

Interventions and policies aimed at improving nutrition in Small Island Developing States: a rapid review

Catherine R. Brown¹, Kern Rocke¹, Madhuvanti M. Murphy¹ and Ian R. Hambleton¹

Suggested citation Brown CR, Rocke K, Murphy MM, Hambleton IR. Interventions and policies aimed at improving nutrition in Small Island Developing States: a rapid review. Rev Panam Salud Publica. 2022;46:e33. <https://doi.org/10.26633/RPSP.2022.33>

ABSTRACT

Objective. To describe features of nutritional interventions implemented in Small Island Developing States (SIDS) in the past 20 years.

Methods. A rapid scoping review was conducted by searching PubMed and Web of Science databases for interventions conducted in SIDS that sought to improve the nutrition of their populations between 2000 and 2019 inclusive. The *Noncommunicable diseases progress monitor 2020* was also examined to assess nutritional policies in SIDS.

Results. A total of 174 interventions were implemented in 49 of the 58 SIDS. The greatest proportion were conducted in the Caribbean (75 interventions; 43%), with the Pacific region, and the Atlantic, Indian Ocean, Mediterranean and South China Sea region each implementing about 30% of interventions. Using the NOURISHING framework, most interventions (67%) were implemented at the community and national or policy level, using multiple components of the framework. The greatest proportion of interventions (35%) were educational and awareness raising. Restrictions on physical availability of and increased taxation on alcohol were the most commonly reported policies that were partially or fully achieved; restrictions on fats were the least commonly reported. These findings were generally consistent across the SIDS regions.

Conclusions. There is a paucity of nutritional policies in SIDS; the reasons may be linked to their social, economic, and environmental vulnerabilities. Interventions should be expanded beyond education to encompass multiple components of the NOURISHING framework, with multisectoral inclusion to ensure stronger stakeholder collaboration and buy-in. A systematic review is warranted using a fuller range of sources to assess the effectiveness of interventions.

Keywords

Nutrition; policy; food and nutrition security; developing countries.

Small Island Developing States (SIDS) is a term designated by the United Nations that refers to a group of 58 small island countries located in the Caribbean, the Pacific, and the Atlantic, Indian Ocean, Mediterranean and South China Sea (AIMS), which share complex social, economic, and environmental vulnerabilities (1, 2). These vulnerabilities contribute partly to their high burden of chronic noncommunicable diseases (3, 4). For instance, the prevalence of child stunting in five of the poorest SIDS exceeds 20% (4). On the other hand, more than half

of SIDS report a prevalence of adolescent obesity of $\geq 10\%$ and adult obesity of $\geq 20\%$, with the highest rates found in the Pacific region (5). For example, 32% and 61%, respectively, of adolescents and adults in Nauru are obese (5). In addition, Trinidad and Tobago has the highest prevalence of diabetes in the Caribbean, with 46% of adults suffering from the condition (5).

Amidst an environment of unstable food supply and accessibility, food utilization in SIDS is characterized by nutritionally poor food choices (4). A nutrition transition has occurred where

¹ George Alleyne Chronic Disease Research Centre, University of the West Indies, Cave Hill Campus, Bridgetown, Barbados. ✉ Catherine R. Brown, catherinerbrown@gmail.com

locally grown foods have been largely replaced by imported foods, which include many calorie-dense, processed items (6, 7). Yet, consumption of good-quality local food is critical, not only for food security and population health, but also for national economic development, as it is a means of generating income through local agriculture and, at the same time, reducing the economic burden of diet-related noncommunicable diseases (6).

The 2017 Global Action Programme on Food Security and Nutrition in SIDS has a three-pronged approach to improving food and nutrition security, namely: strengthening the enabling environments for food security and nutrition; improving sustainability, resilience, and nutrition-sensitivity of food systems; and empowering people and communities for food security and nutrition (4). Food labeling, nutrition standards and guidelines, food marketing, nutritional quality of the food supply, trade and fiscal policies, and food chain incentives are all potential areas for action (8). This interdisciplinary approach is argued to be especially necessary in the field of nutrition as it is related to economic, political, and environmental sciences and it influences humans at physiological, social, and environmental levels (9).

With this backdrop of a high noncommunicable disease burden and poor food utilization, and well documented approaches to improve nutrition in SIDS, it is important to understand what is being done on the ground within these countries to reduce this malnutrition burden. As no reviews have been published that examine what is being done in SIDS to improve the population-level nutritional status, this rapid review sought to document, classify, and describe the features of nutritional interventions that have been conducted in SIDS in the past 20 years, from the individual level to the policy level. The results of the review are being used to inform the Food and Nutrition project (10) on developing its nutrition interventions. This 4-year project focuses on investigating and influencing national food systems to help combat obesity and diet-related noncommunicable diseases in the Caribbean Community (CARICOM), through stakeholder interaction, extensive research, and the creation of several wide-reaching interventions.

METHODS

Study design

This scoping review was expedited as a rapid review by using fewer databases and not searching the grey literature. It followed the guidance of Cochrane training on rapid reviews, the PRISMA extension for scoping reviews, and a leading expert in scoping reviews (11–13).

Eligibility

We searched for reports that described a nutritional intervention conducted in SIDS between 2000 and 2019. These interventions could be at the individual, household, community, or policy level. Study design or study outcomes were not used as eligibility criteria. Inclusion criteria were interventions that: were conducted in any of the 58 SIDS, as designated by the UN (1); sought to improve nutrition of human populations; included a study population of any age; were published between 2000 and 2019, inclusive, or were unpublished; and were published in English.

Search strategy

MEDLINE (via PubMed) (14) and Web of Science (via Clarivate) (15) databases were searched, and the reference lists of included records were also screened for any potentially relevant reports. Search terms were formulated through thorough research of the topic and subsequent rounds of drafting and editing by academic researchers with experience in nutrition and food security, and systematic reviews. Search strategies were kept broad to be highly sensitive and are listed in Annex 1 of the supplementary material.

Record selection

Record selection was done in two stages. First, titles and abstracts were screened for potentially relevant (include) or non-relevant (exclude) records. Second, the full-text records included after the initial screening were reviewed to determine if they were relevant (include) or not relevant (exclude). The records were reviewed by two independent reviewers to determine eligibility. Any disagreements or uncertainties about records at the title/abstract screening stage were resolved by automatically including these papers. During full-text screening, any disagreements were resolved by discussion between the researchers. Records were managed in Rayyan reference manager (16).

Data extraction

A data abstraction form was developed in REDCap[®] 7.3.4 (17), guided by the CONSORT statement on transparent reporting of trials (18). Data were extracted by two independent reviewers. Publication details (author, year, title, and journal), country, sample size and type, and level and type of intervention were extracted during the secondary screening, with instances of discrepancy resolved by discussion between researchers. Classification of systems-level interventions followed the NOURISHING framework, which identifies 10 areas across three domains (food environment, food system, and behavior change communication) where governments can influence what their populations eat (19). Classification of individual-level interventions was done on a case-by-case basis.

Synthesis of results

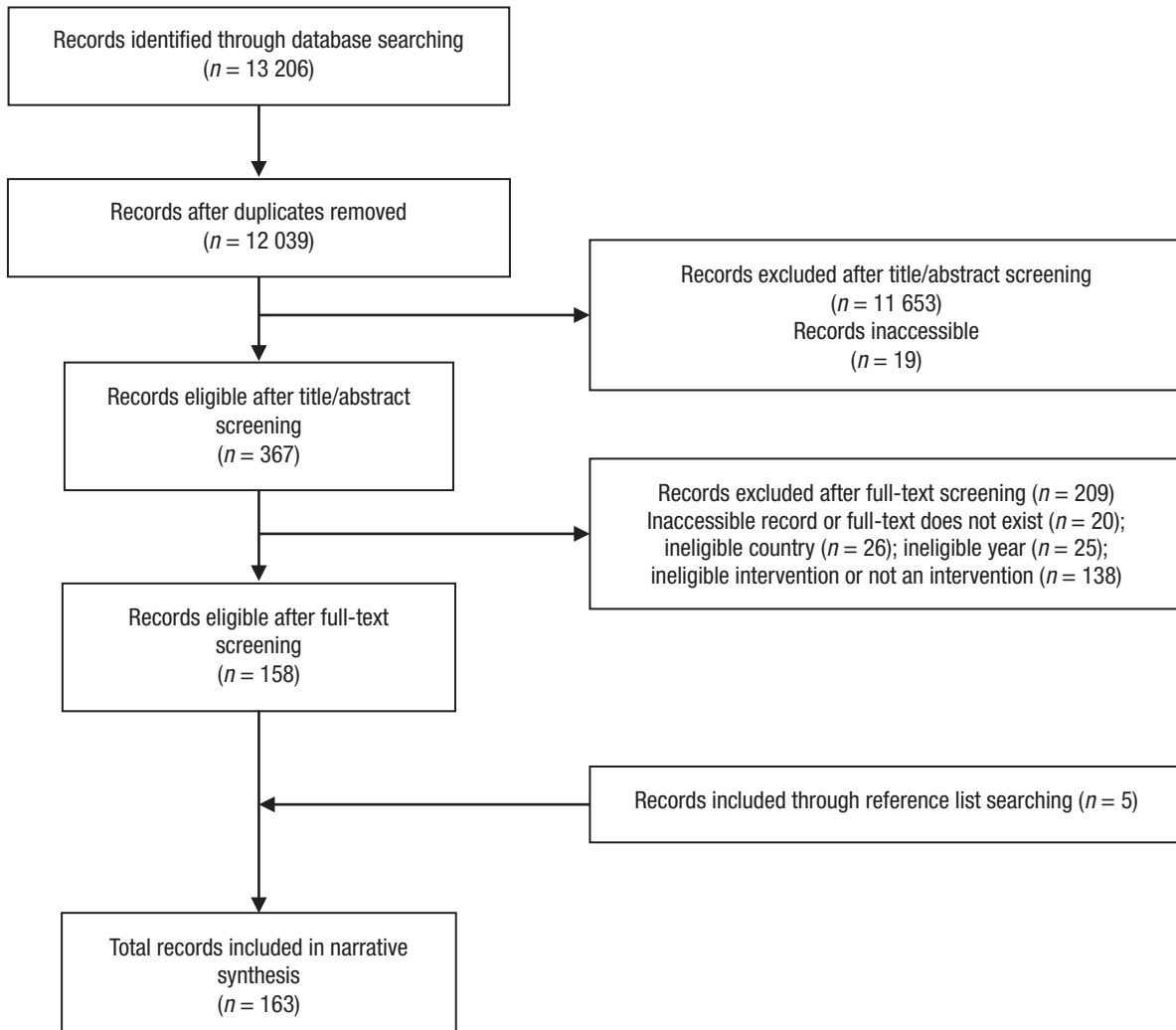
The review takes the form of a narrative synthesis of evidence. Key record-level information was summarized for all included records. To supplement findings from the included records, the WHO *Noncommunicable diseases progress monitor 2020* was used to identify nutrition policies that have been adopted in SIDS (20).

RESULTS

Summary of included records

Of 13 206 records identified through database searching, 158 were included after full-text screening; five were also identified from the reference lists (Figure 1). The full list of the 163 records can be found in Annex 2 of the supplementary material. Within these 163 records, 174 unique interventions were found.

FIGURE 1. Flow diagram of search strategy and record selection



Source: prepared by the authors based on PRISMA recommendations (13).

Records that discussed the same intervention were grouped as one for the analysis.

Interventions were conducted in 49 of the 58 SIDS. Overall, five of nine (56%) SIDS in the AIMS region, 24 of 29 (83%) SIDS in the Caribbean region and 20 of 20 (100%) SIDS in the Pacific region conducted interventions. The greatest proportion of interventions were conducted in the Caribbean (75 (43%)), with the Pacific region and the AIMS region each hosting about 30% of the interventions (Table 1A, supplementary material). Countries that had the most interventions were Fiji (26 interventions), and Guinea-Bissau, Singapore and Jamaica (each with 21 interventions). Participants were most frequently recruited from the general population (46% of interventions), followed by health clinics (34%) and schools (15%); workplaces accounted for 5% of interventions.

Types of interventions

Of the 174 unique interventions, 57 (33%) were individual or household-level interventions, 45 (26%) were community-level interventions, and 72 (41%) were national or policy-level

interventions. Classification of the 117 community-level and national or policy-level interventions according to the Nourishing framework is shown in Table 1.

The most commonly reported intervention components were giving nutrition education and skills (G), followed by raising public awareness about food and nutrition (I²). The least common intervention components were setting nutrition label standards and regulations on claims about food (N¹), and restricting food advertising and commercial promotion (R). The distribution of intervention components was relatively consistent across SIDS regions, except the use of economic tools (U), which was less common in the AIMS region.

Interventions at the community or national/policy level tended to have multiple Nourishing components (up to eight). Interventions with five or more components were mostly policy-driven and related to the intake of salt, fat, and fruits and vegetables. For example, Fiji implemented a 4-year multisectoral intervention through health workers, media, community leaders, food manufacturers and retailers, and consumers to reduce national salt consumption (21). In Mauritius, efforts were made to reduce fat consumption through food labelling, promotion

TABLE 1. Community-level and national- or policy-level interventions, classified by region of Small Island Developing States and components of the NOURISHING framework (19)

Domain	Intervention component	Number of interventions			Total no. (%) (n = 200)
		AIMS	Caribbean	Pacific	
Food environment	N ¹ (Nutrition label standards and regulations on the use of claims and implied claims on food)	2	5	2	8 (4)
	O (Offer healthy food and set standards in public institutions and other specific settings)	5	8	11	23 (12)
	U (Use economic tools to address food affordability and purchase incentives)	1	7	12	19 (10)
	R (Restrict food advertising and other forms of commercial promotion)	2	1	5	8 (4)
	I ¹ (Improve nutritional quality of the whole food supply)	3	7	12	19 (10)
	S (Set incentives and rules to create a healthy retail and food service environment)	2	2	8	12 (6)
Food system	H (Harness supply chain and actions across sectors to ensure coherence with health)	2	9	9	18 (9)
Behavior change communication	I ² (Inform people about food and nutrition through public awareness)	8	13	15	33 (17)
	N ² (Nutrition advice and counselling in healthcare settings)	2	11	3	17 (9)
	G (Give nutrition education and skills)	9	15	14	37 (19)
	Other	0	4	2	6 (3)

AIMS, Atlantic, Indian Ocean, Mediterranean and South China Sea.

Notes: Interventions could be classified by more than one NOURISHING component or may occur in multiple countries of different regions. Shading of cells indicates areas of high (darker grey) versus low (lighter grey) numbers of interventions.

Source: prepared by the authors from the results of the review.

of dietary guidelines, curriculum-based education in schools, and regulation of fatty food provision from government-run food services and at government functions (22). The Marshall Islands implemented the Healthy Stores Program which targeted food stores to encourage healthier food choices and cooking methods through: tastings and cooking demonstrations; labeling and restocking of shelves with healthier food items; and in-store and out-of-store media messaging (23). Table 2 lists examples of interventions classified by the NOURISHING framework.

Individual- and household-level interventions included: personalized breastfeeding promotion; provision of supplements, such as vitamins (especially vitamins A and D), minerals, or ready-to-use supplementary foods; and nutrition counselling.

Policy interventions

The WHO *Noncommunicable diseases progress monitor 2020* (20) provides a definitive picture of nutritional policies in SIDS, of which 40 SIDS reported some policy information (Figure 2).

Across all SIDS regions, restrictions on the physical availability of alcohol (30 of 31 reporting SIDS) and increased excise taxes on alcohol (26 of 31 reporting SIDS) were the most commonly reported policies that were partially or fully achieved, while policies on saturated fatty acids and trans-fats were the least commonly reported (five of 40 reporting SIDS). Of fully achieved policies, restrictions on the physical availability of alcohol (seven of 31 reporting SIDS) and taxes on alcohol (eight of 31 reporting SIDS) were also the most commonly reported, while salt policies were the least commonly reported (two of 40 reporting SIDS).

Of the 40 reporting SIDS, Bahrain, followed closely by Maldives and Singapore (all SIDS in the AIMS region), took the lead on the number of partially or fully achieved policies (six of the seven policies). Guinea-Bissau reported the least number of policies achieved of SIDS in the AIMS region. Among

Caribbean SIDS, Jamaica reported the most partially or fully achieved policies (four of the seven policies), namely physical availability of alcohol, alcohol taxes, and salt and fat policies. Antigua and Barbuda, Suriname, and Haiti reported the least number of policies achieved. Among Pacific SIDS, Timor-Leste reported the most partially or fully achieved policies (four of the seven policies), again on physical availability of alcohol, alcohol taxes, and salt and fat policies. Nauru, Niue, and Tuvalu reported the least number of achieved policies (Table 1A, supplementary material).

Examples of nutrition policies in the WHO *Noncommunicable diseases progress monitor 2020* were described in some of the included records from the database search. With respect to fat policy, Fiji increased import duty on palm oil from 15% to 32% in 2012 (53). Samoa's recognition of salt reduction as a priority action in its national food and nutrition policy and strategy for the prevention of noncommunicable diseases triggered its 2013 nationwide multifaceted salt reduction project, MASIMA (39). A range of salt-reduction activities were reported across Pacific islands, including working with the food industry to reduce sodium content of their food products and meals (25). Strategies for promoting breastfeeding in the Latin Caribbean, including the Baby-Friendly Hospital Initiative, length of maternity leave, and The International Code of Marketing of Breast-milk Substitutes were also discussed (31). Although an overall national strategy to restrict marketing of unhealthy foods and beverages to children is not listed for Fiji in the WHO *Noncommunicable diseases progress monitor 2020*, some packaged food, soft drinks and fast food companies are voluntary signatories to national or global industry initiatives (32). Policies on alcohol were not reported in any of the included records.

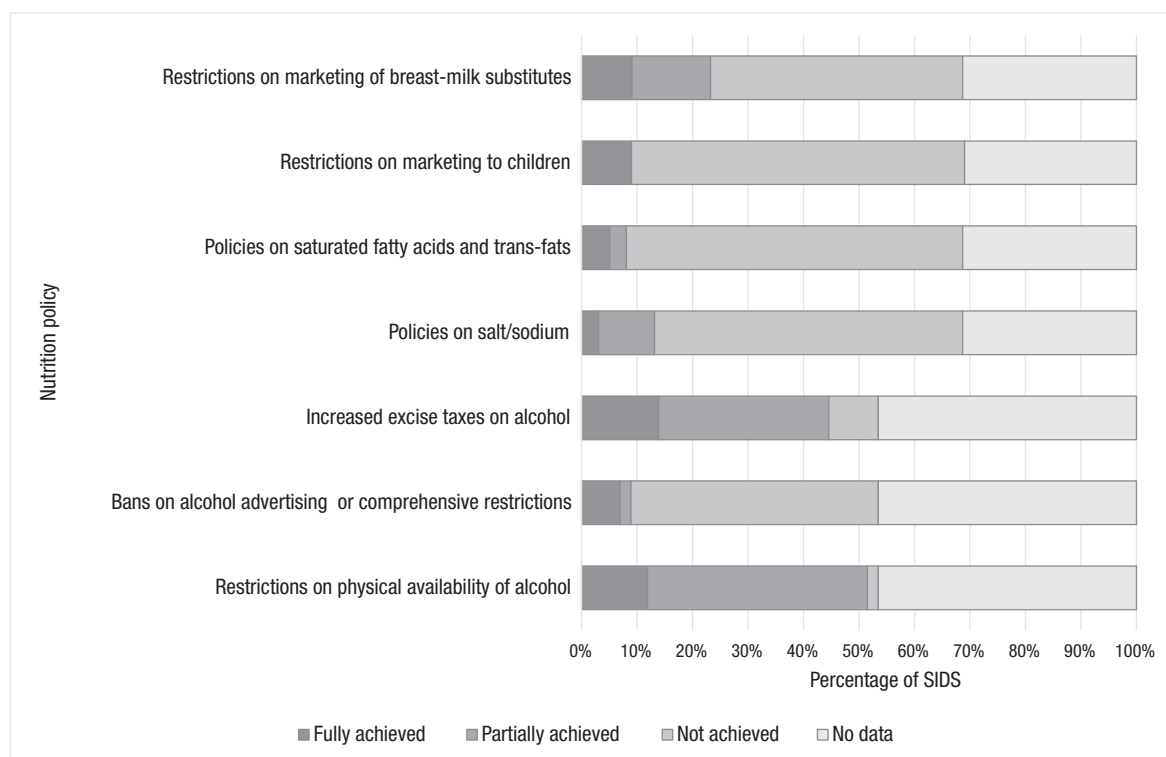
Barriers to and facilitators of interventions

Barriers to implementation and/or effectiveness of interventions ranged from typical constraints of project programming to

TABLE 2. Examples of included community-level and national- or policy-level interventions, classified by the components of the NOURISHING framework (19)

Intervention component	Examples of interventions	Comment
N¹	Regulations on standard nutritional information labelling; front-of-pack sugar warnings (24–26)	Least commonly reported
O	School nutrition policies; school lunch programmes; offering fortified snacks; healthier foods on supermarket shelves (23, 27–30)	Least commonly reported
U	Taxes and subsidy-framed messages on vending machines (26)	NA
R	Tackling marketing of breastmilk substitutes and general advertising to children (25, 31, 32)	NA
I¹	Reformulation of preschool meals; salt reduction by food businesses; wheat/rice fortification (21, 33, 34)	NA
S	Incentives for food businesses to reduce salt; school nutrition policies; taxation or import ban of unhealthy foods (21, 29, 35, 36)	Always accompanied by other components, most commonly with (O)
H	Legislative frameworks and intersectoral coordination to support food fortification; introduction of new cultivars to farmers; land reform; MAISMA project (WHO-guided multifaceted salt reduction intervention) (36–39)	Always accompanied by other components, most commonly with (I ¹)
I²	Public awareness campaigns; promotion of national dietary guidelines; national policies to limit fat and salt intake; school nutrition programs (22, 29, 39, 40)	Commonly reported; typically ran in tandem with projects with wider scope, most commonly with (G) and (O)
N²	Breastfeeding promotion; diabetes self-management programs (31, 41–44)	NA
G	School and community gardening; curriculum-based nutritional education within schools; curriculum-based behavior-change program targeting fruit and vegetable intake in middle-aged women (45–50)	Most commonly reported
Other	Provision of ready-to-use infant formulas in camps for internally displaced people during humanitarian response following an earthquake; training of children as peer influencers in school social networks to increase water consumption and decrease consumption of sugar-sweetened beverages (51, 52)	These interventions are not classifiable by the NOURISHING framework as they lacked sufficient detail or differed greatly from the existing components.

NA, not applicable.

Source: prepared by the authors from the results of this review.**FIGURE 2. Proportion of Small Island Developing States (SIDS) fully, partially and not achieving nutritional policies**

Note: Eighteen of the 20 non-UN members/associate members of the United Nations Small Island Developing States listing were not included in the report, and contributed greatly to the “no data” component.
Source: prepared by the authors based on published data from World Health Organization *Noncommunicable diseases progress monitor 2020* (20).

more context-specific barriers within SIDS communities. High intervention costs were often cited and interventions on food provision were especially described as logistically complex and expensive. Cultural norms were a common community-level barrier; intervention contamination was often cited because of the culture of sharing, and sociocultural norms around food and preference for larger body size affected family acceptance of diet changes. Barriers related to the climatic, political, and economic vulnerabilities of SIDS also emerged. Climate factors in SIDS (e.g. natural disasters, heat, and humidity), socioeconomic downturns, and political upheaval reduced the availability of skilled human resources, study equipment, and healthy food options.

Facilitators of interventions were strongly reflected in relationships with stakeholders. Where researchers held an inclusive approach to working with stakeholders to ensure cultural relevance of interventions, strong relationships and a sense of ownership were formed, which translated into stakeholder support of activities and intervention success. A consequence of successful stakeholder collaboration was participant satisfaction with interventions. Researchers also attributed success to the use of multiple reinforcing components, such as the Marshall Islands Healthy Stores Program which incorporated five NOURISHING components (23).

More details of barriers to and facilitators of interventions are available in Annex 3 of the supplementary material.

DISCUSSION

This rapid scoping review found 174 unique interventions conducted in SIDS between 2000 and 2019. Most interventions were in the Caribbean region and were conducted at a national or policy level. Interventions tended to have multiple NOURISHING components, and the distribution of components was relatively consistent across SIDS regions. The most commonly reported components were giving nutrition education/skills (G), followed by informing about food/nutrition through public awareness (P). Setting nutrition label standards/regulations on the use of claims and implied claims about food (N) and restricting food advertising and other forms of commercial promotion (R) were the least commonly reported.

NOURISHING

Framework and policy implications

It is plausible that the conventional provision of nutrition education/skills and promotion through public awareness were the most common intervention components because of the evolution of health promotion. Early days of health promotion were grounded in an individualistic model where people were thought to have more control of their health, and promotion activities sought to enable people to increase this control (54, 55). However, this model is shifting to include wider societal factors as significant influencers in the health choices individuals make (54, 55). For instance, the 2005 Bangkok Charter highlights the importance of determinants of health in a globalized world, encouraging action from a wider range of civil society, government, and international organizations to build policies and partnerships for health promotion (54). Our review found that these wide-scale, top-down types of interventions (for example, in the form of setting standards

on nutrition labeling or restricting food advertising) were less commonly reported. Indeed, not only does setting legislation first require constant government commitment to population health, but managing the needs of many stakeholders with conflicting interests can be fraught with political implications (56). The private sector, particularly in the food industry, is a powerful stakeholder with considerable influence on national decision-making. Food and beverage companies profit from the sale of processed, unhealthy foods, and attempts at restricting these can be met with strong resistance. In 2021, the resistance of commercial interests affected the passing of a recent front-of-package warning label as a regional standard in CARICOM, whereby an unprecedented “emergency” revote of stakeholders in Jamaica contributed to the standard being rejected at the CARICOM level (57–59). Even so, long-term positive effects of dietary improvements in populations may not coincide with political and budget cycles (56). Thus, it is understandable why policy-makers might avoid these types of nutritional interventions and researchers may find difficulty advocating for them.

The WHO *Noncommunicable diseases progress monitor 2020* illustrates the paucity of nutritional policies in SIDS, and their contextual factors offer a deeper understanding of this finding. The scarcity of advertising bans/restrictions on alcohol within the Caribbean and Pacific – in spite of many alcohol tax policies – can be partially understood by considering the historical and economic relevance of alcohol. Taxation is a blanket intervention applicable to many foods and services, with a key purpose of increasing national revenue (60). Given the economic vulnerabilities of SIDS, the simplicity and economic benefit of this type of policy make it desirable. Furthermore, physical restrictions on alcohol availability (for example, monopolization or licensing of retail outlets) can also increase national revenue, as outlets may be government run and/or licensing may require fees payable to the government. Alternatively, advertising bans and more comprehensive restrictions on alcohol likely hinge on deeper value systems. Large-scale production and exportation of alcohol during colonial times and the associated industrial prosperity have embedded alcohol in the society and culture of SIDS (61). Comprehensive restrictions on alcohol would not only affect these values, but also decades-old economic treaties of international trade in these regions (61).

Policies on saturated and trans-fat were the least commonly reported interventions achieved. As seen from the barriers reported in implementing interventions, populations may not easily support or comply with such policies as they conflict with cultural norms (56). Obesity was often cited by Pacific SIDS as a non-priority; in fact, it was seen rather as reflecting love, belonging and care, and a personal freedom separate from disease (27, 45, 62, 63). Similar norms are found in Caribbean populations where traditions of food preparation and consumption favor high-calorie ingredients and perceptions of body image favor larger body sizes (64–66). In addition, fat policy interventions that were enacted, such as bans on turkey tail imports in Samoa and mutton flap sales in Fiji (67), were wrought with political conflict between the ministries of commerce and health, individual stakeholders (mutton traders), and adherence to trade agreements (68).

Although considered an important means to improve nutrition (69), the concept of promoting the production and consumption of local foods was not commonly reported in the included records as an explicit way to improve nutrition.

Barriers to this strategy are long-standing and complex. These include: international trade treaties in SIDS (including importation of foods); insufficient incentives for the local food chain with limited investment in commercial agriculture and improved agricultural technology; and growing urbanization and subsequent reduction in subsistence farming which relies on insufficient multisectoral rural development strategies (3). These factors may indicate why community food production initiatives were rarely examined in the context of diet-related outcomes (69).

Despite implementation challenges, the potential benefits of nutritional policies cannot be overlooked. The global success of policies on sugar-sweetened beverages highlights such potential; a 2019 Cochrane review concluded that environmental change – through labeling, restricting availability, taxation or other methods – led to reduced consumption of these beverages (70). This has been seen in SIDS such as Barbados where implementation of a 10% value-based tax was associated with decreased sales of sugar-sweetened beverages (71). Furthermore, combining multiple components of the NOURISHING framework to create a multipronged intervention may improve success by increasing its impact (72). National interventions on sugar-sweetened beverages implemented by multiple stakeholders and sectors are most effective, underscoring the importance of engagement and collaboration at all levels (70).

Reporting and implementation of interventions

Sufficiently detailed reporting of interventions is imperative for thoughtful and precise interpretation of findings and translation to other populations. This is especially relevant to SIDS whose interventions, often models from larger countries, must be tailored to suit their small-island context.

In tailoring interventions, it is crucial to recognize the factors that can affect their implementation and success. Working with stakeholders within an environment with climatic, political, and economic constraints can be considered context-specific to SIDS. Smallholder farmers are key to addressing nutrition insecurity in small islands, as is bridging formal and informal parties; yet, multistakeholder and multisectoral collaboration needs to be coupled with sufficient participatory action to be able to create an integrative food security policy that is both effective and acceptable (73). Merely stating the “use” of participatory action may not equate to the level of use that is required in the field. Adequate attention to each step of the collaborative process is needed; enhancing communication has been recommended by reviewing stakeholder relationships, identifying interdependencies, and reordering relationships, while allowing stakeholders to lead these processes (74). Systems dynamics methodology, which was not cited in any reports included, can assist in this refinement process and has shown success with wide-ranging types of participants through its use of participatory action for in-depth exploration of complex issues and/or systems (75). In any case, thoughtful adaptation of evidence-based models to specific populations, cultures, and contexts should be standard. The Diabetes Care in American Samoa project is a successful example of this (41); recognizing limitations in the amount of medical equipment and number of health professionals available in American Samoa, and the higher population blood glucose levels, researchers reframed their clinical algorithms to triage frequency and intensity of

care. They also used an apprenticeship model with newly hired health workers to manage training costs and allow for culturally preferred collective working. When issues arose (e.g. sharing of equipment), there was effective communication between all stakeholders to come up with a culturally appropriate response. Where national policies are concerned, evaluations of government commitment should also be undertaken. This is effectively seen in G8 Research Group’s annual CARICOM monitoring grid for their commitment to the Port-of-Spain Declaration for the prevention and control of noncommunicable diseases and their risk factors in the Caribbean (76). This mechanism holds high-level stakeholders accountable to their commitments and encourages progress in each country, while allowing lessons to be learnt in the implementation of such commitments (76).

Strengths and limitations

This study was the first of its kind for SIDS and may inform regional policy for the implementation of food and nutrition interventions. However, as a rapid review, few databases were searched and neither was the grey literature. In addition, only reports in English were included (although few reports showed up in other languages), which likely reduced the number of relevant records captured in the literature search. In addition, publication bias favoring articles from Western or high-income countries means that research from many SIDS struggles to get published (77). Another limitation is that full details of an intervention may not be described in a given record, especially wide-scale policies. For example, an intervention that used economic tools to address food affordability (U) might have been accompanied by public awareness campaigns (I²), but the authors may not have discussed these campaigns in the manuscript. Thus, our results illustrate a partial snapshot of what evidence exists on nutritional interventions in SIDS and they must be interpreted within these confines.

Conclusion

There is a paucity of nutritional policies in SIDS; the reasons may be linked to their social, economic, and environmental vulnerabilities. Interventions should be expanded beyond simple education to encompass multiple components of the NOURISHING framework and promote multisectoral inclusion and thereby stronger stakeholder buy-in. A systematic review is warranted to examine a fuller range of sources and the effectiveness of interventions.

Author contributions. CRB planned the review, collected and analyzed the data, interpreted the results, and wrote the paper. KR collected and analyzed the data and interpreted the results. MMM conceived the original idea and interpreted the results. IRH conceived the original idea, planned the review and interpreted the results. All authors reviewed and approved the final version.

Conflicts of interests. The authors declare no conflicts of interests.

Funding. The funder of this work, the International Development Research Centre, did not influence in any way the design

of this study, or data collection, analysis, writing, and decision to publish these results.

Disclaimer. The authors hold sole responsibility for the views expressed in the manuscript, which may not necessarily reflect

the opinion or policy of the *Revista Panamericana de Salud Pública / Pan American Journal of Public Health* and/or those of the Pan American Health Organization.

REFERENCES

1. United Nations. Small Island Developing States [Internet]. Sustainable Development Goals Knowledge Platform; 2019 [cited 2019 Apr 17]. Available from: <https://sustainabledevelopment.un.org/topics/sids/list>
2. About Small Island Developing States [Internet]. New York: United Nations Office of the High Representative for the Least Developed Countries, Landlocked Developing Countries and Small Island Developing States; 2022 [cited 2022 Feb 3]. Available from: <https://www.un.org/ohrls/content/about-small-island-developing-states>
3. Food security and nutrition in Small Island Developing States (SIDS). Rome: Food and Agriculture Organization; 2014:16 [cited 2019 Mar 14] Available from: <https://sustainabledevelopment.un.org/content/documents/2231Food%20Security%20and%20Nutrition%20in%20SIDS.pdf>
4. Global action programme on food security and nutrition in Small Island Developing States: supporting the implementation of the Samoa pathway [Internet]. Rome: Food and Agriculture Organization; 2017:8 [cited 2019 Mar 14] 7. Available from: <http://www.fao.org/3/a-i7135e.pdf>
5. Noncommunicable diseases country profiles 2018 [Internet]. Geneva: World Health Organization; 2018 [cited 2020 Jan 20]. Available from: <https://www.who.int/nmh/publications/ncd-profiles-2018/en/>
6. State of food security and nutrition in Small Island Developing States (SIDS) [Internet]. Rome: Food and Agriculture Organization; 2016:8 [cited 2019 Mar 14]. Available from: <http://www.fao.org/3/a-i5327e.pdf>
7. Tu'akoi S, Vickers MH, Tairea K, Aung YYM, Tamarua-Herman N, 'Ofanoa M, et al. The significance of DOHaD for Small Island Developing States. *J Dev Orig Health Dis.* 2018 Oct;9(5):487–91.
8. Promoting healthy diets, food security and sustainable development in the Caribbean through joint policy action [Internet]. Barbados: Caribbean Public Health Agency; 2017:18 [cited 2020 Jan 20]. Available from: https://carpha.org/Portals/0/Documents/CARPHA_6_Point_Policy_for_Healthier_Food_Environments.pdf
9. Allison DB, Bassaganya-Riera J, Burlingame B, Brown AW, le Coutre J, Dickson SL, et al. Goals in Nutrition Science 2015–2020. *Front Nutr.* 2015 Sep 8;2:26.
10. Food and Nutrition (FaN) project [Internet]. Food4Change Caribbean; 2021 [cited 2021 Jun 29]. Available from: <https://food4change.caribbean.org/>
11. Moher D, Stevens A, Garrity C. Introduction to rapid reviews [Internet]. Cochrane Training; 2018 [cited 2019 Mar 21]. Available from: <https://training.cochrane.org/resource/introduction-rapid-reviews>
12. Arksey H, O'Malley L. Scoping studies: towards a methodological framework. *Int J Soc Res Methodol.* 2005 Feb 1;8(1):19–32.
13. Tricco AC, Lillie E, Zarin W, O'Brien KK, Colquhoun H, Levac D, et al. PRISMA Extension for Scoping Reviews (PRISMA-ScR): Checklist and Explanation. *Ann Intern Med.* 2018 Oct 2;169(7):467–73.
14. Fact sheet. MEDLINE, PubMed, and PMC (PubMed Central): how are they different? [Internet]. Bethesda (MD): US National Library of Medicine; 2015 [cited 2015 Aug 13]. Available from: http://www.nlm.nih.gov/pubs/factsheets/dif_med_pub.html
15. Web of Science [Internet]. Clarivate Analytics; 2018 [cited 2019 Jun 19]. Available from: <http://wokinfo.com/>
16. Ouzzani M, Hammady H, Fedorowicz Z, Elmagarmid A. Rayyan—a web and mobile app for systematic reviews. *Syst Rev.* 2016 Dec 5;5(1):210.
17. Harris PA, Taylor R, Thielke R, Payne J, Gonzalez N, Conde JG. Research electronic data capture (REDCap)—A metadata-driven methodology and workflow process for providing translational research informatics support. *J Biomed Inform.* 2009 Apr 1;42(2):377–81.
18. Schulz KF. CONSORT 2010 Statement: Updated Guidelines for Reporting Parallel Group Randomized Trials. *Ann Intern Med.* 2010 Jun 1;152(11):726.
19. About NOURISHING [Internet]. World Cancer Research Fund; 2015 [cited 2019 May 21]. Available from: <https://www.wcrf.org/int/policy/nourishing-framework/about-nourishing>
20. Noncommunicable disease progress monitor [Internet]. Geneva: World Health Organization; 2020: 242 [cited 2020 Jul 26]. Available from: <https://www.who.int/publications-detail-redirect/ncd-progress-monitor-2020>
21. Pillay A, Trieu K, Santos JA, Sukhu A, Schultz J, Wate J, et al. Assessment of a salt reduction intervention on adult population salt intake in Fiji. *Nutrients.* 2017 Dec 12;9(12).
22. Lachat C, Otchere S, Roberfroid D, Abdulai A, Seret FMA, Milesevic J, et al. Diet and physical activity for the prevention of noncommunicable diseases in low- and middle-income countries: a systematic policy review. *PLoS Med.* 2013;10(6):e1001465.
23. Gittelsohn J, Dyckman W, Frick KD, Boggs MK, Haberle H, Alfred J, et al. A pilot food store intervention in the Republic of the Marshall Islands. *Pac Health Dialog.* 2007 Sep;14(2):43–53.
24. Ang FJL, Agrawal S, Finkelstein EA. Pilot randomized controlled trial testing the influence of front-of-pack sugar warning labels on food demand. *BMC Public Health.* 2019 Feb 7;19(1):164.
25. Christoforou A, Snowdon W, Laesango N, Vatucaawaqa S, Lamar D, Alam L, et al. Progress on salt reduction in the Pacific Islands: from strategies to action. *Heart Lung Circ.* 2015 May;24(5):503–9.
26. Seah SSY, Rebello SA, Tai BC, Tay Z, Finkelstein EA, van Dam RM. Impact of tax and subsidy framed messages on high- and lower-sugar beverages sold in vending machines: a randomized crossover trial. *Int J Behav Nutr Phys Act.* 2018 13;15(1):76.
27. Gatti C, Suhas E, Côté S, Anassour Laouan-Sidi E, Dewailly É, Lucas M. Obesity and metabolic parameters in adolescents: a school-based intervention program in French Polynesia. *J Adolesc Health Off Publ Soc Adolesc Med.* 2015 Feb;56(2):174–80.
28. Iannotti L, Duliencia SJ-L, Joseph S, Cooley C, Tuft T, Cox K, et al. Fortified snack reduced anemia in rural school-aged children of Haiti: a cluster-randomized, controlled trial. *PLoS One.* 2016 Dec 22;11(12):e0168121.
29. Lim Y-P. Sharing Singapore's experience in dietetic practice and school nutrition programmes. *Asia Pac J Clin Nutr.* 2008;17 Suppl 1:361–4.
30. Preston AM, Venegas H, Rodríguez CA, Vélez-Rodríguez RM. Assessment of the national school lunch program in a subset of schools in San Juan, Puerto Rico: participants vs. non-participants. *P R Health Sci J.* 2013 Mar;32(1):25–35.
31. Lutter CK, Chaparro CM, Grummer-Strawn L, Victora CG. Backsliding on a key health investment in Latin America and the Caribbean: the case of breastfeeding promotion. *Am J Public Health.* 2011 Nov;101(11):2130–6.
32. Sacks G, Mialon M, Vandevijvere S, Trevena H, Snowdon W, Crino M, et al. Comparison of food industry policies and commitments on marketing to children and product (re)formulation in Australia, New Zealand and Fiji. *Crit Public Health.* 2015 May 27;25(3):299–319.
33. Batra P, Schlossman N, Balan I, Pruzensky W, Balan A, Brown C, et al. A randomized controlled trial offering higher- compared with lower-dairy second meals daily in preschools in Guinea-Bissau demonstrates an attendance-dependent increase in weight gain for both meal types and an increase in mid-upper arm circumference for the higher-dairy meal. *J Nutr.* 2016 Jan;146(1):124–32.
34. Imhoff-Kunsch B, Shakya I, Namohunu SAD, Pitaboe A, Wong P, Tsang BL, et al. Potential dietary contributions from rice and wheat flour fortification in the Solomon Islands: results from the

- 2012–2013 Household Income and Expenditure Survey. *Food Nutr Bull.* 2019;40(1):71–86.
35. Thow AM, Heywood P, Schultz J, Quedsted C, Jan S, Colagiuri S. Trade and the nutrition transition: strengthening policy for health in the Pacific. *Ecol Food Nutr.* 2011 Feb;50(1):18–42.
 36. Tirado MC, Galicia L, Husby HM, Lopez J, Olamendi S, Pia Chaparro M, et al. Mapping of nutrition and sectoral policies addressing malnutrition in Latin America. *Rev Panam Salud Publica.* 2016 Aug;40(2):114–23.
 37. Leitgeb F, Schneider S, Vogl CR. Increasing food sovereignty with urban agriculture in Cuba. *Agric Hum Values.* 2016 Jun 1;33(2):415–26.
 38. Raine A, Portnoy J, Liu J, Mahomed T, Hibbeln JR. Reduction in behavior problems with omega-3 supplementation in children aged 8–16 years: a randomized, double-blind, placebo-controlled, stratified, parallel-group trial. *J Child Psychol Psychiatry.* 2015 May;56(5):509–20.
 39. Trieu K, Ieremia M, Santos J, Neal B, Woodward M, Moodie M, et al. Effects of a nationwide strategy to reduce salt intake in Samoa. *J Hypertens.* 2018;36(1):188–98.
 40. Bovet P, Viswanathan B, Shamlaye C, Romain S, Gedeon J. Addressing noncommunicable diseases in the Seychelles: towards a comprehensive plan of action. *Glob Health Promot.* 2010 Jun;17(2 Suppl):37–40.
 41. DePue JD, Rosen RK, Seiden A, Bereolos N, Chima ML, Goldstein MG, et al. Implementation of a culturally tailored diabetes intervention with community health workers in American Samoa. *Diabetes Educ.* 2013 Dec;39(6):761–71.
 42. Dethlefs HJ, Walker EA, Schechter CB, Dowd R, Filipi L, Garcia JF, et al. Evaluation of a program to improve intermediate diabetes outcomes in rural communities in the Dominican Republic. *Diabetes Res Clin Pract.* 2019 Feb;148:212–21.
 43. Ferguson TS, Tulloch-Reid MK, Cunningham-Myrie CA, Davidson-Sadler T, Copeland S, Lewis-Fuller E, et al. Chronic disease in the Caribbean: strategies to respond to the public health challenge in the region. What can we learn from Jamaica's experience? *West Indian Med J.* 2011 Jul;60(4):397–411.
 44. Less LA, Ragoobirsingh D, Morrison EY, Boyne M, Johnson PA. A preliminary report on an assessment of a community-based intervention for diabetes control in adults with type 2 diabetes. *Fam Pract.* 2010 Jun;27 Suppl 1:46–52.
 45. Butel J, Braun KL, Novotny R, Acosta M, Castro R, Fleming T, et al. Assessing intervention fidelity in a multi-level, multi-component, multi-site program: the Children's Healthy Living (CHL) program. *Transl Behav Med.* 2015 Dec;5(4):460–9.
 46. Derose KP, Palar K, Fariás H, Adams J, Martínez H. Developing pilot interventions to address food insecurity and nutritional needs of people living with HIV in Latin America and the Caribbean: an interinstitutional approach using formative research. *Food Nutr Bull.* 2018;39(4):549–63.
 47. Hanson M, Englberger L, Duncan B, Taren D, Mateak H, Johnson E. An evaluation of a nutrition intervention in Kapinga Village on Pohnpei, Federated States of Micronesia. *Pac Health Dialog.* 2011 Mar;17(1):173–84.
 48. Kaufer L, Englberger L, Cue R, Lorens A, Albert K, Pedrus P, et al. Evaluation of a "traditional food for health" intervention in Pohnpei, Federated States of Micronesia. *Pac Health Dialog.* 2010 Apr;16(1):61–73.
 49. Shiu LKC, Loke WM, Vijaya K, Sandhu NK. Nurturing healthy dietary habits among children and youth in Singapore. *Asia Pac J Clin Nutr.* 2012;21(1):144–50.
 50. White SC, Agurto I, Araguas N. Promoting healthy behaviors to prevent chronic disease in Panama and Trinidad & Tobago: results of the women as agents of change project. *J Community Health.* 2006 Oct;31(5):413–29.
 51. Franken SCM, Smit CR, Buijzen M. Promoting water consumption on a Caribbean island: an intervention using children's social networks at schools. *Int J Environ Res Public Health.* 2018 Apr;15(4):713.
 52. Talley LE, Boyd E. Challenges to the programmatic implementation of ready to use infant formula in the post-earthquake response, Haiti, 2010: a program review. *PLoS One.* 2013;8(12):e84043.
 53. Latu C, Moodie M, Coriakula J, Waqa G, Snowdon W, Bell C. Barriers and facilitators to food policy development in Fiji. *Food Nutr Bull.* 2018 Dec 1;39(4):621–31.
 54. Milestones in health promotion: statements from global conferences. Geneva: World Health Organization; 2009:42 [cited 2020 Apr 30]. Available from: https://www.who.int/healthpromotion/Milestones_Health_Promotion_05022010.pdf
 55. McIntyre L. The evolution of health promotion. *Probe Ott Ont.* 1992;26(1):15–22.
 56. Mozaffarian D, Angell SY, Lang T, Rivera JA. Role of government policy in nutrition—barriers to and opportunities for healthier eating. *BMJ.* 2018 Jun 13;361:k2426.
 57. Kickbusch I, Allen L, Franz C. The commercial determinants of health. *Lancet Glob Health.* 2016 Dec 1;4(12):E895–6.
 58. Front-of-package warning labeling (FOPWL) in the Caribbean [Internet]. Washington (DC): Pan American Health Organization [cited 2022 Feb 2]. Available from: <https://www.paho.org/en/front-package-warning-labeling-fopwl-caribbean>
 59. Chen D. Is evidence being ignored in front-of-package labeling. *The Gleaner.* 15 June 2021 [cited 2022 Feb 2]. Available from: <https://jamaica-gleaner.com/article/commentary/20210615/deborah-chen-evidence-being-ignored-front-package-labeling>
 60. Food taxes and subsidies [Internet]. Copenhagen: World Health Organization Regional Office for Europe; 2020 [cited 2020 May 1]. Available from: <http://www.euro.who.int/en/health-topics/disease-prevention/tobacco/news/news/2012/10/can-fiscal-policies-reduce-noncommunicable-diseases2/food-taxes-and-subsidies>
 61. Economic treaties and alcohol in the Western Pacific Region [Internet]. Manila: World Health Organization Regional Office for the Western Pacific; 2006 Aug [cited 2020 Jan 5]. Available from: <https://static1.squarespace.com/static/59152c88b8a79bdb0e644f2a/t/599643283e00be99ded247cd/1503019817571/Economic+Treaties+and+Alcohol+in+the+Western+Pacific+Region.pdf>
 62. Jakobsen MS, Sodemann M, Biai S, Nielsen J, Aaby P. Promotion of exclusive breastfeeding is not likely to be cost effective in West Africa. A randomized intervention study from Guinea-Bissau. *Acta Paediatr Oslo Nor* 1992. 2008 Jan;97(1):68–75.
 63. Schultz JT, Moodie M, Mavoa H, Utter J, Snowdon W, McCabe MP, et al. Experiences and challenges in implementing complex community-based research project: the Pacific Obesity Prevention in Communities project. *Obes Rev Off J Int Assoc Study Obes.* 2011 Nov;12 Suppl 2:12–9.
 64. Gray PB, Frederick DA. Body image and body type preferences in St. Kitts, Caribbean: a cross-cultural comparison with US samples regarding attitudes towards muscularity, body fat, and breast size. *Evol Psychol.* 2012 Sep 6;10(3):631–55.
 65. Carrère P, Moueza N, Cornely V, Atallah V, Hélène-Pelage J, Inamo J, et al. Perceptions of overweight in a Caribbean population: the role of health professionals. *Fam Pract.* 2016 Dec 1;33(6):633–8.
 66. Bramble J, Cornelius LJ, Simpson G. Eating as a cultural expression of caring among Afro-Caribbean and African American women: understanding the cultural dimensions of obesity. *J Health Care Poor Underserved.* 2009 May;20(2):53–68.
 67. Thow AM, Swinburn B, Colagiuri S, Diligolevu M, Quedsted C, Vivili P, et al. Trade and food policy: case studies from three Pacific Island countries. *Food Policy.* 2010 Dec 1;35(6):556–64.
 68. Snowdon W, Thow AM. Trade policy and obesity prevention: challenges and innovation in the Pacific Islands. *Obes Rev Off J Int Assoc Study Obes.* 2013 Nov;14(2):150–8.
 69. Haynes E, Brown C, Wou C, Vogliano C, Guell C, Unwin N. Health and other impacts of community food production in Small Island Developing States: a systematic scoping review. *Rev Panam Salud Publica.* 2018 Dec 17;42:e176.
 70. von Philipsborn P, Stratil JM, Burns J, Busert LK, Pfadenhauer LM, Polus S, et al. Environmental interventions to reduce the consumption of sugar-sweetened beverages and their effects on health. *Cochrane Database Syst Rev.* 2019 Jun 12;6:CD012292.
 71. Alvarado M, Unwin N, Sharp SJ, Hambleton I, Murphy MM, Samuels TA, et al. Assessing the impact of the Barbados sugar-sweetened beverage tax on beverage sales: an observational study. *Int J Behav Nutr Phys Act.* 2019 Jan 30;16(1):13.
 72. McKenzie J, Nieger B, Thackeray R. Health promotion programs, 6th edition. Glenview (IL): Pearson; 2013:493.
 73. Saint Ville AS, Hickey GM, Phillip LE. How do stakeholder interactions influence national food security policy in the Caribbean? The case of Saint Lucia. *Food Policy.* 2017 Apr 1;68:53–64.

74. Leeuwis C, Aarts N. Rethinking communication in innovation processes: creating space for change in complex systems. *J Agric Educ Ext.* 2011 Feb 1;17(1):21–36.
75. Cresswell AM, Pardo TA, Thompson F, Canestraro DS, Cook ME, Black LJ, et al. Modeling intergovernmental collaboration: a system dynamics approach [internet]. 2002:10 [cited 2022 Feb 20]. Available from: <https://www.albany.edu/cpr/sdgroup/HIMS/papers/HICSS.pdf>
76. Samuels TA, Kirton J, Guebert J. Monitoring compliance with high-level commitments in health: the case of the CARICOM Summit on Chronic Non-Communicable Diseases. *Bull World Health Organ.* 2014 Apr 1;92(4):270-276B.
77. Mulimani P. Publication bias towards Western populations harms humanity. *Nat Hum Behav.* 2019 Oct;3(10):1026–7.

Manuscript received on 10 September 2021. Revised version accepted for publication on 22 February 2022

Intervenciones y políticas orientadas a mejorar la nutrición en los pequeños Estados insulares en desarrollo: una revisión rápida

RESUMEN

Objetivo. Describir las características de las intervenciones nutricionales realizadas en los pequeños Estados insulares en desarrollo durante los últimos 20 años.

Métodos. Se realizó una revisión exploratoria rápida mediante búsquedas en las bases de datos PubMed y Web of Science de las intervenciones realizadas en los pequeños Estados insulares en desarrollo entre los años 2000 y 2019 con el fin de mejorar la nutrición de su población. También se examinó la publicación *Monitoreo de avances en materia de las enfermedades no transmisibles 2020* para evaluar las políticas nutricionales en estos Estados.

Resultados. Se efectuaron 174 intervenciones en 49 de los 58 pequeños Estados insulares en desarrollo. La mayor parte se llevaron a cabo en el Caribe (75 intervenciones; 43%), en tanto que la región del Pacífico y la región de los océanos Atlántico e Índico y de los mares de China Meridional y Mediterráneo efectuaron aproximadamente un 30% de las intervenciones cada una. Con la ayuda del marco NOURISHING, la mayor parte de las intervenciones (67%) se efectuaron a nivel de la comunidad y a nivel de país o de política utilizando distintos componentes del marco. La mayor parte de las intervenciones (35%) fueron educativas y de concientización. Entre las políticas que se notificaron con más frecuencia estuvieron las restricciones a la disponibilidad física de las bebidas alcohólicas y el aumento de los impuestos al alcohol; entre las menos frecuentes, las restricciones a las grasas. Por lo general, estos resultados fueron uniformes en todas las regiones con pequeños Estados insulares en desarrollo.

Conclusiones. Los pequeños Estados insulares en desarrollo tienen pocas políticas nutricionales; esto puede estar relacionado con sus vulnerabilidades sociales, económicas y ambientales. Las intervenciones deberían ampliarse más allá de la educación para así incorporar múltiples componentes del marco NOURISHING, con una inclusión multisectorial que garantice una mayor colaboración y aceptación de las partes interesadas. Se justifica una revisión sistemática que haga uso de una gama más completa de fuentes para evaluar la efectividad de las intervenciones.

Palabras clave

Nutrición; políticas; seguridad alimentaria y nutricional; países en desarrollo.

Intervenções e políticas para melhoria da nutrição em pequenos Estados insulares em desenvolvimento: revisão rápida

RESUMO

Objetivo. Descrever as características das intervenções nutricionais implementadas em pequenos Estados insulares em desenvolvimento (PEID) nos 20 últimos anos.

Métodos. Uma revisão de escopo rápida foi realizada mediante pesquisa dos bancos de dados PubMed e Web of Science, buscando intervenções para melhoria nutricional da população em PEID no período entre 2000 e 2019. A publicação *Noncommunicable Diseases Progress Monitor 2020* também foi consultada para avaliar as políticas nutricionais destes países.

Resultados. Foram implementadas 174 intervenções em 49 dos 58 PEID, distribuídas na sua grande maioria na região do Caribe (75, 43%) e nas regiões do Pacífico e AIMS (Atlântico, Índico, Mediterrâneo e Mar do Sul da China) (cerca de 30% cada). Elaboradas a partir do *NOURISHING Framework*, a maior parte das intervenções (67%) teve implementação ao nível nacional, da comunidade ou de política, englobando os vários componentes deste quadro. Houve predomínio de intervenções educacionais e de sensibilização (35%). Observou-se com maior frequência o cumprimento total ou parcial de políticas de restrição à oferta física de bebidas alcoólicas e aumento de impostos sobre estas. Políticas de restrição à utilização de gorduras em alimentos foram as menos observadas. Em geral, as conclusões foram semelhantes em todas as regiões de PEID.

Conclusões. Os PEID carecem de políticas nutricionais, devido a fatores possivelmente associados a vulnerabilidades ambientais e socioeconômicas. Além de educacionais, as intervenções devem ser ampliadas para englobar diversos outros componentes do *NOURISHING Framework*, com participação multissetorial para assegurar uma maior colaboração e comprometimento das partes envolvidas. Recomenda-se realizar uma revisão sistemática, com pesquisa de um rol mais amplo de fontes de informação, para avaliar a efetividade das intervenções.

Palavras-chave Nutrição; políticas; segurança alimentar e nutricional; países em desenvolvimento.
