my lifestyle to manage my hypertension" [51] (p.7)
	Spiritual	Reassurance to maintain low-salt diet	Suharto <i>et al.</i> [47]	"... I calmed down after they reminded me to monitor my tension, pray and put my trust in God..." [47] (p.9)
		Spiritual growth	Chantakeeree <i>et al.</i> [49]	"I have a fulfilling life....I believe one is born to die, and when our time is up, we should die, not?" [49] (p.6)

studies and 11 cross-sectional studies. Table 4 presents 8 studies on low-salt diet practices that used qualitative methods. The largest sample size among the included studies was found in a Thai study with 2,552 samples [31]. The number of samples used in the other studies ranged from 6 to 1,599. Regarding the study setting, 14 quantitative studies were conducted in rural areas, 5 in urban areas, and 4 nationwide. For the qualitative studies, 5 were conducted in rural areas, 2 in urban areas, and 1 nationwide. Overall, the study population ranged from 45 to 90 years old, according to the 31 included studies.

### Practice of Low-Salt Diet in Older People with Hypertension

Among hypertensive older adults in SEA, the most common low-salt dietary practice is reducing or regulating salt intake when cooking. This was mentioned in 14 quantitative studies and 3 qualitative studies. Other low-salt dietary practices include reducing or limiting consumption of salty or high-salt foods (10 studies), not adding salt at meals (2 studies), avoiding instant or ready-to-eat foods (5 studies), and reading nutrition labels on packaged foods to choose low-salt products (4 studies). Some hypertensive older adults also used other seasonings to flavor food (2 studies) and reduced

their use of other flavor enhancers, such as soy sauce and MSG (3 studies). One study each showed that hypertensive older adults reduced the consumption of fried foods, replaced high-salt snacks with fruit, replaced sodium salt with potassium salt, cooked at home, and ate out less.

Quantitative studies have shown that hypertensive older individuals have poor compliance with low-salt diets. Meanwhile, in the qualitative studies, most participants explained why they were unable to fully implement low-salt diet practices and the factors that supported and motivated them to improve compliance. These findings will be discussed in detail in the next section.

### **Challenges and Opportunities for Low-Salt Diet Practices**

Our study focused on identifying challenges and opportunities for the successful implementation of a low-salt diet in SEA. We classified these challenges and opportunities into four categories: individual, environmental, social, and spiritual factors. The article's text describes these categories in detail, and we also provide a summary of the participants' statements in Table 5. Some of the challenges are related to individual factors such as "eating habits that are difficult to change", "long-standing preference for salty flavors", "perceptions that still focus on cultural beliefs", and "declining cognitive abilities". On the other hand, opportunities arise from individuals such as "motivation to recover" and "hope to be free from recurrent physiological problems". Environmental factors such as "difficult access to healthy food" and "abundance of high-salt foods available" are considered challenges. Social factors such as "misperceptions about low-salt diets" and "dietary patterns that are not culturally adapted" are also challenges. At the same time, "family support, peer support, and support from health service providers" are opportunities. Finally, spiritual factors offer opportunities for "reassurance to maintain a low-salt diet and "spiritual growth".

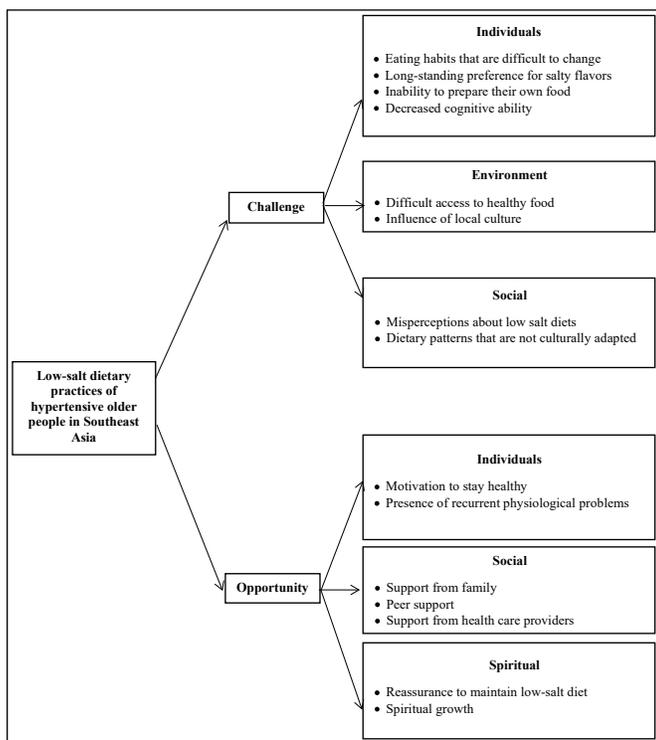
## **DISCUSSION**

This study aimed to examine low-salt diet practices among older patients with hypertension in SEA countries. The evidence suggests that hypertensive older adults in SEA are not effectively implementing low-salt diets. This aligns with previous studies, which found that African, SEA, and Eastern Mediterranean countries are among the least active in promoting salt reduction [55]. Poor lifestyle choices and a lack of patient self-care awareness are contributing factors to the global increase in the prevalence of chronic diseases, including hypertension and other cardiovascular diseases [15, 56-59], and this may explain why SEA has the third-highest number of hypertension cases in the world. Therefore, this study highlights the importance of lifestyle management strategies for hypertensive older adults, particularly in the context of low-salt dietary practices.

The main finding of this review indicates that the most common practice among hypertensive older adults in SEA to reduce salt intake is to reduce the amount of salt in their daily diet. However, previous studies have yielded different results, with the most common low-salt dietary practice globally being the use of salt substitutes in cooking (51.5%). These studies were conducted in Europe (39%), South America (25%), and North America (18%) [20]. In the Eastern Mediterranean [59] and SEA [60], industry players are implementing initiatives to reduce salt consumption through food product reformulation. This difference stems from the primary source of salt in these countries. In SEA countries, salt is added during cooking and through condiments like soy sauce and fish sauce, which are also used during cooking [61]. On the other hand, in different countries, salt is consumed chiefly through processed foods such as bread, cereal products, ready meals, and processed meats [62-64]. Therefore, it is crucial to identify and address the primary dietary source of salt in the diets of hypertensive older individuals before providing interventions to improve their low-salt nutritional practices.

During our review, we identified challenges and opportunities in implementing low-salt diet practices for hypertensive older adults. The studies we examined involved participants following a low-salt diet and faced various challenges during implementation. One significant challenge was SEA's traditional food culture. In these communities, consuming salty and fermented foods has been a part of their traditional food culture. Due to the availability of salt and seasonal fish, indigenous people have used salt to preserve food, helping them overcome the unpredictability of nature and enabling them to consume fish consistently, a key part of their diet [63]. Further research is needed to identify effective interventions that can improve adherence to an appropriate low-salt diet. These interventions should take cultural aspects into account and involve families in implementing this practice. Therefore, future study is recommended to address this shortcoming.

Another interesting finding in our review was that many families had misconceptions about what a low-salt diet entails. Despite cooking with reduced salt, they still added high-salt products such as soy sauce and roddae to their cooking meals. This highlights the importance of reinforcing knowledge and educating consumers on the benefits of a low-salt diet [65]. Inadequate education can lead to misconceptions about low-salt diet practices [66], so it is essential to provide health education and skill training to consumers, especially those caring for older persons with hypertension [67]. Nurses can play a vital role in educating families and hypertensive older adults about the importance of a low-salt diet and dispelling misconceptions about it. Future studies should focus on innovative and appropriate approaches to providing health education.



**Fig. (2):** Framework of challenges and opportunities for low-salt diet practices of hypertensive older people in Southeast Asia.

We identified some opportunities for improving the implementation of low-salt diet practices for hypertensive older individuals, which are presented in Fig. (2). One of the opportunities is the involvement of family support in the process, because health behavior change is influenced by the family structure (for example: living with extended family) and the support of family members can increase adherence to low-salt diet practices [66]. Therefore, in future studies, it is essential to involve families in efforts to improve low-salt diet practices.

Nurses and healthcare providers in the community have a significant responsibility to assist hypertensive older adults in managing and improving their low-salt diet practices. It is essential to take participants' cultural beliefs into account and involve their families in their efforts. The government should also consider implementing salt-reduction strategies that use salt substitutes. For the food industry, it is also necessary to reformulate food products into low-salt alternatives.

The findings provide insights into how older adults adopt a low-salt diet without any help from healthcare professionals. The findings also highlight the challenges these individuals face when following a low-salt diet. This information can be helpful for nurses and other healthcare providers when designing interventions to encourage hypertensive older adults to adopt a low-salt diet.

### CONCLUSION

Our review is the first to examine the natural low-salt dietary habits of hypertensive older adults in SEA,

usually without any intervention. After analyzing the articles, we found that most hypertensive older adults in SEA do not follow a low-salt diet. We also identified several challenges and opportunities in implementing low-salt dietary habits among hypertensive older adults. Despite this finding, intervention studies are still needed to improve adherence to low-salt diets among hypertensive older people in SEA. These studies should consider cultural factors and involve families in implementing the practice, as the practice of low-salt diets among hypertensive older people in SEA remains relatively poor.

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### CONFLICT OF INTEREST

The authors declare no conflict of interest.

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### AUTHORS' CONTRIBUTION

- Study conception and design : IAP, AMI, ELS
- Data collection : IAP, AMI
- Data analysis and interpretation : IAP, AMI, ELS
- Drafting of the article : IAP, AMI
- All authors have approved the manuscript draft.

### GENERATIVE AI AND AI-ASSISTED TECHNOLOGIES IN THE WRITING PROCESS

During the preparation of this work the authors limitedly used ChatGPT (GPT-4, OpenAI) to get language suggestions and do minor proofreading in some parts of the manuscript. After using this tool/service, the authors reviewed and edited the content as needed and take full responsibility for the content of the published article.

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