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Transforming food systems in Maritime Southeast Asia and Pacific Small Island Developing States to support food security and sustainable healthy diets

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Food is one of the basic necessities for human life. Nutritious food is essential for human health and helps oneself live up to our best potential as productive members of society. In spite of this, 3 billion people are estimated to have limited access to nutrient-rich food, and there are 768 million undernourished people in the globe today. There are still concerns with food systems and food security, despite the fast economic transformation of low- and middle-income nations in Maritime Southeast Asia and Oceania over the past 10 years. These issues include dwindling agricultural land, deforestation, ineffective food supply networks, environmental degradation, changing and unhealthy diets, non-communicable diseases, disappearing cultural legacy, and ineffective policies. These problems are exacerbated by climate change, natural hazards, and pandemic shocks. This review explores the perspectives of food systems that relates to all the elements and activities in transforming agri-food industry. In this paper, we discuss the

challenges and solutions to transforming food systems in this region to achieve a sustainable and healthy diet for all, with the perspective of bringing the region closer toward the UN sustainable development goals. This paper is an outcome of the deliberations that took place during the Food Security in Small Islands and Developing States workshop in 2020. It also includes insights from subsequent expert group sessions that focused on the following topics: Agriculture and Food Systems; Nutrition, Health, and Culture; Innovations and Digitalization in Food Systems; as well as Policies Coordination and Future Shocks.

KEYWORDS

food security, food system, sustainable, healthy diets, Southeast Asia and Pacific Islands

1 Introduction

Developing nations in Maritime Southeast Asia (MSEA) and Pacific Small Island Developing States (PSIDS) have undergone rapid economic transformations over the last decade. One of the Sustainable Development Goals (SDGs) stressed the significance of realizing the goal of “End hunger, achieve food security and better nutrition, and promote sustainable agriculture,” as stated in the United Nations’ list of SDGs (Lin et al., 2022). The Sustainable Development Goals (SDG) require a strong global food system and food security. The region’s food security and food networks, however, face a number of challenges. Deforestation, unhealthy diets, environmental degradation, declining agricultural land, non-communicable diseases, declining cultural legacy, and ineffectual policies are a few of these. An estimate of 5.5% of the world’s population lives in MSEA and PSIDS, which are particularly susceptible to changes in the food system and are therefore at the forefront of food insecurity (World Bank, 2019a). Due to a variety of factors, including their small annual GNI (especially PSIDS) (Figure 1B), size and location (Figure 1A), rapid population development, and purchasing power, countries in the area are vulnerable (UNDP, 2019). These problems are and will be further exacerbated by climate change, natural hazards and pandemic shocks (UNESCAP, 2021).

In this paper, we identify the challenges of transforming MSEA and PSIDS food systems to achieve sustainable and healthy diets in three key areas: (1) agriculture and food systems, (2) nutrition, public health, and food cultural heritage and (3) innovations and digitalization in food systems. We then identify gaps in current knowledge and suggest where policies might be usefully developed to bring the region closer to achieving the UN sustainable development goals. For the challenges in each of these categories, we provide plausible recommendations, and then finally conclude with the largely untapped, underutilized, and underestimated possible collaboration between MSEA and PSIDS countries to address these challenges. Our assessment focuses on low- and middle-income economies in MSEA and PSIDS (Figure 1) as they share similar economic development pathways, ecological, climatic, and cultural characteristics which impact and shape their shared food systems. Many of these countries also have colonial histories. They include 14 Commonwealth countries, 18 UNESCO SIDS member states (UNESCO, 2022), 8 ASEAN nations (ASEAN, 2024), 2 OECD (Organization for Economic

Co-operation and Development) (OECD, 2024a), 2 DAC (Development Assistance Committee) (OECD, 2024b), and 22 ODA (Official Development Assistance) recipients (OECD, 2024c).

This paper presents the outcomes of the Food Security in Small Islands and Developing States online workshop held from September 1st to 4th, 2020. During the workshop, experts in various fields, who conduct research across the region, came together to discuss their research. Following the workshop, participants were asked to write contributions based on their assigned groups, which included Agriculture and Food Systems, Nutrition, Health, and Culture, Innovations and Digitalization in Food Systems, and Policies Coordination and Future Shocks. Subsequently, a small working group was formed to compile and refine these write-ups into the final report.

2 Agriculture and food systems

In the absence of knowledge about the practicalities of implementing sustainable diets and the variety of factors that could be in play, in this part, we focused more narrowly on research about broader initiatives in agriculture and food systems. Food systems includes producing, processing, packaging and selling food. The players in the food system range from farmers, small and medium-sized businesses, and multinational companies. Smallholder farmers make up a significant portion of the agricultural sector in PSIDS. Root crops, vegetables, fruit, and livestock for domestic uses, excess sales, and offerings are typical components of smallholder production strategies. These strategies are complemented by revenue from primary commodities like copra, kava, cocoa, coffee, and vanilla (Shukrullah, 2018). Some of the challenges faced by family farmers includes: (i) the compact size of farmland; (ii) the difficulty gaining access to adequate input resources, such as better farming varieties, high-quality fertilizer, and agrochemicals; (iii) the difficulty obtaining access to production technological advancements; (iv) the lack of improved husbandry knowledge; (v) the urbanization of labor in the agriculture sector; (vi) and the poor quantity of international manufacturing investor (Shukrullah, 2018). MSEA and PSIDS share many similarities in their agricultural and food systems including production, processing, marketing, distribution, consumption, and disposal, which together often result in inefficient use, unhealthy food, and decreased food security.

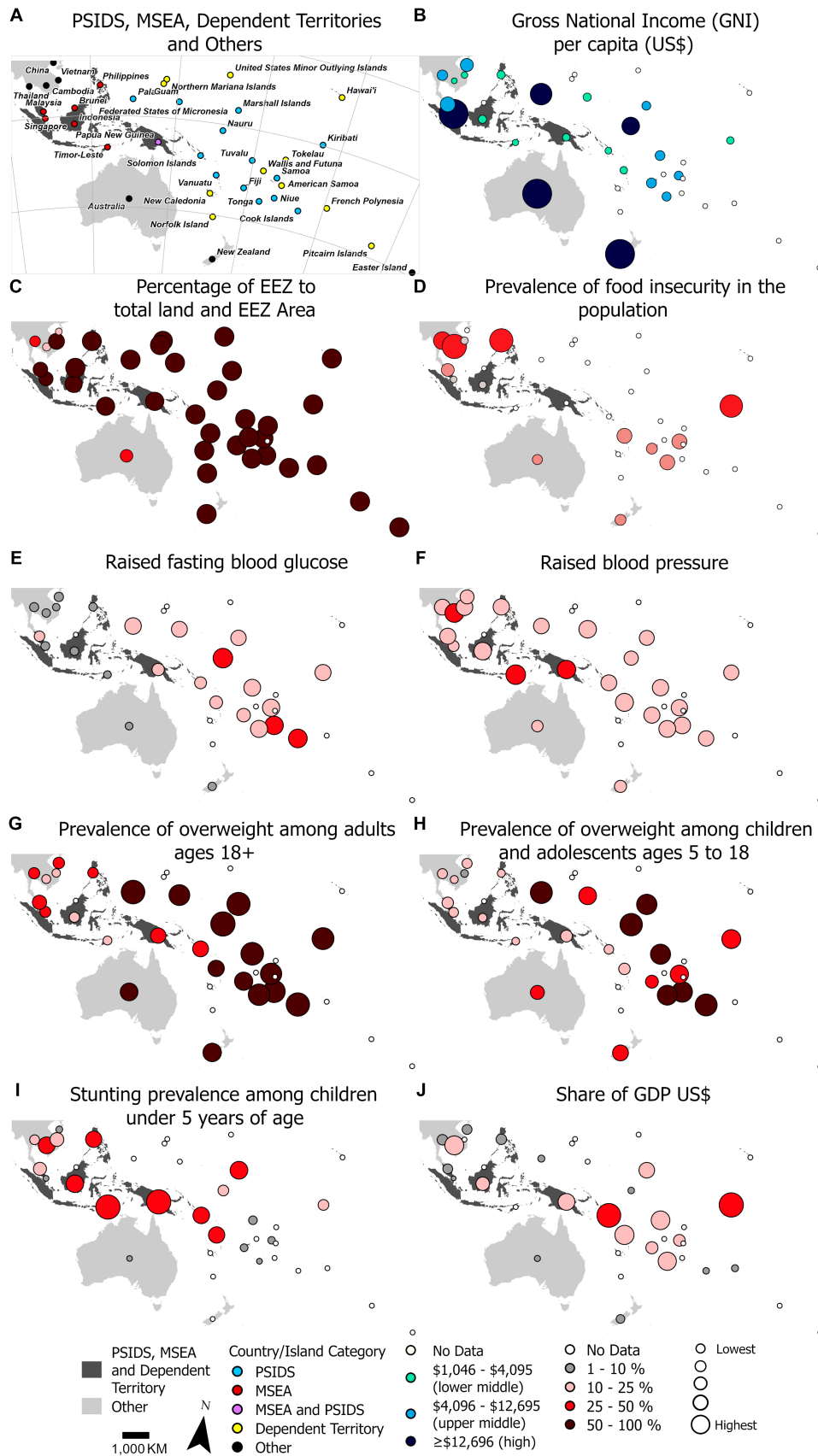


FIGURE 1 (A) Map of study area, including the Pacific Small Island Developing States (PSIDS), Maritime Southeast Asia (MSEAS) and Dependent Territories. Other countries and islands that are not part of these categories but within the mapping region such as Australia and New Zealand, were included for

(Continued)

FIGURE 1 (Continued)

comparative purposes. (B) Total gross national income (GNI) per capita (US\$) (The World Bank 2022). (C) Percentage of Exclusive Economic Zone (EEZ) to total land and EEZ are. (D) Percentage prevalence of moderate or severe food insecurity in the total population for year 2019 calculated from 2018 to 2020 (3-year average) (FAO, 2022). (E) Percentage prevalence of population with fasting glucose ≥ 126 mg/dl (7.0 mmol/l) or history of diagnosis with diabetes or use of insulin or oral hypoglycemic drugs for year 2014 (WHO, 2022). (F) Percentage prevalence of population with raised blood pressure (systolic blood pressure ≥ 140 OR diastolic blood pressure ≥ 90) for year 2015 (WHO, 2022). (G) Prevalence of overweight among adults [BMI ≥ 25 (%)] for year 2016 (WHO, 2022). (H) Prevalence of overweight among children and adolescents, BMI $> +1$ standard deviations above the median (%) for year 2016 (WHO, 2022). (I) Prevalence of stunting (height-for-age < -2 standard deviation from the median of the World Health Organization (WHO) Child Growth Standards) among children under 5 years of age for year 2020 (WHO, 2022). (J) Percentage share of GDP for Agriculture, Forestry and Fishing) for year 2019 (FAO, 2022). Note the circle in white indicates countries with no data available for a specific indicator.

Most of the countries share similar tropical climates, crop species, agricultural systems, and shared histories of colonization (Figure 1). But they also have significant differences, such as for PSIDS, subsistence agriculture was traditionally practiced in rural areas by small-scale farmers, but this has declined rapidly due to the expansion of cash crop production and urbanization (Connell, 2015). The result has been changes in food consumption patterns away from traditional root crop-based diets to highly processed imported food, reducing the supply of local nutritious food associated with the diversity of traditional wild foods (Guell et al., 2021).

The region's Pacific Islands devote billions of dollars to importing goods from the primary sector, which includes forestry, farmland, fisheries, and aquaculture. Urban residents have little ownership of land, do not grow their own food, and rely heavily on imported foods. Imported goods play a significant role in the diets of Pacific Islanders and have evolved into staples in many of the region's islands. In the Solomon Islands, grains, wheat, and noodles are now considered essential foods. The top five main industry imports for the majority of Pacific Island nations are meat, cereals and cereal products, beverages, food preparations, and sugar. The aforementioned imported food items are the main food groups that comprise over 50 % of the overall dietary energy consumed in certain PSIDS (Sherzard, 2020).

In comparison, the majority of MSEA agriculture is a combination of small-scale and industrial farming, with rice serving as the primary crop and staple food (De Koninck and Rousseau, 2013; Birthal et al., 2019). Palm oil production has also expanded rapidly in Malaysia and Indonesia, along with other cash crops such as coffee and coconut (De Koninck and Rousseau, 2013). In cities that frequently rely significantly on food imports, urban farms are essential to creating a more stable food system. In the event that the food supply networks are disrupted, these farms act as a buffer for the market's supply (Kulasooriya et al., 2022). Farmers can also cultivate a broad range of products all year long thanks to urban agriculture. Farmers can minimize issues brought on by pests and diseases that are carried by the soil by using soilless agricultural systems like aeroponics and hydroponics, and they can additionally improve produce output.

The expanding agricultural industry has helped with job creation, agribusiness startup possibilities, and poverty alleviation (Anik et al., 2017). Rapid population growth has increased the demand for food, which has accelerated agricultural production in favor of high-value crops. This has been done by expanding the land, primarily through deforestation (Hosonuma et al., 2012), rather than by making technological advancements and diversifying the agricultural industry. Tropical agriculture is the major direct driver of deforestation (Salim, 2010), which has caused 70% of forest loss in the tropics (Hosonuma et al., 2012; Ritchie and Roser, 2021). Food systems and associated

land-use practices and change (i.e., deforestation) account for approximately 30% of total greenhouse emissions and therefore directly contribute to climate change (Mbow et al., 2019). The impacts of climate change, including increased climatic extremes such as droughts and floods and sea level rise, and land tenure issues limit local production and accelerate a transition away from agriculture in some areas (Mendelsohn, 2008).

Across the region there has been a trend toward a smaller number of crops, including cash crops, resulting in a loss of knowledge and a reduction in the utilization of traditional crops associated with subsistence agriculture, consequently decreasing resilience and impacting food security. Globally, there is an enormous diversity of edible plants. However, only 103 plants out of 30,000 edible plant species account for 90% of the global food supplies (Arora, 2014), with three main global crops (wheat, rice and maize) supplying over 50% of plant-based food (FOA, 2019). In particular for MSEA and PSIDS, this narrowing threatens agricultural biodiversity and sustainable production systems and eventually has an effect on food security, nutrition, and socioeconomic resilience (Hoeschle-Zeledon and Jaenicke, 2009; Mustafa et al., 2019).

At the other end of the supply chain, the scale of food loss and waste (FLW) in MSEA and PSIDS is similar to developed countries, with approximately one-third of the total food produced being lost, and more than 30% of food loss occurring after harvesting and during processing (Asian Development Bank, 2013; Underhill and Kumar, 2014). Postharvest management is increasingly recognized as an essential strength for MSEA and PSIDS to adapt to volatility and uncertainty (Choudhury, 2006; Acedo and Weinberger, 2009; Kowlessar, 2018). The major causes for FLW in the region are the lack of on-farm postharvest infrastructure, limited or discontinuous access to labor, poor transport systems, a lack of a cool chain, and general supply chain dysfunction (Choudhury, 2006; Asian Development Bank, 2013; Kitinoja, 2016).

In summary, due to the limitation of agricultural land availability, farms in PSIDS are generally small in comparison to MSEA. However, MSEA farms are mostly planted with cash crops which are more profitable. Therefore, both MSEA and PSIDS still rely heavily on food imports particularly of staple food. Most large-scale plantations in MSEA are adopting advanced technological approaches to their agricultural practices. Such technology advances are beyond the reach for farms in PSIDS due to economic scale and practicality. Urbanization, which results in labor mobilization, is a major problem faced by the farms in both MSEA and PSIDS. For MSEA, foreign laborers are recruited to work in the farm while in PSIDS, family members are the main source of labor on farms.

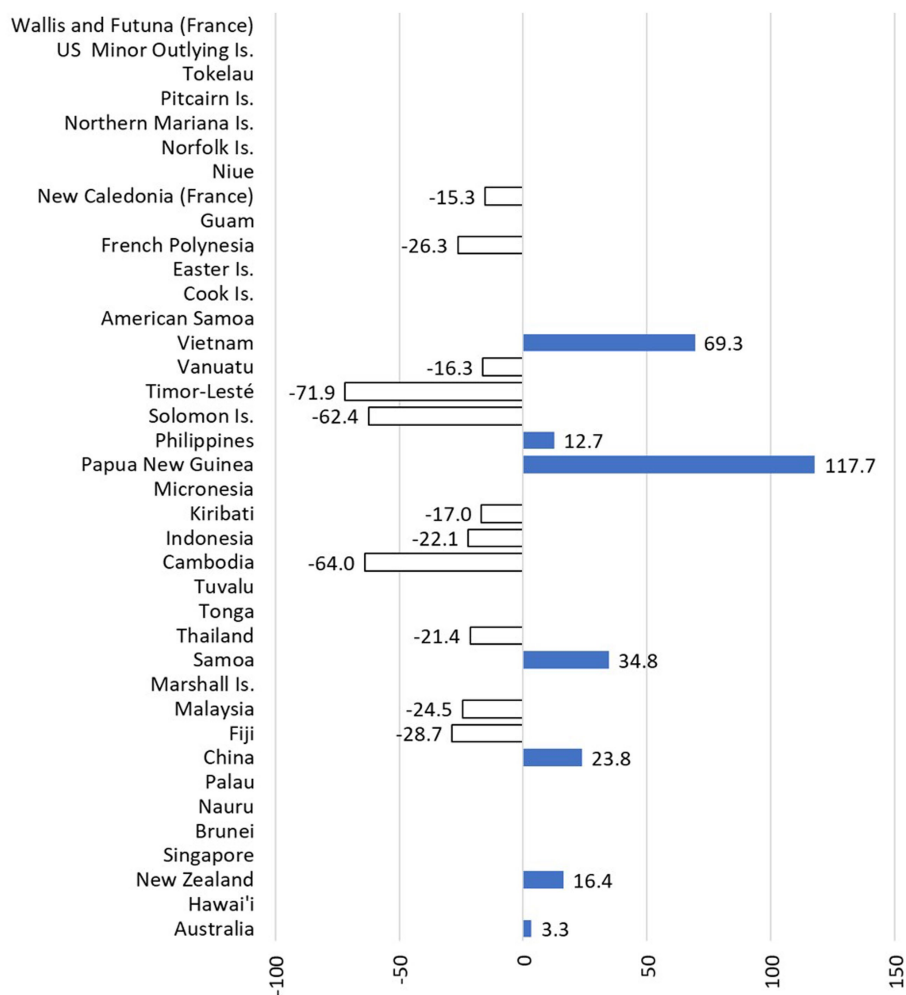


FIGURE 2

Percentage difference between fruits and vegetables supply available for consumption and the minimum amount required by the population (400g per capita per day) (FAO, 2022). Positive % indicates surplus above minimally required amount, and negative % for the gap to achieve 400g.

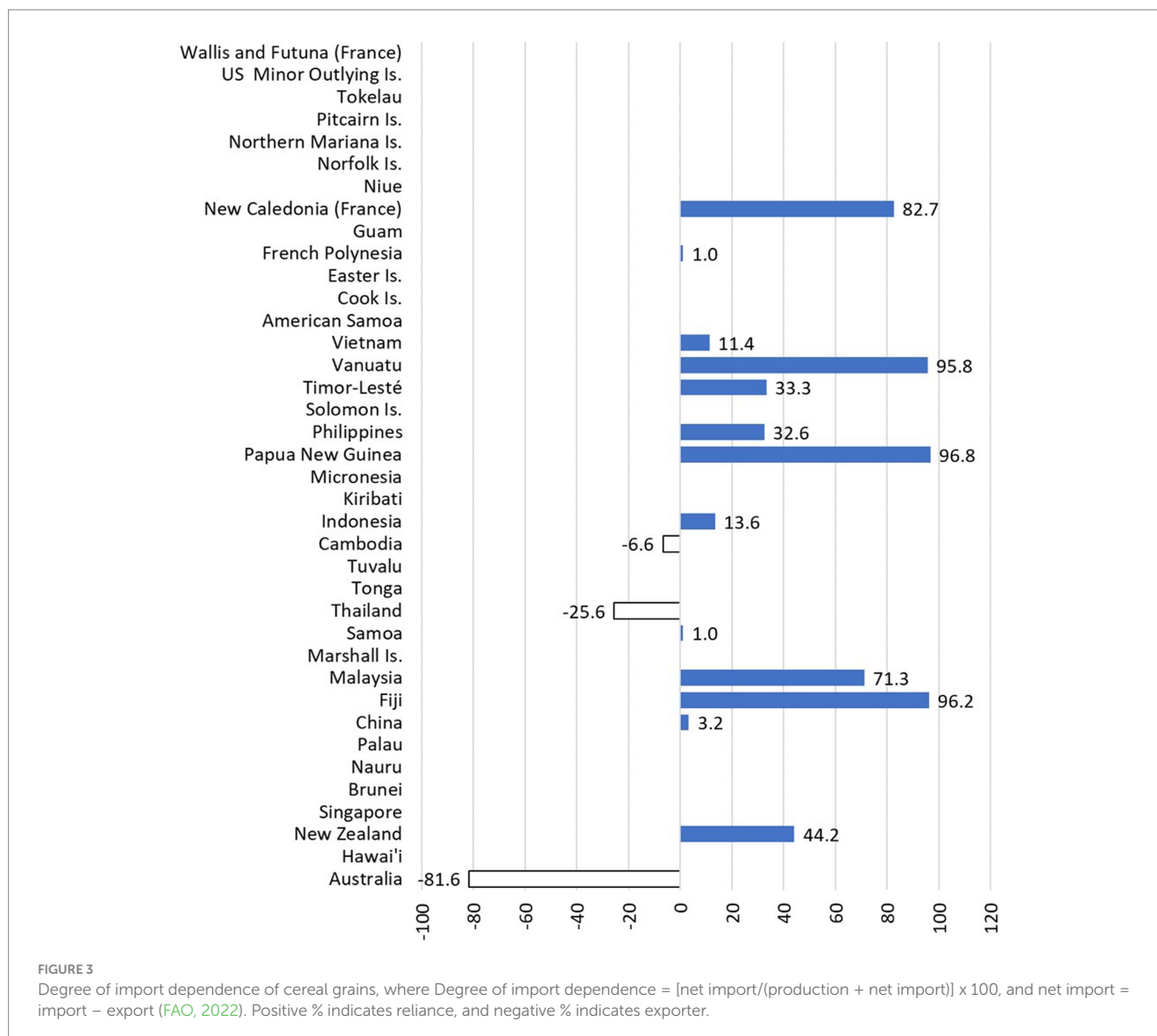
3 Nutrition, health, and culture

The effects of industrialization, increased cash crop production, liberalization of world trade and urbanization are driving changes in nutrition, culture, and diet in MSEA and PSIDS with dramatic consequences for population health. Across the region there is an obesity epidemic (Figures 1G,H) that is accompanied by a high prevalence of non-communicable diseases (NCD), such as diabetes and hypertension (Figures 1E,F), with the prevalence of diabetes in PSIDS being at least twice that of the global average (WHO, 2022). The co-existence of obesity and NCD with food insecurity (Figure 1D) and stunting among children under five (Figure 1I) clearly points to the failure of the food systems in MSEA and PSIDS to provide balanced nutrition to the population. The economic impacts of obesity have shown to be substantial globally, irrespective of economic or geographical context (Okunogbe et al., 2021) and prevalence of NCDs in populations will result in reduced productivity leading to stagnant economic growth (Jaspers et al., 2015).

Colonization and Westernization of diets can overshadow traditional consumption of healthy and nutritional food and its preparation, especially in PSIDS. PSIDS import large amounts of ultra-processed energy-dense, nutrient-poor (EDNP) foods and

beverages, such as two-minute noodles, sweet drinks and high-fat canned meat, which negatively impact diets. The consumption of EDNP foods is very prevalent among PSIDS (Sievert et al., 2019) due to aggressive marketing, along with food dumping by other nations and indiscriminate imports of non-conforming products, such as restructured meat products containing high fat but low protein (Gewertz and Errington, 2010; Snowdon and Thow, 2013; Thow et al., 2017). Furthermore, access to fruit and vegetables in the region is often limited (Figure 2), and hence intake is low (Lako et al., 2019). The urban poor are particularly at risk because of little to no access to land for subsistence production of fruits and vegetables. Some of the proposed government strategies to address obesity and other diet-related non-communicable diseases include the implementation of a healthy school food policy, junk food and sugar taxes, advertisement bans and initiatives to ban the importation of EDNP foods in multiple jurisdictions in PSIDS and MSEA (Veatupu et al., 2019).

Nutritious and climate-resilient crops, including traditional crops, suited for local agro-ecological conditions and geo-social contexts can also address diet-related issues by encouraging traditional food and the consumption of underutilized crop species. Some locally grown food crop such as taro (*Colocasia esculenta*) has played a leading role



as an important starch source, which can be maintained as a semi-feral crop with little human intervention. Since taro is a very hardy and resilient crop, it can be brought into cultivation rapidly to address food shortages and provide food supplements to reduce dependencies on imported cereals (Figure 3). Such crops adapted to the region can contribute to diversifying staple foods, away from rice and wheat. While the impact of plant-based alternatives to meat are commonly advocated to address climate change and health (Clark et al., 2019; IPCC, 2022), such a change is yet to be observed in PSIDS and MSEAS, as diets are strongly linked to culture and identity (Reddy and van Dam, 2020).

4 Innovations and digitalization in food systems

Food traceability systems, smart farming and customization and personalization through digitalization are changing food systems in MSEAS and PSIDS (ASEAN, 2022; Kulasoorya et al., 2022). First, there has been an opening up of supply chain

efficiency and transparency for both producer and consumer (World Bank, 2019b), which includes the application of traceability systems such as real-time monitoring systems for post-harvesting, extraction and manufacturing stages using Quick Response (QR) codes and Radio Frequency Identification (RFID) tags (Costa et al., 2012). For instance, the dietary supplement company “Nutrilite” has established the 9-step traceability process (i.e., botanical, seed selection, farm selection, growing, harvesting, extracting, manufacturing, packaging and consumer) to ensure food safety for their consumers. Secondly, smart farming allows the integration of information and communication for precision farming including sowing, irrigation, fertilizer, pesticide, and herbicide application, and harvesting (Bach et al., 2010), utilizing automated vehicles, earth observation, drones, low-cost sensors, and robots for the agricultural activities (Mauser et al., 2015). Another aspect of innovation that contributes to fruits and vegetables with longer shelf lives, better organoleptic quality, nutritional value, safety, and healthfulness is the preservation methods. Processing, storage, transportation, and distribution expenses are

significantly affected by the preservation technique. One of the oldest and most popular postharvest practices is drying, which is a feasible and efficient preservation method. Fruit, vegetables, spices, and herbs, as well as meat and fish, all have considerably longer shelf lives and better nutritional value when dried. The latest and most optimistic novel drying methods is called “smart drying,” which involves using sensors, tools, and procedures (such as monitoring and controlling standard and drying variables and/or the dryer’s conditions, etc.) to increase drying performance. A cutting-edge method that is being used to non-destructively identify and evaluate quality changes in several fruits and vegetables is near-infrared (NIR) spectroscopy as a smart drying technology (Moscetti et al., 2017). The application of NIRS has been utilized for the investigation of many crops in MSEA such as durian (Somton et al., 2015), tapioca starch (Phetpan and Sirisomboon, 2015), oil palm fresh fruits (Novianty et al., 2020) and black rice (Chen et al., 2018). Finally, health-conscious consumers can be supported with customization and personalization of products and ingredients through devices which identify the nutritional value of the food via mobile phone apps (Prasad et al., 2019) and 3D food printing kitchen appliances with customizable ingredients and nutrition (Sun et al., 2015).

5 Policy coordination and future shocks

The proposed policies need to take into consideration the balance of economic demands with food security and to implement short-and

long-term approaches in order to increase food productivity, farm incomes, targeted nutrition interventions and job creation. Long-term investment and promotion of rural agriculture are necessary to reduce supply and demand shocks. While, at a national level, short-term intervention can provide emergency assistance for food supply and enhance social safety nets (Berhane et al., 2014). However, developing and implementing policies can be challenging due to the diverse regulatory practices, lack of cooperation and legal obligations that differ between member countries, especially for cross-border policies related to food imports (Islam and Kieu, 2020). There are numerous policies and programs developed in MSEA and PSIDS coordinated among member states to manage long-term (i.e., NCDs and climate change) and short-term food issues and shocks. For example, following the food supply crises in 2007–2008 and 2010, the Asian Development Bank (ADB) in collaboration with a number of international organizations outlined the potential for a food policy framework (Asian Development Bank, 2013). Other policies and programs such as the Vientiane Action Program (2004–2010) (ASEAN, 2007) and the ASCC Blueprint (ASEAN, 2016) have also been developed to manage long-term volatility in food prices and access.

Policies in the region need to address shocks to food security since many countries in the region are some of the most vulnerable (Greenville and Kawasaki, 2018) to the impact of climate change likely on markets, supply chains and agricultural production (McLeod et al., 2019; Islam and Kieu, 2020). There are already a range of policies addressing this vulnerability including five joint statements released by the ASEAN Heads of States between 2007 and 2014 to support climate change resilience. The ASEAN Climate Change Initiative (ACCI) was established for discussions between member states on agriculture, forestry, energy, and natural disaster

TABLE 1 Recommendations for transforming food systems in MSEA and PSIDS.

Domain	Challenge	Recommendation
Agriculture and food systems	Crop diversification	Building sustainable food systems requires a wider use of local underutilized crops and forest resources, and has great potential in the region, which is home to several mega-biodiversity countries (Malaysia, Indonesia, Philippines, Thailand, Papua New Guinea, Australia). The local underutilized crops are rich in nutrients and locally adapted (Jaenicke, 2013).
	Food waste	Provide incentives to reduce food losses by using the latest technologies including waste valorization to convert waste products into value-added products (Stevens et al., 2018; Xiong et al., 2019). For example, fish production produces almost 60% waste-product in the forms of skin and bone. Reduction in waste from food packaging and application of Circular Economy approaches (Chen et al., 2021).
	Food systems	Strengthen local food systems (and infrastructure) to complement global food supply systems, which can be unreliable and risky.
Nutrition, health and culture	Health and nutrition	Work with responsible manufacturers to supplement nutritious food and develop affordable and appealing alternatives to EDNP foods, including farm-to-table food production.
	Education	Healthy food choice education at community centers, religious organizations and schools including re-invigorating local food production (i.e., home and school gardens).
	Nutrition	<i>In-situ</i> fortification of staple foods can also be a cost-effective alternative to help improve micronutrient status (Xie et al., 2021). Diversify production and consumption of local nutritious foods. For example, marine vegetables, such as Caulerpa (edible sea algae grapes), is abundant but is underused as food in local culture.
Innovations and digitalization in food systems	Innovative technologies	In PSID and MSEA these innovative technologies are relatively underdeveloped compared to high income countries and need to be customized to the region.
Policy	Coordination	Greater coordination between jurisdictions to create shared policies and strategies.
	Funding	Funding to support such initiatives such as meal subsidies (i.e., school and company lunches) and innovative small and medium enterprises focused on food sustainability
	Transdisciplinary	Develop evidence-based food policy and practice to transform food systems supported by training and developing in transdisciplinary research and policy to address cross-sectoral issues such as food, health, and environment

management that affects food security. While a climate change action and food security framework has been developed by the Pacific Islands Forum (PIF), policies also need to address other shocks to food systems such as the financial crisis and most recently by the Covid-19 pandemic. Since January 2020, global food prices have increased by 40%, such as maize prices which increased by 66%, wheat prices by 23% and cereal prices by 45% higher (World Bank, 2021). The pandemic exacerbated malnutrition, with an estimated 3 billion people having limited access to nutrient-rich food (FAO et al., 2020). The pandemic has magnified pre-pandemic vulnerabilities and inequities especially in agricultural and rural communities (Yasmi et al., 2020).

6 Discussion

MSEA and PSIDS is a unique region home to both poor and emerging economies, with most countries in lower-middle income economic categories. Approaches to transform food systems to address food security and sustainable healthy diets in the region range from agricultural practices to digitalization. In Table 1 we provide a range of recommendations for addressing these challenges.

The region is experiencing rapid economic growth and with the advancement in international connectivity, resulting in the adoption of Western food systems and culture including the consumption of ultra-processed unhealthy food. The challenge now is to increase the consumption of healthy and nutritious food within local food system. As agriculture is very closely linked with food supply, there is a need to regulate agricultural activities and land use so that the environmentally friendly food can be produced. However, the agricultural system is a leading cause of deforestation in the region, a global biodiversity hotspot (Lamb, 2010; Carrasco et al., 2017). Harnessing the region's biodiversity in underutilized crops for food security and nutrition may play an important role in future food supplies of diverse and nutritious foods. Transforming food systems through a wider use of underutilized crops would also act as a buffer against the effects of climate change and will provide natural and socio-economic resilience (Jaenicke, 2013) to safeguard our planet for future generations. Achieving diet equality with minimum disruption to the environment in this region requires appropriate social intervention through policies that are formulated after adequate consultations with all the stakeholders involved.

Transforming the region's food system is not going to be an easy journey as there are many factors and a vast diversity of people involved. However, coming together to identify the problems will be a first step toward achieving a nutritious, healthy and sustainable diet for all those who reside in this region, especially in the face of natural disaster and pandemics. The potential of collaboration between MSEA and PSIDS is underexplored, underexploited, and underappreciated. The response to the pandemic provides a snapshot of the opportunities for MSEA and PSIDS countries to work together. Policies to address Covid-19 impacts include the ASEAN+3 Emergency Rice Reserve to strengthen the food supply safety net (ASEAN, 2020; Kim et al., 2020) and the FAO investing USD 30 million to improve economic inclusion and social protection to reduce poverty in Asia, acknowledging the greater

impact of Covid-19 on women rather than men (FAO, 2020). South-south learning and cooperation is a promising prospect to increase knowledge transfer and enhance policy coherence via transdisciplinary and transnational research in MSEA and PSIDS. This can be achieved by co-developing solutions to address their development challenges.

7 Conclusion

In summary, this paper underscores the persisting and pressing issues related to food security and sustainable, healthy diets in MSEA and PSIDS. These challenges include diminishing agricultural land, deforestation, inefficient food supply networks, environmental degradation, shifting and unhealthy dietary patterns, non-communicable diseases, loss of cultural heritage, and ineffective policies. Furthermore, these challenges are further exacerbated by climate change, natural disasters, and pandemics. The paper illustrates the complex and interconnected nature of these challenges, highlighting the need for a holistic approach to transform the food systems in the region, aligning with the UN Sustainable Development Goals. To address these shared challenges effectively, the region can tap into the untapped potential of South-South collaboration between MSEA and PSIDS countries. Collaborative knowledge-sharing and cooperation among these nations have the potential to yield more efficient policy interventions and innovative solutions, ultimately fostering a more resilient and sustainable food future in the region.

Author contributions

CC: Conceptualization, Formal analysis, Funding acquisition, Project administration, Writing – original draft, Writing – review & editing. EG: Conceptualization, Formal analysis, Writing – original draft, Writing – review & editing. ACC: Conceptualization, Formal analysis, Writing – original draft, Writing – review & editing. MA: Conceptualization, Formal analysis, Writing – original draft, Writing – review & editing. PS: Conceptualization, Funding acquisition, Supervision, Writing – review & editing. CS: Conceptualization, Funding acquisition, Supervision, Writing – review & editing. AA: Conceptualization, Supervision, Writing – review & editing. SA-A: Conceptualization, Supervision, Writing – review & editing. RB: Conceptualization, Writing – review & editing. AC: Conceptualization, Writing – review & editing. HM: Conceptualization, Writing – review & editing. KK: Data curation, Writing – review & editing. KSK: Conceptualization, Writing – review & editing. GK: Conceptualization, Funding acquisition, Writing – review & editing. PM: Conceptualization, Funding acquisition, Writing – review & editing. FM: Conceptualization, Writing – review & editing. ML: Conceptualization, Writing – review & editing. RS: Data curation, Writing – review & editing. MS: Conceptualization, Writing – review & editing. BM: Conceptualization, Writing – review & editing. PN: Conceptualization, Writing – review & editing. AL: Conceptualization, Data curation, Formal analysis, Supervision, Writing – original draft, Writing – review & editing.

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