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Reclaiming traditional, plant-based, climate-resilient food systems in small islands

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Abstract

Small island developing states face challenges in cultivating healthy food systems and are currently bearing substantial burdens of obesity and type 2 diabetes. Local food production—rooted in collective local and Indigenous traditions, self-sufficiency, and climate-adaptive agricultural practices—has long emphasised a fibre-rich, plant-based diet; however, common histories of dietary colonialism have replaced local, small-scale farming and fisheries with non-nutritive cash crops, intensive livestock operations, and high-quality food exportation. Along with declines in traditional food availability, the resulting food import dependence has fostered a diabetogenic ecosystem composed of energy-dense cereal products, animal-based fats, and processed foods. The destabilisation of local food sectors undermines small island social and cultural systems, contributes to impoverishment and food insecurity during natural disasters, and, ultimately, can reduce diet quality and increase type 2 diabetes risk. Despite ongoing marginalisation of traditional local food systems, locally produced foods such as starchy roots, legumes, fruits, and seafood persist as nutritious and ecologically relevant cornerstones of self-determined local economic productivity and dietary health. Findings from community and epidemiological work suggest that local food production—bolstered by local and Indigenous agroecological knowledge, cultural preservation, and collective agency—can aid in reclaiming healthy and climate-resilient small island food systems.

Introduction

Small island developing states (SIDS)—delineated by the UN as low-income and middle-income countries and other non-independent island territories throughout the Caribbean, the Pacific, the Atlantic, Indian Ocean, Mediterranean, and South China Sea¹—bear substantial burdens of obesity and type 2 diabetes. Although self-sufficient food production in local and Indigenous communities once utilised climate-adaptive practices to support a minimally processed and plant-based diet, common histories of globalisation have diminished and co-opted traditional local food sectors, amplifying food import dependence

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Contributors

AM conceptualised the research question, searched the literature, analysed and interpreted the data, and wrote the Review. JM supervised and contributed to the Review. Both authors read and approved the final manuscript.

Declaration of interests

We declare no competing interests.

and diet-related chronic disease. Initially characterised as dietary colonialism in the Pacific, the destabilisation of local food production can extend to small islands around the world, amplifying poor socioeconomic conditions, contributing to periodic food insecurity during natural disasters, and undervaluing healthy and culturally relevant diets. In this Review, we aim to describe the interconnection between shifting food systems and type 2 diabetes risk in small islands (as systemically shaped by dietary colonialism) and we posit that local food production, informed by climate-resilient agroecological knowledge, cultural traditions, and collective self-determination, has the capacity to support a more nutritious and sustainable food supply.

Type 2 diabetes prevalence and contributors

Small islands around the world have a disproportionate prevalence of diet-related chronic diseases. In 2019, eight of the ten countries with the highest age-adjusted prevalence for diabetes were SIDS, and, in some SIDS, as many as one in three adults were diagnosed with diabetes (figure 1).² Health disparities in insulin dysregulation have intensified in SIDS and other low-income and middle-income countries due to an epidemiological transition associated with obesity, physical inactivity, and poor diet quality.³ At the start of the century, the average mortality rate from diabetes in the Caribbean was five times that observed in mainland USA.⁴ In Oceania, fasting plasma glucose rose by 0.22 mmol/L in men and 0.32 mmol/L in women per decade from 1980 to 2008, which is 3.5 times the average worldwide increase during the same period.⁵ Stark health disparities exist in SIDS, with Indigenous groups, such as Aboriginal and Torres Strait Islander people in the Pacific, having as much as a 20 year reduction in life expectancy compared with the total Australian population;⁶ however, both Indigenous and non-Indigenous island communities, including Black and South Asian populations in the Caribbean, have high levels of chronic disease morbidity and mortality, beckoning investigation of ubiquitous, structural facets of food and social systems.⁷

The rapid rise in type 2 diabetes among indigenous populations in small islands has long motivated biogenetic theories of disease, including the so-called thrifty gene hypothesis,⁸ despite sparse anthropological evidence for famine in regions with year-round subsistent food availability.⁹ Other mechanisms have emphasised the metabolic mismatch of early-life undernutrition and subsequent obesity in these rapidly modernised, dual-burden food environments.¹⁰ Despite these findings, a prevailing emphasis on biological determinism in the literature often fails to recognise the extensive role that past and ongoing marginalisation might have in increasing type 2 diabetes risk.¹¹ Diabetogenic environments in SIDS have been proposed to stem from common histories of colonisation, through which healthy and climate-adaptive local food traditions were eliminated in the interests of the colonising nation.¹² The coerced shift away from traditional local food sources towards import dependence might offer insights into contemporary type 2 diabetes risk in island food environments.

As an important driver of diet quality and chronic disease risk, the term dietary colonialism captures the processes by which colonial and neocolonial powers have exerted undue influence in small islands that, in turn, have destabilised local food and agricultural

production, marginalised traditional food cultures, and created external food dependency.¹³ The inequitable integration of island political economies into the global marketplace by colonising nations—and, increasingly, by transnational corporations and regional trade policies—drives shifts in the food system of SIDS that diminish human health and agroecological climate resilience. Originating in the historical displacement of biodiverse subsistence farming and fishing communities for non-nutritive plantations and forced labour, dietary colonialism continues to shape island food supplies via inexpensive meat and processed food importation,¹⁴ the erosion of cooperative social values and small-scale networks of food exchange,¹⁵ and the continued industrialisation and international monopolisation of local agricultural production. Instead of reinforcing genetic determinism and weight stigmatisation, efforts to promote nutritional health should recognise and grapple with long-standing structural barriers to cultural, economic, political, and communal food agencies.¹⁶

Traditional local food production

Evidence from early cultures documents a diverse range of nutrient-dense fruits and vegetables available in island ecosystems, many of which continue to shape current dietary preferences (table).^{17–30} Indigenous communities subsisted on a fibre-rich and carbohydrate-rich diet, gathering seasonal fruits, legumes, nuts, and seeds and cultivating endemic root species, plantains, and other farinaceous crops in home-based farms.^{19,23,31} Among Indigenous Caribbean tribes, archaeological evidence suggests a strong reliance on starchy plants such as cassava, yautía, and maize, eventually intensifying towards root crop horticulture and gardening.^{18,19} Oceania, Polynesia, Micronesia, and Melanesia people subsisted on taro, yams, breadfruit, banana,^{21,22} and other local fruits rich in carotenoids and rarely associated with population micronutrient deficiencies.²⁴ On the west African coast, ancient grains such as millet and sorghum shaped the agricultural economies of early societies.^{28,29} Apart from some seafood in coastal areas, animal protein only occasionally supplemented this plant-based diet, likely due to weather and natural resource-related constraints on land-based animal husbandry.^{19,21,22,32} Linguistic evidence from the Hawaiian Islands suggests that small animal consumption was an ancillary luxury to more regularly consumed starchy staples.²³ Robust social networks also enabled the exchange of foods and agroecological knowledge, fostering a collective sense of community wellbeing.^{19,22,29}

Historically, traditional local food production practices might have been climate resilient and designed to withstand highly variant ecological and climatic conditions. Networks of numerous small farmers offered localised food sources, particularly among inland or remote communities.^{22,29} A dietary reliance on starchy roots also reflected the need for an energy-dense food with a short growing season and underground protection from natural disasters.^{24,33} Archaeological evidence suggests that agricultural practices, such as terracing, agroforestry, and multicropping, preserved biodiversity, minimised erosion, and improved soil nutrient status, protecting the quality of sparse arable land.^{17,19,26} Traditional food trees in agroforestry and home gardens additionally enhanced food access and dietary diversity, particularly among rural and resource-constrained families.³⁴ Culinary traditions also reduced the severity of food shortages during cyclones, droughts, and forest fires. For

example, in the Caribbean, cassava bread was and continues to be pervasively produced for its shelf life and transportability.^{18,19} In small Pacific islands, drying, fermentation, and paste-making also improved long-term food storage, particularly in areas where coralline structures and volcanic surfaces limited agricultural productivity.²⁶ Thus, place-based traditional food practices ensured food and nutritional security, despite topographical and climatic constraints, through the preservation of food and environmental biodiversity.³⁴

Local and Indigenous sociocultural customs in small islands continue to highlight local foods as a means of promoting health and expressing identity, social relationships, and economic wellbeing,³² with plant-based foods serving as cornerstones of traditional cuisine. In many Pacific islands, the current cultivation and consumption of remnant cultigens, such as the giant taro and breadfruit, serve as evidence for the historical gathering of their wild counterparts.²¹ Foods from forests, including yams, wild ferns, fruits, and nuts, are also a major contributor to food security in the region.²⁴ In the Caribbean, locally produced plantains, melons, cassava, and other starchy crops continue to be widely used in traditional cooking.^{17,19,35} The largest proportion of daily available energy per person in SIDS continues to come from plant-based foods, including starchy roots, fruits, vegetables, nuts, and legumes, especially when compared with the greater proportion of energy from animal sources and vegetable oils consumed in larger economies (figure 2).²⁰ Aquatic food consumption also remains high in SIDS, accounting for as much as 90% of animal protein intake, mostly from coastal subsistence fisheries in the Pacific, and continuing to contribute to traditional and transitioning dietary patterns in the Caribbean, such as in Guadeloupe and Martinique.^{36,37}

The history and impact of colonisation

The colonisation of many island communities, beginning during the 1500s and extending into the 1900s, radically reconfigured local food systems. Colonising nations often reoriented local agriculture away from traditional, small-scale production and towards intensive plantation economies (table). In the Caribbean, early Spanish colonisers introduced plantations for cash crops such as coffee, sugarcane, and tobacco for transatlantic export markets,^{17,31} and large-scale sugarcane and coconut industries similarly replaced the cultivation of root crops, fruits, and seafood in the Pacific.³² In Guinea-Bissau, agricultural colonisation also displaced ancient grains and, among the urban poor, led to deficiencies in the intake of plant-based protein, thiamine, calcium, and iron.^{28,29} Reduced availability of traditional roots, tubers, and maize have also been associated with low fibre intake.⁴

Along with nutritional deficits, agricultural intensification in some SIDS has amplified environmental deterioration, including inequitable land management, diminished freshwater resources, use of agricultural chemicals, and increased pollution.³⁸ The introduction of large-scale animal husbandries such as poultry farms and cattle grazing, which has roots in the colonial period, has also put strains on sparse pasture and increased dependence on imported animal feed.^{4,39} Industrial land-based agriculture in islands has been linked to extensive forest clearance, soil erosion, and local species threats; in marine ecosystems, export commercial production has also marginalised subsistence fisheries and led to the overexploitation of fish stocks.⁴⁰ In the Pacific, modern monoculture of cash crops also

de-emphasises tree planting within agricultural systems, resulting in agrodeforestation and loss of agrobiodiversity.⁴¹ The decoupling of crop production from local ecogeographical conditions has also contributed to the genetic erosion of traditional food crops, destabilising local economic development.⁴²

Declines in traditional food production have also contributed to adverse socioeconomic conditions. Although historically sustained by the work of Indigenous people and displaced African slaves, agricultural operations dispossessed land ownership away from small farmers, leading to radical impoverishment and disenfranchisement. Inequities in land tenure also threaten the sustainability of domestic food production.^{26,29,31} 20th century geopolitical pressures encouraging the abandonment of small-scale farming in favour of urbanisation, industrialisation, and tourism—postcolonial, neoliberal policies pressed on SIDS to assimilate into the so-called developed global political economy of food⁴³—also exacerbated rural unemployment, agricultural labour shortages, food pricing instability, and heavy food import dependence.^{17,26,29} Additionally, declines in local food production reinforce structural susceptibility to food insecurity, particularly in imported food distribution systems that are vulnerable to the climate.¹⁷ Coastal flooding, droughts, hurricanes, and other extreme weather events also devastate fragile natural and built resources, highlighting the need for more localised, climate-resilient, and ecologically relevant mitigation strategies.⁴⁴

Dietary colonialism, food import dependence, and type 2 diabetes

Histories of dietary colonialism (eg, intensive plantation economies, urbanised food centres, underutilised subsistence fisheries, and diminished agroecological knowledge) in small island food systems forecast a continued trajectory towards modern food dependence.^{13,45} The replacement of traditional food farming with non-nutritive cash crops—many of which are still cultivated today—has driven nutritional deficiencies and necessitated the importation of inexpensive, energy-dense foods such as polished enriched rice.⁴⁶ In some islands, processed food consumption has also been reinforced via foreign governmental aid, including the US supplemental nutrition assistance programme, and overseas remittances.³¹ Urbanisation and industrialisation pressures to abandon labour-intensive agriculture augment poor diet quality, sedentary behaviour, and weight gain.⁴⁷ With roots in the plantation economy, these and other shifts in the socioeconomic fabric of island populations—including racialised class stratification, concentrated political power, and land monopolisation—have also restructured value systems away from mutual aid and towards the marketplace, perpetuating persistent poverty and income inequality.⁴⁸

Globalised international trade continues to exploit local diets and marginalise traditional local food production.⁴⁹ Countries such as Australia and the USA are increasingly criticised for so-called dumping high-fat processed food into island food supplies,⁴⁶ practices that are often coupled with the exportation of high-quality foods that are locally produced, such as groundnuts and reef fish.^{12,13,46} In some Pacific islands, the sale of local fishing rights to high-income countries has been associated with declines in local tuna consumption and increased canned fish intake.⁵⁰ In the Caribbean, former sugar plantations are now used to grow export commodities, such as coconut and coffee, outcompeting the domestic

availability of root crops, vegetables, and fruit.⁴ In Seychelles, attempts to renew traditional plant-based crops are impeded by high labour costs on farms and, consequently, are increasingly replaced by eggs, poultry, and pork for the tourism sector.³⁰ With diminished local foods, dietary colonialism in SIDS is currently driven by the importation of cereal products such as rice, which has more than quadrupled in the past half century, and imported meats and animal and vegetable oils (figure 3).²⁰

The dependence on food imports in small islands facilitates a nutrition transition towards colonial diets implicated in obesity and type 2 diabetes, augmenting the total dietary energy available in the food supply, particularly from animal-based fats, refined cereals, and other processed foods.^{4,51} In the Caribbean, increased total energy intake during the 20th century—largely attributable to fat from beef, pork, milk, and butter—was correlated with age-adjusted diabetes mortality.⁴ Excess consumption of white bread, sugar, and sugar-sweetened beverages (high glycaemic foods implicated in obesity and type 2 diabetes risk^{52–54}) also increased, whereas that of fruit, vegetables, roots, and legumes declined.⁴ In Puerto Rico, where as much as 85% of the food supply is imported, sugary beverages, sweets, dairy, and processed meats are major contributors to total energy intake,⁵⁵ a reliance on energy-dense foods that, along with low intake of fruits, vegetables, and fibre, has been associated with adiposity in this population.⁵⁶ In contrast, intentionally purchasing local foods on the island has been linked to a higher diet quality, including increased intake of fibre, plant-based protein, and healthy fats.⁵⁷

An imported diet higher in animal fats, processed foods, and lower in dietary fibre has also been consistently observed throughout the Pacific.^{32,50,51} Declines in starchy root crops, fruit, coconut, and seafood intake have been accompanied by a heavy reliance on rice, canned meats, and sugar, contributing to malnutrition and adiposity.^{32,51} A survey in Vanuatu found that individuals who consumed imported margarine, butter, and processed meat were 2.2 times more likely to be classified as having obesity and 2.4 times more likely to have diabetes than those whose dietary fat came from traditional food sources.⁵⁸ Among adult Samoans, a so-called modern dietary pattern composed of rice, potato chips, and refined grains has also been associated with metabolic syndrome.⁵⁹ Sugar-sweetened beverages and other highly processed foods are also salient examples of the role that these globalised food supplies have in poor diet quality, with their heavily advertised convenience and low costs driving consumption, particularly in low-income communities and areas with low access to safe water.^{47,60} Importantly, with rice and other colonial and capitalist foods now considered staples and often cultivated locally in invariably globalised island food supplies, rigid distinctions between local, traditional, and imported foods can become ineffectual;⁶¹ instead, efforts to relocalise food systems emphasise food sovereignty as a place-based strategy for equitable, relational, and ecologically sustainable food and agricultural self-determination.⁶²

Local foods and cardiometabolic health

Despite increasingly imported diets, robust evidence suggests plausible mechanisms relating local food consumption to diet quality and metabolic health. Although excess dietary sugar and refined cereals can contribute to hyperglycaemia and subsequent insulin dysregulation,

high-carbohydrate diets alone do not necessarily predict type 2 diabetes risk.⁵² The consumption of traditional, fibre-rich foods might be an important protective factor against weight gain, insulin resistance, and type 2 diabetes.^{63–65} In an intervention study, a low-fat, high-carbohydrate traditional Hawaiian diet rich in dietary fibre led to significant decreases in weight, blood pressure, fasting blood glucose, and lipid concentrations.⁶⁶ Resistant starch, a viscous, fermentable fibre most commonly found naturally in legumes, green bananas, and roots,⁶⁷ might also confer benefits, improving insulin sensitivity in metabolic syndrome, reducing unrestricted energy intake, decreasing systemic inflammation, and stimulating gut-mediated glucagon-like peptide-1 release.^{68–72} Among individuals with diabetes, a 12 week low glycaemic index diet rich in legumes showed greater reductions in glycosylated haemoglobin than a whole wheat fibre diet.⁷³ Traditional root and tuber crops, such as cassava, also confer a lower glucose response than cereal grains⁷⁴ and have remained varied genetically relative to non-traditional crops, serving as dietarily diverse sources of vitamins and minerals such as calcium, iron, and magnesium.⁷⁵

Local food production also contributes plant-based proteins to the diet, including tropical legumes such as cowpeas and groundnuts, which are mostly consumed where they are produced and constitute an estimated 80% of traditional protein intake.⁷⁶ Plant-based proteins that are minimally processed and nutrient-dense can serve as an alternative to imported meats and have been associated with lower type 2 diabetes risk, are high in fibre, and have a healthier fat profile.^{77–79} Lean animal protein such as seafood, poultry, and eggs might also have dietary advantages in prevention of type 2 diabetes^{80,81} and can be locally procured by integrating equitable, sustainable, and climate-adaptive management. White and oily fish consumption has been associated with reduced type 2 diabetes incidence, probably due to the beneficial effects of polyunsaturated fatty acids on insulin sensitivity, and can be rich sources of fat-soluble vitamins A and D.⁸⁰ Beyond nutrient intake, home-based and community-based food production methods (eg, small-scale farms, home gardens, and ponds) serve as the stage on which familial, spiritual, cultural, economic, and ecological relationships are fortified⁸² and might contribute to a more holistic approach to wellbeing and cardiometabolic health.

Self-determined and climate-resilient island food systems

Despite entrenched histories of colonisation and food import dependence, island communities have looked towards food sovereignty—with roots in protecting the rights and livelihoods of smallholder farmers and fisherfolk, reprioritising local agriculture to feed local people, and preserving communal and agroecological food cultures⁸³—and the revitalisation of local food production in attempts to build healthy, self-sufficient, and climate-resilient food systems. Based on current data from the Food and Agriculture Organization of the UN, a 10 year net increase in local food production among SIDS has been correlated with lower age-adjusted diabetes prevalence ($r=-0.203$; figure 4).^{2,20} Although this evidence is only observational, the health benefits associated with local food production and traditional diets are plausible. For example, Papua New Guinea currently has among the lowest adult prevalence of obesity (6.8%) and diabetes (14.4%) among Pacific Islands⁴⁷ and has long prioritised the preservation of self-sustainable communities based on farming and traditional social networks.⁸⁴ Local and Indigenous

food practices, grounded in shared knowledge and biodiverse ecosystem resources, have also been increasingly reclaimed for health promotion.^{82,85} Small-scale subsistence farming in Jamaica, a cornerstone of household and national food security, has sought to leverage intergenerational expertise, traditional food crops, and agroecology in combatting food import dependence.⁸⁶ In Pohnpei's Go Local island food network, community-based production of banana, taro, and breadfruit through home gardening, collective seedbanks, and small-scale food processing, was shown to successfully increase carotenoid intake and decrease rice consumption.⁸² Adherence to a neotraditional diet high in plant-based fibre, lean protein, and Indigenous fruits and vegetables has also been associated with lower adiposity.⁵⁹

Reclaiming local food production and traditional plant-based diets, and, in a neotraditional approach, developing synergies between Indigenous and modern sustainable production technologies,⁸⁷ could also promote food security and climate resilience in small islands (where imported food supplies can otherwise break down during natural disasters).¹⁷ Improving local food distribution systems, refrigeration, and traditional value-added products such as cassava flour³³ might help small farmers move their agricultural product to local markets effectively. Ethnobiological knowledge—with expertise in adapting to highly variable environments and unpredictable weather disturbances—can also be used to develop resilient resource management and mitigation strategies, while collectivist agricultural traditions can overcome natural resource constraints by amassing physical, social, and economic assets.⁸⁸ Indigenous farming practices, such as shifting agroforestry and multicropping systems, use a diverse matrix of ground and tree crops, which conserves soil nutrient status, preserves species habitats, and produces a biodiverse range of food crops that can be more consistently cultivated throughout the year than monocultures.^{40,89} These traditional practices can also be combined with soil conservation strategies such as contour ploughing to minimise erosion and reduce the risk of landslides during hurricanes or earthquakes.⁹⁰ Sustainable plant-based food production will also be important in mitigating climate change⁹¹ and has shown potential in small islands. In the Caribbean, while beef and dairy production has declined due to climate-related heat stress and disease pathogens, the market values of vegetables, plantains, and fruits have increased, corroborating the economic viability of these staples.³⁵ Subsistence fisheries, which are high-quality lean protein sources largely operating within informal kin networks, have also been recognised as fundamental to food security in the Pacific and contribute to local economies at a level equalling five times that previously assumed.⁹²

Although diets are also influenced by individual tastes and dietary preferences, reclaiming authentic food autonomy in these environments with highly colonised, imported food supplies will require acting beyond interventions that fail to address, or even perpetuate, deeply rooted socioecological inequities. For example, some research in the Pacific has endorsed behavioural change strategies to improve diet quality and physical activity, but this research cites the local culture (eg, valuing large body sizes and prioritising familial and social wellbeing over individual health) as barriers to health promotion.⁴⁶ Other more distal strategies, including trade policies such as tariffs on unhealthy food imports, might aggravate food insecurity,⁹³ whereas foreign aid or nutritional assistance programmes can perpetuate dependence instead of local economic productivity.³¹ Revitalising small island

local food production instead looks to local and community-based resources, including cultural traditions, social support networks, and ecological diversity as assets, not obstacles, to self-determination and health.

Conclusions

Local food production in small island communities is embedded in rich socioecological traditions, employing local and Indigenous knowledge and ecological resources that have been mostly overlooked in shared histories of dietary colonialism and dependence on food imports. Reclaiming local foods could offer an opportunity to bolster a more traditional plant-based and fibre-rich diet, providing nutritious and minimally processed alternatives to an otherwise energy-dense imported food supply. Revitalising small-scale agriculture and subsistence fisheries offers a systemic approach to improve diet quality, potentially reducing the burden of type 2 diabetes and related chronic diseases. The need to ensure food security in islands with imported supply chains that are vulnerable to climate change is becoming increasingly relevant and more work is needed to assess the capacity for local food production to sustain population dietary needs in a self-sufficient and climate-adaptive manner. Future public health work should integrate rigorous interdisciplinary research within community-based action and use local expertise to foster a healthy, culturally relevant, and self-determined local food system.

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Search strategy and selection criteria

This Review was based on evidence documented in both the academic and grey literature, aiming to provide a comprehensive overview of findings from peer-reviewed articles, international organisations, books, and community-based research approaches, particularly in typically under-resourced settings. We searched Google Scholar with the terms “small island developing states,” “Pacific islands,” “Caribbean,” “diabetes,” “obesity,” “insulin resistance,” “Indigenous foods,” “traditional diets,” “local food production,” “subsistence fisheries,” “agricultural decline,” “agroecology,” “sustainable development,” “climate change,” “climate resilience,” “food security,” “food import dependence,” “globalization,” “colonization,” “nutrition transition,” “diet quality,” “plant-based diets,” “dietary fiber,” “resistant starch,” “informal economy,” “social support networks,” and “Indigenous knowledge” for references published at any publication date. Articles were screened by title and abstract to identify relevant full-text reports. Evidence from a diverse range of disciplines was incorporated to provide a balanced summary of the literature and included nutrition, epidemiology, archaeology, ecology, and the medical sciences. Publicly available datasets from the International Diabetes Federation and the UN Food and Agriculture Organization served as the basis for illustrative analyses.^{2,20}

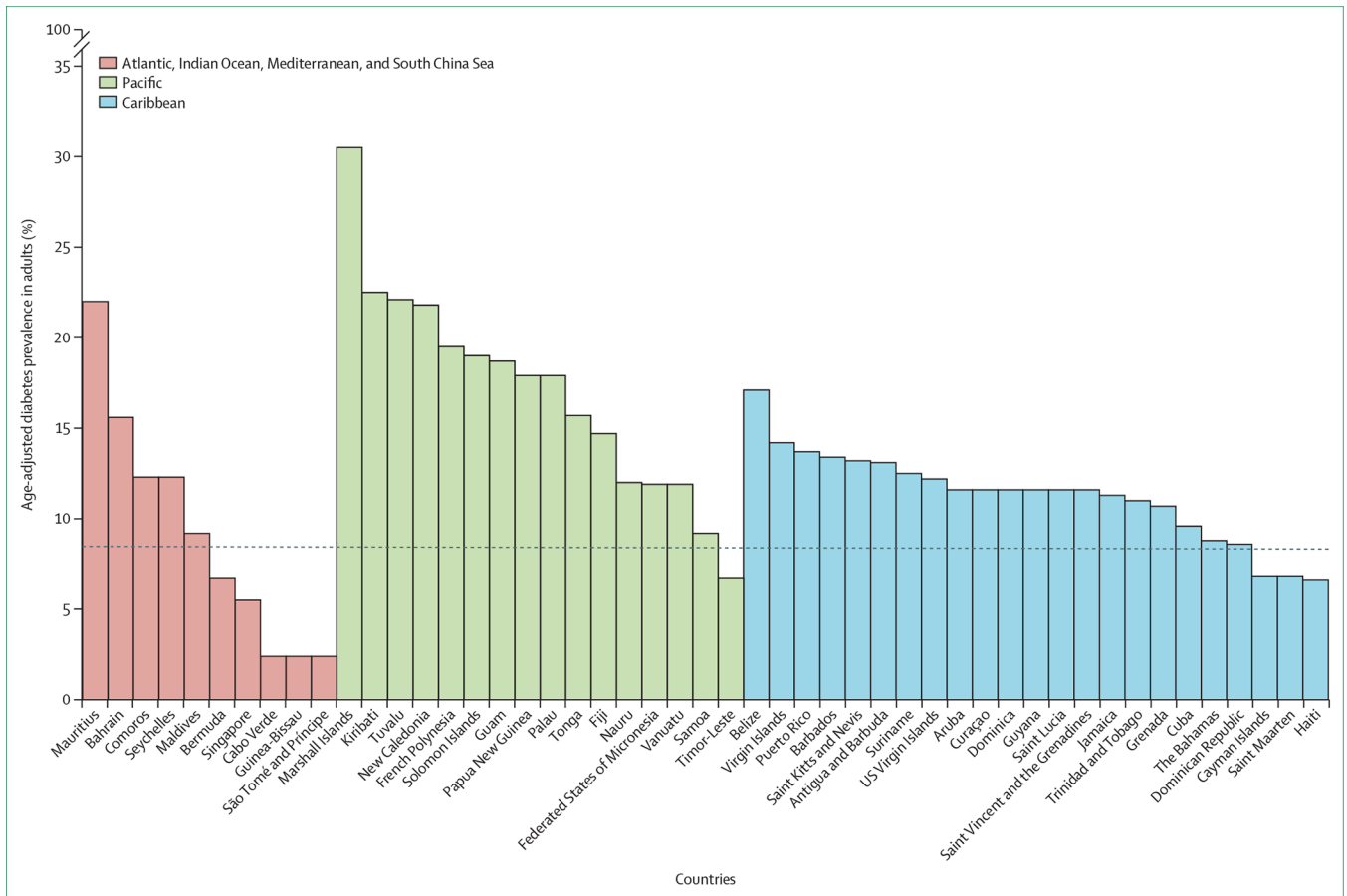


Figure 1: Age-adjusted diabetes prevalence in adults (20–79 years) in small island developing states in 2019

The dashed line indicates the worldwide age-adjusted diabetes prevalence in adults. Data from the International Diabetes Federation.²

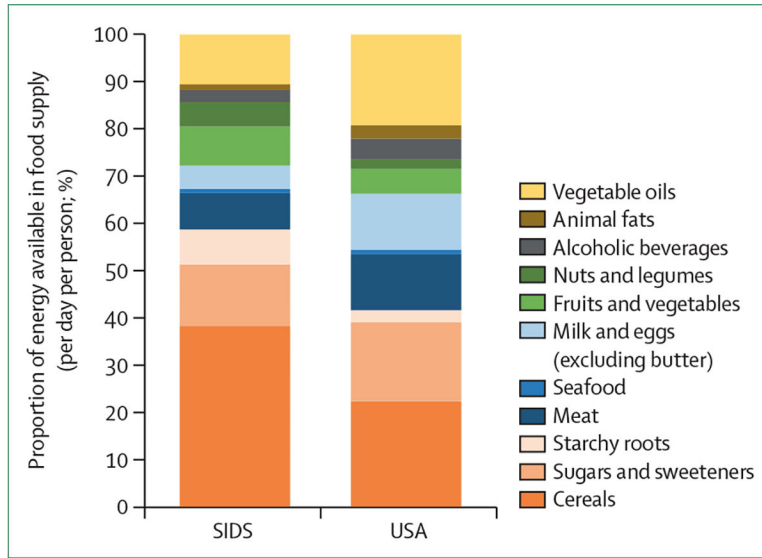


Figure 2: Proportion of energy available from various food groups in SIDS and the USA
 Data from the Food and Agriculture Organization of the UN,²⁰ 2013. Cereals include wheat, rice, barley, maize, rye, oats, millet, and sorghum products; sugars and sweeteners include sugar, honey, and other sweeteners; starchy roots include cassava, potatoes, sweet potatoes, and yam products. Meat includes bovine, mutton, poultry, and pork products; seafood includes crustaceans, cephalopods, molluscs, and freshwater, demersal, and pelagic fish; fruits and vegetables include tomatoes, onions, citrus, grapefruit, bananas, plantains, apples, pineapples, dates, and grapes; nuts and legumes include beans, peas, other pulses, and nut products; animal fats include raw animal fats, butter, cream, and fish oil; and vegetable oils include soybean, groundnut, sunflower seed, rapeseed, cottonseed, palm, coconut, sesame seed, olive, and maize oils. SIDS=small island developing states.

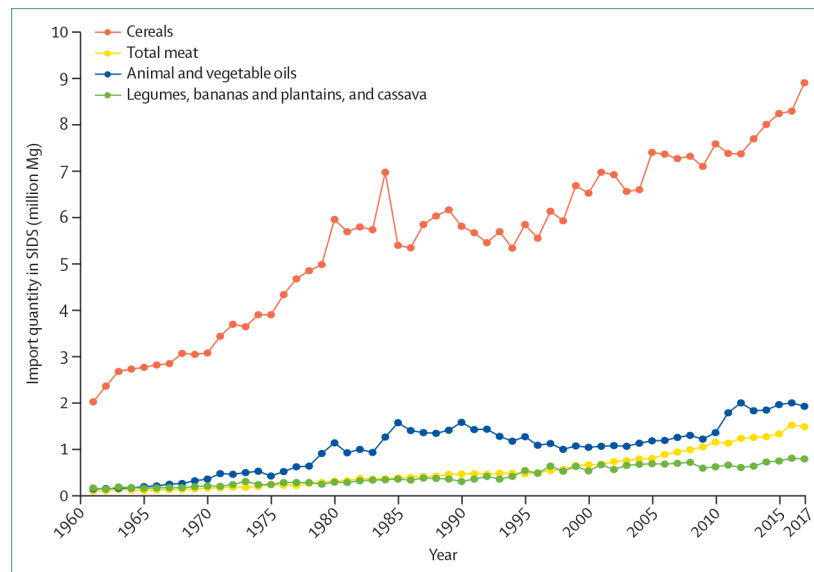


Figure 3: Import quantities of various food groups in SIDS from 1961 to 2017

Data available from the Food and Agriculture Organization of the UN.²⁰ Cereals include barley, buckwheat, canary seed, flour, fonio, maize, millet, oats, quinoa, rice, rye, sorghum, and wheat; total meat includes pork, beef, poultry, and mutton products; animal and vegetable oils include beeswax, raw animal fats, coconut, castor bean, cottonseed, groundnut, linseed, maize, olive, palm, rapeseed, safflower, sesame, soybean, and sunflower oil; legumes, bananas and plantains, and cassava includes Bambara beans, broad beans, chickpeas, lentils peas, bananas, plantains, cassava, and cassava flour. SIDS=small island developing states.

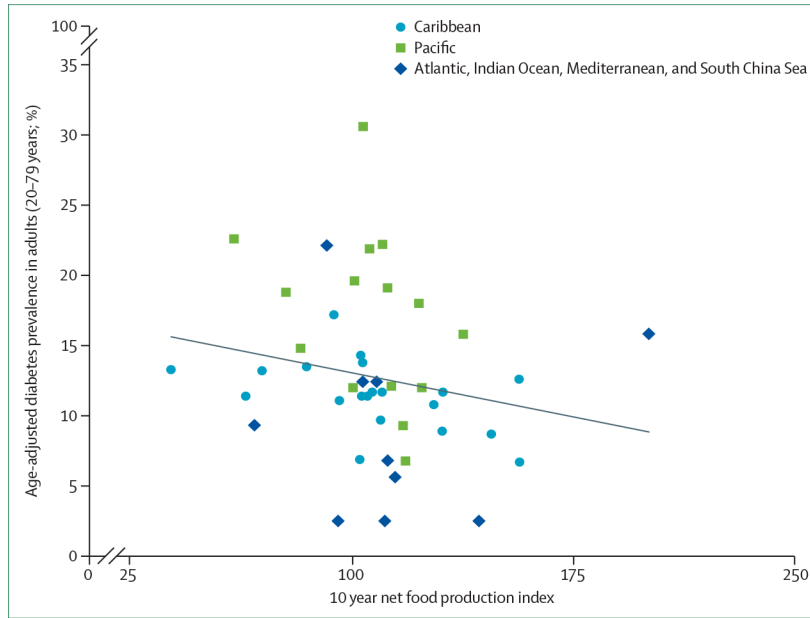


Figure 4: Association between age-adjusted diabetes prevalence and 10 year food production index in SIDS

Data available from the International Diabetes Federation and the Food and Agriculture Organization of the UN.^{2,20} Estimates for age-adjusted diabetes prevalence are from 2019 and only include adults aged 20 to 79 years. The 10 year food production index estimates are from 2016 and use 2004–06 as the base period, in which the base period index score is 100 (values below 100 indicate a decline in local food production from the base period and values above 100 indicate an increase). The index includes food crops and livestock products originating in each country that are considered edible and that contain nutrients; coffee and tea are excluded because they have no nutritive value. The grey line indicates the correlation between age-adjusted diabetes prevalence and 10 year net food production index across all SIDS ($r = -0.203$). SIDS=small island developing states.

Historical shift from local food production toward cash crops and food imports in small islands

Table:

	Traditional local foods	Indigenous food production practices*	Colonial cash crops and modern food imports
Caribbean ¹⁷⁻²⁰	Starchy plants: cassava, sweet potato, marunguey, taro, arrowroot, yautía, maize, plantains; nuts and legumes: jack-bean, common bean, wild legumes, and groundnuts; fruits: peppers, pineapple, papaya, camistel, avocado, sapodilla, passion fruit, coconut, mango, and banana; and lean protein: rodents, pigeon, reef fish, land crabs, and mollusks	Subsistence: home gardening, gathering, and net-based and trap-based fishing; intensification: terracing, ditch irrigation systems, and conucos (ie, fertilised mounds); and processing: cassava breadmaking	Cash crops: sugarcane, cocoa, coffee, tobacco, spices, and rice; and food imports: rice, beans, wheat, maize products, sugar, vegetable oils, poultry, and processed meat and fish
Pacific islands ²⁰⁻²⁷	Starchy plants: taro, yams, sago, cassava, breadfruit, plantains, and sweet potato; fruits: banana, coconut, and mango; and lean protein: reef fish, mollusks, land crabs, octopus, sea urchins, edible insects, domesticated pigs, small animals	Subsistence: gathering of wild plants and insects, inland hunting, fishing, home gardening; intensification: slash-and-burn techniques, shifting cultivation, multicropping, animal husbandry, terracing, agroforestry; and processing: pounding, drying, paste and pudding making, leaf-wrapped mixtures, flour, fermentation	Cash crops: sugarcane, tobacco, coffee, coconut (copra), pineapple, maize, citrus trees; and food imports: rice, wheat, vegetable oils, poultry, noodles, snack foods, desserts, processed meats and fish, canned vegetables, juices, alcoholic beverages
West African coast ^{17,28-30}	Grains: maize, millet, sorghum, rice, fonio; starchy plants: yams, kaffir potato, African breadfruit, cassava, sweet potato; and legumes: cowpeas, Bambara groundnut, geocarpa bean, African yam bean	Subsistence: gathering of wild starchy plants; intensification: small-scale farming; and processing: pudding and sauce making, pounding, frying, flour	Cash crops: sugarcane, rice, cotton, barley, potatoes, beans, groundnuts, coffee, banana, coconut; and food imports: rice, wheat, animal fats, sugar, beverages, poultry, maize

* Subsistence refers to practices that supply food for personal and local consumption (typically small in scale and with little to no surplus for market) and intensification refers to practices used to increase agricultural productivity (typically for commercial sale and using advanced technologies).