Received: 25 September 2023 | Revised: 12 December 2023 | Accepted: 4 January 2024

DOI: 10.1002/wmh3.604

RESEARCH ARTICLE

WMHP WORLD MEDICAL & HEALTH POLICY WILEY

Food security in slow-onset disasters: A policy review in Southeast Asian regions

Hiep N. Le[1,2,3,4] | **Ernesta Sofija**[1] | **Neil Harris**[1] | **Thu Nguyen**[5] | **Hai Phung**[1]

[1]School of Medicine and Dentistry, Griffith University, Gold Coast, Queensland, Australia

[2]An Giang University, Long Xuyên, Vietnam

[3]Vietnam National University, Ho Chi Minh City, Vietnam

[4]Health and Agricultural Policy Research Institute, University of Economics Ho Chi Minh City, Ho Chi Minh City, Vietnam

[5]School of Government and International Relations, Griffith University, Gold Coast, Queensland, Australia

Correspondence

Hai Phung, School of Medicine and Dentistry, Griffith University, 1 Parklands Drive, Southport, QL 4222, Australia.
Email: hai.n.phung@griffith.edu.au

Funding information

Griffith University International Postgraduate Research Scholarship (GUIPRS)

Abstract

Slow-onset disasters, a neglected climatic event, affect the agricultural sector in Southeast Asia and threaten regional food security. Improving food security in slow-onset disasters requires policy development by both regional and national governments. Despite this articulated need, very little research on the national and regional food security policies in slow-onset disaster events has been undertaken. Focusing on Southeast Asia, this paper aims to (i) review existing policies to support food security in slow-onset disasters; (ii) identify strengths, weaknesses, and gaps in the existing policies; (iii) explain the policy window on food security in slow-onset disasters. An analytical framework of eight components of food security was adopted for the content analysis of 39 related policy documents collected from 11 countries in Southeast Asia and the Association of Southeast Asian Nations. The study found that none of the 39 policies directly targeted improving food security in slow-onset disasters. Existing policies to support food security in slow-onset disasters were incorporated in the context of climate change or national target programs on green development, agricultural development, nutrition, and famine. Our analysis also revealed that existing policies primarily focus on the first two pillars of the food security framework: food availability and access, with a predominant emphasis on availability. However, the third pillar, food utilization, is often overlooked. This study recommends developing a comprehensive policy to address protracted food insecurity, particularly among vulnerable populations in areas impacted by slow-onset disasters.

KEYWORDS
food security, policy, slow-onset disasters, Southeast Asia

Key points

- *Policy gap*: Southeast Asian regional organizations and governments lack specific policies for food security in slow-onset disasters.
- *Prioritization issue*: Existing policies primarily focus on food availability and access, neglecting the vital aspect of food utilization.
- *Calls for action*: Policymakers should include food utilization in their strategies to enhance dietary diversity among vulnerable populations in slow-onset disaster-affected areas. In addition, this study recommends that policymakers develop strategies exclusively for addressing slow-onset disasters, rather than incorporating them into climate change, agricultural development, and famine programs. Policymakers should also prioritize a multihazard approach in their policy design to enhance food security during slow-onset disasters in the region.

INTRODUCTION

In recent decades, the frequency and severity of natural and man-made disasters have increased alarmingly (Thomas & López, 2015). While catastrophic events such as earthquakes, tsunamis, and hurricanes often dominate headlines and capture public attention (Mamuji & Kchouk, 2018), there is a lesser-known category of disasters that unfolds over an extended period, gradually eroding lives, ecosystems, and economies (Ratti, 2017; Staupe-Delgado, 2019a; Yamori & Goltz, 2021). These events are referred to as "slow-onset disasters" and are characterized by their creeping nature and long-term impact on vulnerable populations and the environment (Kaneberg et al., 2023; Yamori & Goltz, 2021). Unlike sudden-onset disasters that strike swiftly and demand immediate emergency response, slow-onset disasters unfold gradually, often taking weeks, months, or even years to manifest fully (Mamuji & Kchouk, 2018; United Nations General Assembly, 2016). Examples of slow-onset disasters have been identified by the United Nations (UN) (United Nations, 2011), UN Office for Disaster Risk Reduction (2015), and the World Health Organization (2023), including droughts, increasing temperatures, desertification, loss of biodiversity, land and forest degradation, ocean acidification, sea level rise, and salinization. This gradual onset often obscures their potential severity and urgency, making it challenging for authorities, communities, and individuals to recognize and respond effectively (Staupe-Delgado, 2019b). Consequently, slow-onset disasters can exacerbate underlying vulnerabilities, leaving communities ill-equipped to cope with their long-term consequences on various aspects of society, including food insecurity (Food and Agriculture Organization [FAO], 2021a; Ngcamu & Chari, 2020).

Food insecurity refers to the lack of consistent access to sufficient, safe, and nutritious food that meets individuals' dietary needs for an active and healthy life (Anderson, 1990). Slow-onset disasters can lead to reduced agricultural productivity, loss of livelihoods, and limited access to food, resulting in food insecurity (Choularton et al., 2012; Ngcamu & Chari, 2020).

The gradual nature of these disasters presents a challenge for communities to adapt and recover, leading to prolonged periods of food insecurity (Staupe-Delgado, 2019a).

Southeast Asia comprises eleven countries and is a critical agricultural and food-producing region (Bhadrakom et al., 2022). The region is home to the world's two largest rice exporters (Thailand and Vietnam) and the world's leading exporters of several key internationally traded agricultural commodities (OECD-FAO, 2017). A significant portion of the rural impoverished population continues to rely heavily on agriculture for their livelihoods (Bhadrakom et al., 2022). Despite the region's sustained economic development over the past several decades, 600 million inhabitants continue to contend with food and nutrition insecurity (FAO, 2021b). In addition, Southeast Asian countries are geographically prone to various natural hazards, including slow-onset disasters (United Nations, Economic and Social Commission for Asia and the Pacific [ESCAP] 2020). Climate change plays a crucial role in exacerbating slow-onset disasters in Southeast Asia (Anschell & Tran, 2020). Rising temperatures and changing precipitation patterns contribute to frequent droughts, leading to crop failures, water scarcity, economic losses, and food insecurity (Brenton et al., 2022; Sheffield & Wood, 2008). Deforestation, illegal logging, and unsustainable land use practices contribute to the degradation of forests and the loss of valuable ecosystems (Hughes, 2017). Land degradation reduces soil fertility, increases the risk of erosion, and affects water quality and availability (Montanarella et al., 2016). These impacts have far-reaching consequences for agricultural productivity, biodiversity, and the overall sustainability of the region (Shrestha, 2011). Ocean acidification and sea level rise are slow-onset disasters that also affect coastal areas of Southeast Asian countries (Chou, 2014). The region is highly vulnerable to the impacts of rising sea levels, which lead to coastal erosion, saltwater intrusion, and the loss of coastal habitats (Chou, 2014). Ocean acidification, caused by the absorption of carbon dioxide by seawater, poses a threat to marine ecosystems and the livelihoods of coastal communities that depend on fisheries and tourism (Chou, 2014). Salinization, the process of increased salt content in soil and water, is an additional slow-onset disaster in Southeast Asia (Scheelbeek et al., 2016). It affects agricultural productivity, water quality, and the availability of freshwater resources, posing challenges to food security and water management in the region (Scheelbeek et al., 2016; United Nations, ESCAP 2020).

Since the Food and Agriculture Organization (FAO) published its definition of food security in 1996 (FAO, 1996), Southeast Asian governments have placed significant emphasis on policies that enhance food security in the context of sudden-onset disasters (ASEAN Secretariat, 2009; Lassa et al., 2019; National Nutrition Council, 2009). However, slow-onset disasters have received little attention (Mamuji & Kchouk, 2018), leading to a lack of knowledge of policies, action plans, and strategic programs in Southeast Asian countries to tackle food security during such events. Developing policies to enhance food security in slow-onset disasters is imperative due to the gradual but profound impacts these disasters have on agricultural systems and communities (Staupe-Delgado, 2019b). By outlining targeted action plans and programs, these policies may mitigate reduced productivity, prevent food shortages, and foster long-term resilience, contributing to social well-being amidst environmental challenges.

Therefore, reviewing and understanding existing policies to address food security in the context of slow-onset disasters can inform future policy efforts to achieve sustainable development in Southeast Asia. As such, this paper aims to (i) review existing policies to support food security in slow-onset disasters in Southeast Asia; (ii) identify strengths, weaknesses, and gaps in the existing policies; (iii) explain the policy window on food security in slow-onset disasters in Southeast Asia. By comprehensively examining the policies and strategies currently in place, this study aims to provide recommendations to tackle food security in slow-onset disasters.

Analytical framework for assessing food security in slow-onset disasters

This study adopted a pre-structured case methodology, with an existing analytical framework defining the data collection and analysis structure (Miles & Huberman, 1994). In addition, this study also adopted the comprehensive food security analytical framework from the study of Hadley et al. (2023) to guide the analysis of national and regional policies on food security in slow-onset disasters. The study acknowledges the existence of several interconnected food security frameworks. First, developed in 2008, the FAO's food security framework has been widely used as a foundational model for understanding food security (FAO, 2008). However, it has faced criticism for its limitations as overlooking sociocultural elements and its lack of specific concepts contributing to each overarching pillar (Chan et al., 2018; Musaiger, 1993; Myers et al., 2017). Recognizing the limitations of the FAO framework, Savary et al. (2020) then extended the conceptualization of food security. They introduced a six-component system that provided a more detailed breakdown of the pillars established by FAO. Availability, for example, was categorized into primary food production, food production and supply stability, and food reserves and stockpiles (Savary et al., 2020). Access was divided into physical and economic access, and utilization was reclassified into utility, safety, quality, and nutritional value (Savary et al., 2020). Despite this expansion, sociocultural factors remained overlooked in this framework. This limitation has been finally addressed in the study of Hadley et al. (2023), which features the influence of sociocultural factors on food consumption patterns and food security (Musaiger, 1993; Owino, 2019). Sociocultural factors include cultural norms, food preparation, consumption traditions, and religious practices that influence an individual's capacity to use or access food (Musaiger, 1993; Owino, 2019). Cultural norms often dictate what is considered acceptable or desirable to eat within a community. These norms can influence dietary choices and nutritional diversity. For example, in some cultures, meat is considered a staple and a symbol of affluence (Giacoman et al., 2021), while in others, vegetarianism may be the norm due to ethical or environmental concerns (Šmugović et al., 2021). The methods of food preparation and consumption traditions can also affect food security. In many cultures, traditional methods of preserving food, such as drying, smoking, or fermenting, play a crucial role in ensuring food availability throughout the year, especially in regions with limited access to modern preservation technology (Mandisvika et al., 2015). Religious beliefs often dictate specific dietary restrictions or fasting periods, which can impact nutritional intake and food security. For instance, the practice of fasting during Ramadan in the Islamic faith can affect food consumption patterns, shedding light on the impact of this religious practice on dietary habits and energy balance (Lessan et al., 2018). Therefore, sociocultural factors play a critical role in food security, especially food utilization. Addressing food security effectively requires a nuanced understanding of these sociocultural dynamics. Policies and interventions must be culturally sensitive and adaptable to local contexts to ensure they are effective and sustainable. By acknowledging and integrating these sociocultural aspects, food security strategies can be more inclusive, addressing the needs of diverse populations while respecting their cultural identities. The conceptual framework from the study of Hadley et al. (2023) with three pillars and eight components of food security is presented in Figure 1.

We adopt Hadley et al.'s (2023) framework in this study because it offers a comprehensive perspective on food security, incorporating three pillars and eight components. It also overcomes the limitations of previous frameworks, including those offered by FAO (2008) and Savary et al. (2020), which either neglected sociocultural factors or lacked specificity (Musaiger, 1993; Myers et al., 2017). Hadley et al.'s (2023) framework explicitly integrates sociocultural factors, making it well-suited for analyzing food security within the context of slow-onset disasters in Southeast Asia. Its detailed categorization of

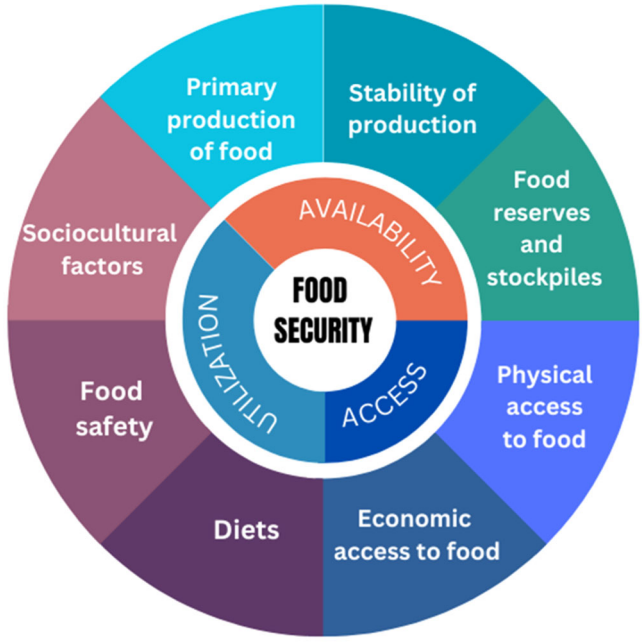

FIGURE 1 Eight components of food security adopted from Hadley et al. (2023). based on the FAO framework (FAO, 2008) and Savary et al. (2020). FAO, Food and Agriculture Organization.

components aids in identifying which food security components are being addressed and which are lacking, thereby enabling the formulation of pertinent recommendations.

METHODS

Data collection

Given no universally accepted definition of policy exists that transcends all contexts, this study adopted the Centers for Disease Control and Prevention (CDC) (2023) broad definition of policy. It defined policy as a law, regulation, procedure, administrative action, incentive or voluntary practice of governments and other institutions (CDC, 2023). Accordingly, this study examines a wide range of policy documents developed by the Association of Southeast Asian Nations (ASEAN), including the ASEAN Framework and Regional Action Plan, and by the governments of Southeast Asian countries, including their national programs of action, national strategic plans, national master plans, national development plans, and sectoral roadmaps on food security in slow-onset disasters.

Policy documents that address slow-onset disasters and food security were identified through multiple sources, including: (1) 11 Southeast Asia countries' relevant ministry government websites (Ministry of Agriculture, Ministry of Environment, and Ministry of Health); (2) ASEAN database; (3) United Nations Office for Disaster Risk Reduction database; and (4) FAO of the United Nations (FAOLEX database). Search strategies used for each database are described in Appendix A. The inclusion criteria were as follows: (1) National policy documents of the 11 Southeast Asia countries OR Regional policy documents of Southeast Asia; (2) from any time-period, (3) available in English, and (4) publicly accessible. Publicly accessible documents were defined as documents free of

charge in digital or print format, accessible through internet search or by request through in-country experts at the step of identifying the full text of policies. We excluded policies that addressed climate adaptation or other environmental aspects but did not link these to the eight components of food security. Hence, the exclusion criteria were as follows: (1) Not written by or in collaboration with country governments, (2) no policy relevance (international reports, communications, scientific publications, policy brief), (3) not applied nationally or regionally, (4) not relevant to slow-onset disasters and food security, (5) not available in full text, and (6) not written in English. As shown in Figure 2, searches initially retrieved 6042 hits at the identification phase. Through screening of titles, abstracts, and summaries, 247 relevant policies were retained from all sources. Then, 218 policies were maintained after duplicates were removed. Of the 218 documents identified for full-text screening, 179 were eliminated based on the exclusion criteria. Among of these eliminated policies, 91 policies were not relevant to food security, as these policies did not establish a direct connection with the eight components of the analytical food security framework. Instead, their primary focus was on enhancing aspects such as green growth, renewable energy, waste management, carbon inventory, or the reduction of greenhouse gas emissions. In addition, the remaining excluded policies were focused on sudden-onset disasters, ($n = 25$), food and nutrition only ($n = 38$), health policy adaptation ($n = 9$), agricultural adaptation ($n = 6$), and neither officially published by governments ($n = 7$) nor in English ($n = 3$). Finally, a total of 39 policy documents were included in the qualitative synthesis (Table 1).

Data analysis

This study adopted qualitative content analysis to identify "themes or coding frames" to categorize the collected 39 policy documents (Hall & Steiner, 2020; Hsieh & Shannon, 2005;

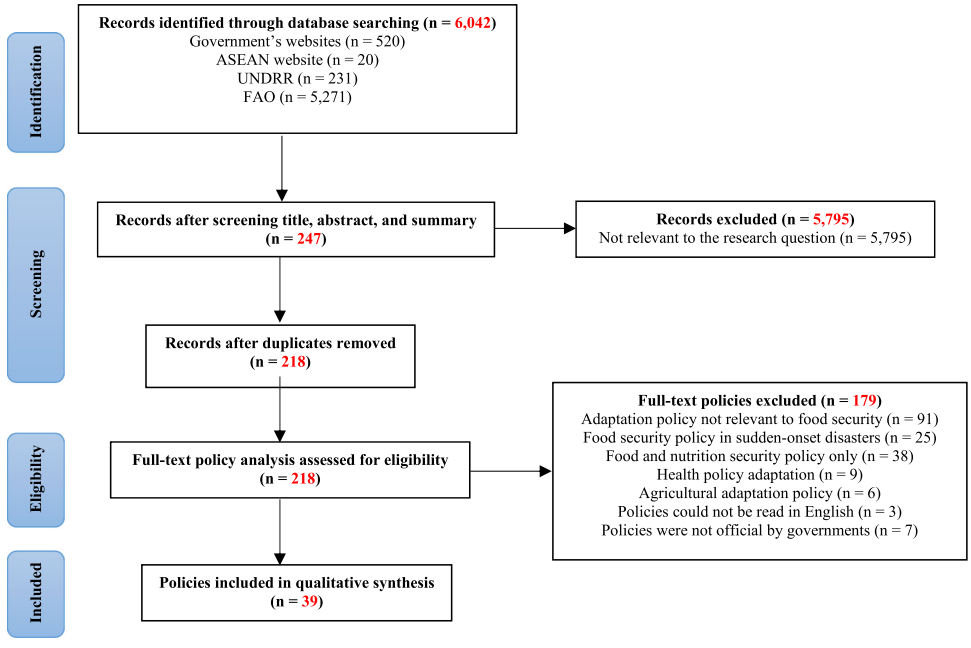

FIGURE 2 Results flow chart.

TABLE 1 List of all policy documents identified and analyzed.

Number	Country/region	Policy document name	Year of issued	References
1	Cambodia	National Adaptation Programme of Action to Climate Change (NAPA)	2006	Ministry of Environment (2006)
2		Strategic National Action Plan For Disaster Risk Reduction 2008–013	2008	National Committee for Disaster Management and Ministry of Planning (2008)
3		Plan of Action for Disaster Risk Reduction in Agriculture 2014–2018	2013	General Directorate of Agriculture (2013)
4		Cambodia Climate Change Strategic Plan 2014–2023	2013	(National Climate Change Committee (2013))
5		National Strategy for Food Security and Nutrition (NSFSN 2014–2018)	2014	Council for Agricultural and Rural Development (2014)
6		National Action Plan for the Zero Hunger Challenge in Cambodia (NAP/ZHC 2016–2025)	2016	Council for Agricultural and Rural Development (2016)
7		National Biodiversity Strategy and Action Plan	2016	National Council for Sustainable Development (2016)
8		Climate Change Action Plan 2016–2018	2016	Ministry of Environment (2016)
9	Indonesia	National Action Plan Addressing Climate Change	2007	State Ministry of Environment (2007)
10		Indonesia Climate Change Sectoral Roadmap—ICCSR	2009	Ministry of National Development Planning (2009)
11		National Adaptation Plan Executive Summary 2019	2019	Ministry of National Development Planning (2019)
12		Indonesia's Adaptation Communication	2022	Ministry of Environment and Forestry (2022)
13	Laos	National Strategy on Climate Change of the Lao PDR	2010	Government of Lao PDR (2010)
14		Plan of Action for Disaster Risk Reduction and Management in Agriculture (2014–2016)	2014	Ministry of Agriculture and Forestry (2014)
15		Agriculture Development Strategy to 2025 and Vision to the year 2030	2015	Ministry of Agriculture Forestry (2015)
16		National Green Growth Strategy of the Lao PDR till 2030	2018	Secretariat for Formulation of National Green Growth Strategy of the Lao PDR (2018)

(Continues)

TABLE 1 (Continued)

Number	Country/region	Policy document name	Year of issued	References
17		National Strategy on Disaster Risk Reduction (NSDRR) 2021–2030	2021	The Ministry of Labor and Social Welfare (2021)
18		National Plan of Action on Nutrition (NPAN) 2021–2025	2021	Ministry of Health DoHaHP, Centre of Nutrition (2021)
19	Myanmar	Myanmar Action Plan for Disaster Risk Reduction (MAPDRR)	2012	Ministry of Social Welfare Relief, and Resettlement, Relief and Resettlement Department (2012)
20		Myanmar's National Adaptation Programme of Action (NAPA) to Climate Change	2012	National Environmental Conservation Committee (2012)
21		Myanmar Climate Change Strategy and Action Plan (MCCSAP) 2016–2030	2017	Ministry of Natural Resources and Environmental Conservation (2017)
22		Myanmar Sustainable Development Plan (2018–2030)	2018	Ministry of Planning Finance (2018)
23		Multi-sectoral National Plan of Action on Nutrition (MS-NPAN) 2018/19–2022/23	2018	National Nutrition Centre Department of Public Health, Ministry of Health and Sports (2018)
24		Myanmar Climate Change Master Plan (2018–2030)	2019	Ministry of Natural Resources and Environmental Conservation (2019a)
25		Myanmar Climate Change Strategy (2018–2030)	2019	Ministry of Natural Resources and Environmental Conservation (2019b)
26	Philippines	The Updated Philippine National Action Plan to Combat Desertification, Land Degradation and Drought (DLDD)	2010	Department of Agriculture (2010)
27		National Climate Change Action Plan 2011–2028	2011	Climate Change Commission (2011)
28		Philippine Development Plan 2017–2022	2017	National Economic and Development Authority (2017)
29	Timor-Leste	National Adaptation Programme of Action (NAPA) on Climate Change	2010	Ministry For Economy And Development (2010)
30		Zero Hunger Challenge—National Action Plan for a Hunger and Malnutrition Free Timor-Leste	2014	National Council for Food Security, Sovereignty and Nutrition in Timor-Leste (2014)

TABLE 1 (Continued)

Number	Country/region	Policy document name	Year of issued	References
31		National Food and Nutrition Security Policy	2014	The National Council on Food Security, Sovereignty and Nutrition (2014)
32		Timor-Leste's National Adaptation Plan—Addressing climate risks and building climate resilience	2021	Secretariat of State for Environment, Coordinating Minister for Economic Affairs (2021)
33	Thailand	Climate Change Master Plan 2015–2050	2015	The Office of Natural Resources and Environmental Policy and Planning, Ministry of Natural Resources and Environment (2015)
34		The 24-year agriculture and cooperative strategy (2017–2036) and the 5-year agriculture development plan under the twelfth national economic and social development plan (2017–2021)	2017	Ministry of Agriculture and Cooperatives (2017)
35		Thailand Country Program on Climate Change	2017	Climate Change Management and Coordination Division, Office of Natural Resources and Environmental Policy and Planning (2017)
36	Vietnam	National Action Plan For The Implementation Of The 2030 Sustainable Development Agenda	2017	Government of Viet Nam (2017)
37	ASEAN	ASEAN integrated food security (AIFS) framework and strategic plan of action on food security in the ASEAN region (SPA-FS) 2015–2020	2016	ASEAN Sectoral Working Group on Crops ASWGC and Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) (2016)
38		ASEAN Regional Plan of Action for Adaptation to Drought 2021–2025	2021	ESCAP-UN (2021)
39		ASEAN Framework on Anticipatory Action in Disaster Management	2022	Association of Southeast Asian Nations (ASEAN) (2022)

Abbreviation: ASEAN, Association of Southeast Asian Nations.

Schreier, 2012). In this study, both directed and conventional approaches of content analysis were used to identify themes and subthemes for analysis, respectively. While themes originate from the text in the conventional content analysis, themes in the directed content analysis can be derived from theories or research findings (Hsieh & Shannon, 2005). Accordingly, the framework of eight components of food security adopted by Hadley et al. (2023) informed the eight themes for analysis. Subthemes for analysis were developed through inductive text reading. In this step, two researchers (H. N. L. and T. N.) read the 39 policy documents line by line to look for strategies related to food security. Once the themes and subthemes were identified, the analysis continued with counting the number of policy documents that mention each subtheme. Findings are synthesized in Table 2 to draw conclusions about the strengths and areas for improvement of the current approach of 11 Southeast Asian Governments in ensuring food security in slow-onset disasters.

RESULTS

The analysis of 39 regional and national policies shows that eight of 11 Southeast Asian nations have adopted policies on food security in response to various slow-onset disasters, with Cambodia having the most such policies (eight), followed by Myanmar (seven) and Laos (six) while no policies were advanced by the governments of Brunei, Singapore, or Malaysia. All 39 policies were developed to address climate change, malnutrition, and famine (Table 2). This suggests that solutions for enhancing food security in slow-onset disasters were limited to the contexts of climate change, agricultural development, and hunger eradication. No food security policies in the exclusive context of slow-onset disasters were adopted by regional institutions ASEAN or the eleven Southeast Asian countries.

Figure 3 provides clear evidence that drought stands out, having the highest number of strategic policies designed to enhance food security in the region. Additionally, over half of the reviewed policies adopted a multihazard approach, addressing a spectrum of environmental challenges related to slow-onset disasters rather than focusing on a single issue.

As shown in Table 2, although all components of the food security pillars of the Hadley et al.'s (2023) framework were addressed in the reviewed policies, the majority of policies focused on the strategies for component 1—primary food production. Only about a third of policy documents addressed components 2, 3, and 4 and one policy proposed strategies to support the food utilization pillar (components 6, 7, and 8). While component 1 encompassed various strategies to improve food production and availability, dominant by climate-resistant varieties, water management, and integrated cropping techniques, component 2 focused on resilience and stability mainly through water supply and community-based management strategies. Component 3 proposed two main types of strategies, including establishing community seed banks and rice banks or food and seed reserves. Components 4 and 5 emphasized food access through infrastructure development and economic empowerment strategies. While component 4 included irrigation and rural infrastructure, component 5 concentrated on livelihood diversification, cash distribution, and social protection schemes to enhance financial access to food. Policy strategies for components 6, 7, and 8 were limited, including efforts to improve sustainable nutrition infrastructure, provide safe drinking water and sanitation, and promote gender equity in water use. However, due to variations in ecological and environmental conditions among ASEAN countries, a direct comparison was not recommended.

TABLE 2 Number of policies addressed and issued the strategy to support food security in slow-onset disasters.

Food security pillar	Component/themes	Number of policies addressed	Strategy/subthemes	Number of policies issued the strategy
Food availability	Component 1—primary food production	33	Climate resistant varieties	22
			Water management	16
			Climate smart agricultural technology	7
			Integrated cropping techniques	7
			Indigenous crop varieties and technology	5
			Regenerate degraded soil	5
			Eco-friendly crops	2
			Early warning system	2
			Farmer capacity building	2
			Forest restoration	1
			Planting schedule	1
			Erosion reduction	1
			Decrease input costs	1
			Building climate resilient ecosystems	1
			Provide technical advisory services	1
			Agricultural diversity	1
	Component 2—stability of food production	9	Water supply	4
			Community-based management	2
			Ecosystem-based approach	1
			Diversification of agriculture production	1
			Food independent village	1
			Climate smart village	1
			Home-gardens using climate smart approach	1
	Component 3—food reserves and stockpile	10	Seed bank	5
			Emergency food reserves	2
			Food and seed reserves	2
			Rice bank	1
Food access	Component 4—physical access	14	Irrigation infrastructure	8
			Protected infrastructure	4

(Continues)

TABLE 2 (Continued)

Food security pillar	Component/themes	Number of policies addressed	Strategy/subthemes	Number of policies issued the strategy
			Distribution water networks	3
			Rural infrastructure	2
			Infrastructure for stocking water	1
	Component 5—economic access	5	Livelihood diversification activities	2
			Cash distribution	1
			social protection schemes and public employment	1
			Public work programs	1
			Financial incentive mechanisms	1
Food Utilization	Component 6—diets	1	Increase sustainable infrastructure for nutrition	1
	Component 7—food safety	1	Safe drinking water	1
			Sanitation	1
	Component 8—sociocultural factors	1	Gender equity in water use	1

		Droughts	Increasing temperatures	Desertification	Loss of biodiversity	Land and forest degradation	Ocean acidification	Sea level rise	Salinisation
National Adaptation Programme of Action to Climate Change (NAPA)	Cambodia	●				●		●	●
Strategic National Action Plan For Disaster Risk Reduction 2008 - 2013	Cambodia	●							
Plan of Action for Disaster Risk Reduction in Agriculture 2014-2018	Cambodia	●			●	●			●
Cambodia Climate Change Strategic Plan 2014 - 2023	Cambodia	●							
National Strategy for Food Security and Nutrition (NSFSN 2014 - 2018)	Cambodia	●				●			
National Action Plan for the Zero Hunger Challenge in Cambodia (NAP/ZHC 2016-2025)	Cambodia	●							
National Biodiversity Strategy and Action Plan	Cambodia				●	●			
Climate Change Action Plan 2016 – 2018	Cambodia					●			
National Action Plan Addressing Climate Change	Indonesia	●	●	●					
Indonesia Climate Change Sectoral Roadmap - ICCSR	Indonesia	●			●				●
National Adaptation Plan Executive Summary 2019	Indonesia	●				●			●
Indonesia's Adaptation Communication	Indonesia	●							
National Strategy on Climate Change of the Lao PDR	Laos	●				●			
Plan of Action for Disaster Risk Reduction and Management in Agriculture (2014—2016)	Laos	●							
Agriculture Development Strategy to 2025 and Vision to the year 2030	Laos	●							
National Green Growth Strategy of the Lao PDR till 2030	Laos				●	●			
National Strategy on Disaster Risk Reduction (NSDRR) 2021 – 2030	Laos	●							
National Plan of Action on Nutrition (NPAN) 2021-2025	Laos	●							
Myanmar Action Plan for Disaster Risk Reduction (MAPDRR)	Myanmar	●				●			
Myanmar's National Adaptation Programme of Action (NAPA) to Climate Change	Myanmar	●				●			●
Myanmar Climate Change Strategy and Action Plan (MCCSAP) 2016–2030	Myanmar	●			●	●			●
Myanmar Sustainable Development Plan (2018 – 2030)	Myanmar	●							
Multi-sectoral National Plan of Action on Nutrition (MS-NPAN) 2018/19 – 2022/23	Myanmar	●							
Myanmar Climate Change Master Plan (2018 – 2030)	Myanmar	●							●
Myanmar Climate Change Strategy (2018 – 2030)	Myanmar	●			●				
The Updated Philippine National Action Plan to Combat Desertification, Land Degradation and Drought (DLDD)	Philippine	●		●					
National Climate Change Action Plan 2011-2028	Philippine		●	●					
Philippine Development Plan 2017-2022	Philippine	●							
National Adaptation Programme of Action (NAPA) on Climate Change	Timor-Leste	●							
Zero Hunger Challenge - National Action Plan for a Hunger and Malnutrition Free Timor-Leste	Timor-Leste	●							
National Food and Nutrition Security Policy	Timor-Leste	●	●	●					
Timor-Leste's National Adaptation Plan - Addressing climate risks and building climate resilience	Timor-Leste	●				●			●
Climate Change Master Plan 2015-2050	Thailand	●			●	●		●	●
The twenty-year agriculture and cooperative strategy (2017-2036) and the five-year agriculture development plan under the twelfth national economic and social development plan (2017-2021)	Thailand	●			●				
Thailand Country Programme on Climate Change	Thailand	●				●			
National Action Plan For The Implementation Of The 2030 Sustainable Development Agenda	Vietnam	●							●
ASEAN integrated food security (AIFS) framework and strategic plan of action on food security in the ASEAN region (SPA-FS) 2015-2020	ASEAN	●							
ASEAN Regional Plan of Action for Adaptation to Drought 2021 - 2025	ASEAN	●							
ASEAN Framework on Anticipatory Action in Disaster Management	ASEAN	●	●						

FIGURE 3 National and regional policies addressing food security in slow-onset disasters.

DISCUSSION

This study aimed to review the current policies addressing food security in slow-onset disasters across Southeast Asia, evaluating their strengths, weaknesses, and gaps, while elucidating the policy landscape within this context. Our findings reveal that none of the 39 policies identified and analyzed specifically targeted improving food security during slow-onset disasters, suggesting the presence of a significant gap in policy development at both the regional and national levels in Southeast Asia. However, eight Southeast Asian nations advanced policies to address food security linked with the types of slow-onset disasters in climate change or national target programs on green development, agricultural development, nutrition, and famine, with Cambodia being the most proactive. Most of these policies aimed at improving primary food production, with less emphasis accorded to other aspects of food security. Climate-resistant varieties and water management were the main strategies proposed to enhance primary food production. Drought leads in the number of national and regional policies for improving food security in the region, and notably, more than half of the reviewed policies adopt a multihazard approach, addressing various environmental challenges associated with slow-onset disasters rather than concentrating on a single issue. Components related to food reserves, physical access, and economic access were considered within the policies. On the other hand, the policies provided limited strategies for components associated with diet, food safety, and sociocultural factors.

This study's findings reflect the evolving nexus of food security, climate change, and disaster risk reduction in the literature. This nexus was first outlined in the policy brief titled "Reducing disaster risks to food security in South Africa: Towards integration and co-operation" published by the FAO Regional Disaster Risk Reduction and Management Office for Southern Africa (FAO, 2012). The connection between disaster risk reduction and food security revolves around the idea that disasters impact the availability and accessibility of food (FAO, 2012; Masipa, 2017). The intersection of climate change and food security is focused on the influence of climate change on agricultural productivity, thereby affecting food production (FAO, 2012). When it was first introduced in 2012, the nexus between food security, climate change, and disaster risk reduction was developed against the backdrop of sudden-onset disasters.

Despite growing calls for policymakers to incorporate the nexus between three issues into government policies to address food insecurity in sudden-onset disasters, it is important to recognize that each of these issues has distinct driving factors that do not overlap (Habiba et al., 2016; Zembe et al., 2022). For instance, food insecurity, particularly food access, is influenced by a variety of socioeconomic factors and disruptions to the food distribution system; climate change has some consequences that are separate from food security; and disaster risk reduction encompasses slow-onset disasters. Due to these distinct factors, integrating food security strategies for slow-onset disasters within broader policy contexts like climate change or agricultural development often results in a lack of targeted focus. For example, climate change policies tend to be broad, encompassing a wide range of environmental issues from emission controls to biodiversity conservation, and may not sufficiently address the unique challenges posed by slow-onset disasters such as long-term drought or soil degradation (Kļaviņš et al., 2009; Naser et al., 2019). Similarly, agricultural development policies are typically focused on enhancing productivity and famine relief efforts are usually reactive, addressing immediate food shortages rather than the underlying, gradual processes leading to food insecurity (Fuller, 2015; John et al., 2022). In contrast, policies exclusively targeting food security in the context of slow-onset disasters can be more nuanced and specific. These policies focus on the gradual and often less visible effects of these disasters, such as the incremental degradation of arable land, changes in rainfall patterns affecting crop cycles, or the slow diminishment of water resources.

By concentrating specifically on these aspects, such policies can develop long-term strategies that are proactive rather than reactive, focusing on building resilience and adaptive capacities in agricultural systems and local communities. Going beyond the existing literature on the nexus of food security, climate change and disaster risk reduction, this research strongly recommends Southeast Asian governments develop an extensive and comprehensive policy focused on specifically improving food security in the context of slow-onset disasters in Southeast Asia.

Furthermore, our findings highlight significant gaps in Southeast Asian policies, especially the modest number of strategies for the food utilization pillar. Most of the reviewed policies focused on improving the component of primary food production under the pillar of food availability and overlooked other components of food security such as diet, food safety, and sociocultural factors under the pillar of food utilization. It is widely accepted that the effects of climate change (including slow-onset disasters) on food shortages are indisputable, leading to low dietary diversity and undernutrition (Niles et al., 2021). Low dietary diversity is a key factor contributing to undernutrition (Fite et al., 2023; Kumar & Mohanty, 2023). When individuals have limited access to a variety of foods, their diets may lack essential nutrients, leading to under or mal-nutrition (Kumar & Mohanty, 2023). This is particularly concerning for vulnerable populations, such as pregnant women and children, who have higher nutrient requirements (Dessalegn et al., 2021; Fite et al., 2023; Gelebo et al., 2021). The existing modest strategies to enhance the food utilization pillar, particularly dietary diversity, possibly impede efforts to alleviate food insecurity in slow-onset disasters. Recognizing the evident risk of insufficient dietary diversity as one of the primary causes of undernutrition globally and in many nations (Zeinalabedini et al., 2023), this research proposes that existing national policies and action plans on the food utilization pillar be reinforced with additional strategies to promote dietary diversity and nutritional status, especially for vulnerable populations such as ethnic minorities, women, and children in slow-onset disaster-affected locations.

Additionally, the paramount importance of establishing and enforcing safe food consumption practices, particularly in regions prone to disasters, cannot be overlooked. Slow-onset disasters such as drought have the potential to jeopardize both water availability and food safety (Ghosh, 2019; Saha et al., 2021). The consumption of contaminated food and unsafe drinking water carries the risk of foodborne illnesses, which can have severe health implications, especially for vulnerable demographics such as children, the elderly, and individuals with compromised immune systems (Berry et al., 2007). To effectively tackle these challenges, food safety policies must extend their scope beyond the production phase. They should encompass comprehensive measures that guarantee safe food handling, storage, and preparation practices at the consumer level. This can be achieved by implementing public awareness campaigns to promote safe cooking techniques and appropriate food handling practices during slow-onset disasters.

Our study also highlights an additional significant gap in Southeast Asian food security policies related to the neglect of sociocultural factors in food utilization. This neglect goes beyond policy completeness, impacting the effectiveness and relevance of these policies within diverse sociocultural contexts. It underscores the profound influence of cultural norms, traditions, and religious beliefs on dietary preferences and practices in Southeast Asia, which extend to aspects of nutrition, health, and overall well-being. Our findings reveal that current policies fail to adequately consider these factors, leading to a disconnect from the actual dietary needs and practices of local communities. This issue becomes increasingly critical in the context of slow-onset disasters like droughts and land degradation, where the need for culturally cognizant and adaptable responses is essential. The current study suggests a need to reorient policy development, comprehensively integrating sociocultural factors into food security strategies, to guarantee cultural sensitivity

and alignment with local dietary habits. This approach, coupled with engaging local communities to gather their insights and preferences, is vital for developing technically viable, socially acceptable, and sustainable strategies to effectively mitigate the impacts of slow-onset disasters on food security.

While the limitations in existing policies on food security for slow-onset disasters present an opportunity for policy development and improvement in Southeast Asia, we need to highlight that several existing policies are likely to contribute to and enable the reduction or amelioration of the food insecurity burden.

First, agriculture has been a traditional livelihood and contributes to food security for a large portion of the population in the region (Bhadrakom et al., 2022). Therefore, in the context of climate change and natural disasters (including slow-onset disasters), the agricultural sector is seriously affected and threatens food security by reduced primary food production and production instability (Thornton et al., 2014). To deal with this situation, Southeast Asian countries have launched many timely policies. The most chosen rapid adaptation strategy has been climate-resistant crop varieties, such as drought and salt-tolerant (ASEAN, 2022; Climate Change Commission, 2011; Council for Agricultural and Rural Development, 2016; General Directorate of Agriculture, 2013; Government of Lao PDR, 2010; Government of Viet Nam, 2017; Ministry of Agriculture and Forestry, 2014, 2015; Ministry of Environment, 2016; Ministry of National Development Planning, 2009, 2019; Ministry of Natural Resources and Environmental Conservation, 2017, 2019a, 2019b; Ministry of Planning Finance, 2018; Ministry of Social Welfare Relief, and Resettlement, Relief and Resettlement Department, 2012; National Economic and Development Authority, 2017; National Environmental Conservation Committee, 2012; Secretariat of State for Environment, Coordinating Minister for Economic Affairs, 2021; State Ministry of Environment, 2007; The National Council on Food Security, Sovereignty and Nutrition, 2014; The Office of Natural Resources and Environmental Policy and Planning, Ministry of Natural Resources and Environment, 2015). Utilizing climate-resistant varieties can enhance the resilience of crops to slow-onset disasters by making them more able to withstand water stress, soil degradation, and saline intrusion, resulting in more stable yields and improved food security (Karri & Nalluri, 2023).

Second, water management is another strategy that has been utilized to mitigate the effects of drought by optimizing water use and ensuring efficient distribution among different sectors, including agriculture (Climate Change Management and Coordination Division, Office of Natural Resources and Environmental Policy and Planning, 2017; Council for Agricultural and Rural Development, 2016; Department of Agriculture, 2010; General Directorate of Agriculture, 2013; Ministry of Agriculture and Forestry, 2014; Ministry of Environment and Forestry, 2022; Ministry of National Development Planning, 2019; Ministry of Natural Resources and Environmental Conservation, 2017, 2019a, 2019b; Ministry of Social Welfare Relief, and Resettlement, Relief and Resettlement Department, 2012; National Council for Food Security, Sovereignty and Nutrition in Timor-Leste, 2014; Secretariat of State for Environment, Coordinating Minister for Economic Affairs, 2021; State Ministry of Environment, 2007; The Ministry of Labor and Social Welfare, 2021; The Office of Natural Resources and Environmental Policy and Planning, Ministry of Natural Resources and Environment, 2015). This approach allows Southeast Asian countries to sustain agricultural activities, maintain ecosystems, and support communities' water needs during extended dry periods by conserving water (Shadeed et al., 2020). Moreover, proper water management plays a crucial role in controlling soil salinity by preventing water logging and excessive salt build-up, ensuring agricultural lands' continued productivity (Kumar & Sharma, 2020).

In addition, establishing a seed bank was another strength of the reviewed policies (Government of Viet Nam, 2017; Ministry of Agriculture and Cooperatives, 2017; Ministry of

Natural Resources and Environmental Conservation, 2017, 2019a; Ministry of Social Welfare Relief, and Resettlement, Relief and Resettlement Department, 2012). A seed bank is a repository for many crop seeds, encompassing traditional and climate-resistant varieties. By conserving diverse seed collections, the genetic diversity of crops is preserved (Honnay et al., 2007), ensuring the availability of resilient seeds capable of withstanding the impacts of slow-onset disasters. Seed banks store specially bred or selected seeds of climate-resistant varieties designed to tolerate various climatic stresses. When slow-onset disasters strike, farmers can access these climate-resilient seeds from the seed bank, enabling them to replant their fields and enhance their chances of maintaining crop productivity and food security despite adverse climate conditions.

Our findings also revealed a significant strength in the existing environmental policies across Southeast Asia, particularly in their strategic alignment to support food security amidst increasing drought conditions in the region (Zhang et al., 2021). According to ASEAN [2023], Southeast Asia has consistently faced severe droughts for a long time. In the last 5 years, the region has encountered the most formidable droughts in decades, affecting all ASEAN Member states. At the height of these events, more than 70% of the land area was impacted, exposing nearly 60% of the region's population. Hence, our findings are vital in providing strategic evidence for the region where agriculture plays a critical role in economies and sustenance. Furthermore, the analysis presented in this study brings to light a critical aspect of environmental policy-making in Southeast Asia: the adoption of a multihazard approach regarding slow-onset disasters by over half of the reviewed policies. This approach has been recognized as beneficial for designing effective disaster risk reduction policies (Bronfman et al., 2019). It allows decision makers to address climate-induced hazards and build resilience in infrastructure projects (Green & Chmutina, 2019). Furthermore, multi-hazard assessments help in exploring possible cascading impacts that may arise from the interaction of multiple hazards, thereby informing future hazard adaptation and reduction (Ihinegbu, 2021). Therefore, we urge policymakers and other stakeholders in Southeast Asia and beyond to prioritize the expansion and refinement of multihazard approaches in designing slow-onset disaster risk policies. The goal is to create a more resilient, adaptive, and sustainable approach to food security withstanding the complex challenges posed by slow-onset disasters in the region.

Limitations

Several limitations related to the scope of collected data can be identified within this study. First, the scope of the review was limited to publicly available online government policies on the critical components of the food security framework. Our analysis did not consider the policy's development, implementation, or outcome, rather it examined the content of policies as the manifestation of high-level government commitment and response to support food security in slow-onset disasters. This paves the way for future research to explore the effectiveness of Southeast Asian countries policies and assess the extent to which the policies are implemented in practice. In addition, as our study focuses on official government policy documents to analyze food security policies in slow-onset disasters in Southeast Asia, policy briefs and other policy documents published by regional agencies were beyond the scope of our study. Future research should consider including these elements to offer a more comprehensive understanding of policy development and food security strategies. This research direction opens the opportunities to examine the translation of the policy discourse led by research agencies and nongovernmental organizations on food security in slow-onset disasters into official national policies. Moreover, language limitation may have meant the exclusion of policy documents on food security, such as dietary diversity, during

slow-onset disasters published in local languages. In fact, only three policies were eliminated because they were not written in English, according to the findings of this study. Last, the analysis within this study focuses on the national or regional government levels; future research on lower-level policy would add more comprehensive strategies that improve food security in response to slow-onset disasters in Southeast Asian countries.

CONCLUSION

This study reviews existing policies introduced by the regional organization ASEAN and the governments of Southeast Asian countries to support food security in slow-onset disasters. The key findings of this study indicate that no specific government policies were developed at the regional or national levels in Southeast Asia to directly address food security in slow-onset disasters. Existing policies primarily focus on the first FAO pillar of food availability, modestly consider the second pilar of food access, and overlooked the last pillar of food utilization. Further action should be taken by policymakers to consider the pillar of food utilization to improve the dietary diversity of vulnerable populations in areas impacted by slow-onset disasters.

ACKNOWLEDGMENTS

This research is supported by the Griffith University International Postgraduate Research Scholarship (GUIPRS) for the first author (Hiep N. Le). Open access publishing facilitated by Griffith University, as part of the Wiley - Griffith University agreement via the Council of Australian University Librarians.

CONFLICT OF INTEREST STATEMENT

The authors declare no conflicts of interest.

ETHICS STATEMENT

Not applicable.

ORCID

Hai Phung http://orcid.org/0000-0003-1533-8074

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How to cite this article: Le, H. N., Sofija, E., Harris, N., Nguyen, T., & Phung, H. (2024). Food security in slow-onset disasters: A policy review in Southeast Asian regions. *World Medical & Health Policy*, *16*, 353–375. https://doi.org/10.1002/wmh3.604

APPENDIX A

See Table A1

TABLE A1 Search strategy.

Sources	Search strategy
Government websites	Started by accessing the official government websites: Ministry of Environment, Ministry of Agriculture, and Ministry of Health of each country in Southeast Asia. On each ministry's webpage, searched each individual tab for relevant policies. Or on Webpage Search Bar: searched each term: "National Policy," "National Plan," "National Strategy," or "National Guidelines." Then, selected policies that have a title, abstract, or summary related to "slow-onset disasters," or "creeping disasters," or types of slow-onset disasters[a] or "food security," or "food insecurity." In the case of websites that did not exhibit English, the online artificial intelligence tool (Google Translate) was used to translate from the local language to English to identify appropriate policies.
ASEAN	Started by accessing the ASEAN website (https://asean.org/). Then, searched each individual tab for relevant policies. Or on Webpage Search Bar: searched each term: "Regional Policy," "Regional Plan," "Regional Strategy," "Regional Guidelines." Then, selected policies that have a title, abstract, or summary related to "slow-onset disasters," or "creeping disasters," or types of slow-onset disasters[a] or "food security," or "food insecurity."
United Nations Office for Disaster Risk Reduction	Started by accessing the website: https://www.preventionweb.net. Navigated to the Main webpage Information Tabs, then searched with the theme: policy and plans, then limited the Region and Country to Asia and chose policies that have a title, abstract, or summary related to "slow-onset disasters," or "creeping disasters," or types of slow-onset disasters[a] or "food security," or "food insecurity" in Southeast Asian countries and ASEAN.
Food and Agriculture Organization	Started by accessing the website: https://www.fao.org/faolex/country-profiles/en/. Then, searched each individual country's profile and read through Policies, Legislation, and International Agreements. Then, selected policies that have a title, abstract, or summary related to "slow-onset disasters" or "creeping disasters" or types of slow-onset disasters[a] or "food security" or "food insecurity." To search for ASEAN, the keyword "ASEAN" was typed into the webpage search bar. After that, selected policies that have a title, abstract, or summary related to "slow-onset disasters" or "creeping disasters" or types of slow-onset disasters[a] or "food security" or "food insecurity" within regional ASEAN.

Abbreviation: ASEAN, Association of Southeast Asian Nations

[a]Types of slow-onset disasters included droughts, increasing temperatures, desertification, loss of biodiversity, land and forest degradation, ocean acidification, sea level rise, and salinisation (United Nations, 2011; UN Office for Disaster Risk Reduction, 2015, p. 10). The glacial retreat was not included due to its inappropriate with the Southeast Asia region.

AUTHOR BIOGRAPHIES

Hiep N. Le is a PhD candidate at the School of Medicine and Dentistry, Griffith University, Australia.

Ernesta Sofija, PhD, is Senior Lecturer in Public Health and Health Promotion at the School of Medicine and Dentistry, Griffith University, Australia.

Neil Harris, PhD, is Director, Higher Degree Research for the Health Group and Professor of Public Health at the School of Medicine and Dentistry at Griffith University, Australia.

Thu Nguyen, PhD, is Associate Lecturer at the School of Government and International Relations, Griffith University, Australia.

Hai Phung, MD, MPH, PhD, is Program Director of Public Health (Postgraduate) and Senior Lecturer in Epidemiology, Research Methods and Global Health at the School of Medicine and Dentistry, Griffith University, Australia.