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POLICY BRIEF:

Food security challenges and vulnerability in Small Island Developing States (SIDS)

2021

Food security challenges and vulnerability in Small Island Developing States

Written by

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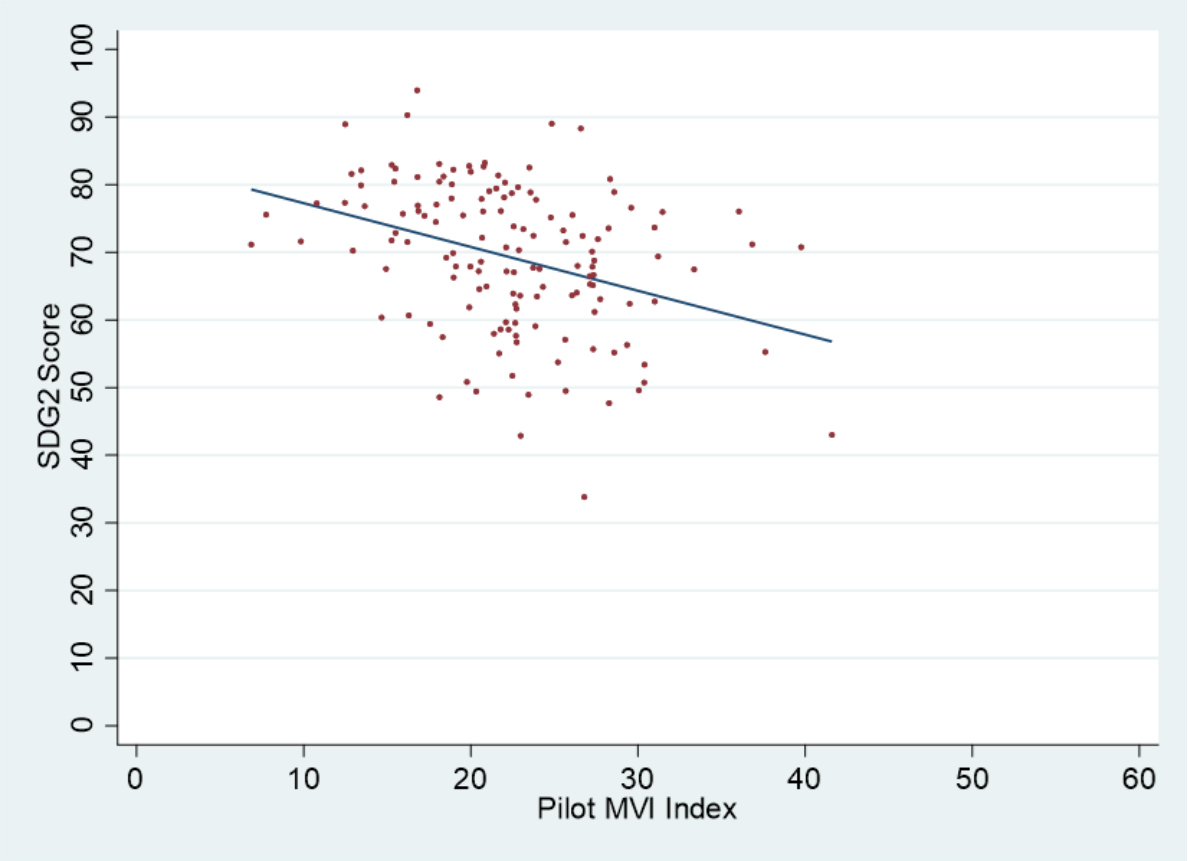
The impact of vulnerability on the Zero Hunger Goal

Achieving food security and improving nutrition are crucial to reach the 2030 Agenda for Sustainable Development. Not only they are essential to reach SDG2 – Zero Hunger, but they are also linked to many other SDGs including SDG3 – Good Health and Well-Being, SDG12 – Responsible Consumption and Production, SDG14 – Life Below Water, and SDG15 – Life on Land, among others.

The new pilot Multidimensional Vulnerability Index (MVI)[1] prepared by the Sustainable Development Solutions Network (SDSN) and the UN Resident Coordinators in Small Island Developing States (SIDS) shows that there exists a negative relationship between the degree of structural vulnerability of countries across the world and their progress towards achieving SDG2 – Zero Hunger (Figure 1). This implies that countries with a higher degree of vulnerability face more difficulties to end hunger and achieve food security and improved nutrition.

Figure 1. Pilot MVI vs SDG2 – Zero Hunger



[1] The Pilot MVI is an index which aims at measuring the degree of *structural* vulnerability of a country. It is made up of 18 indicators selected to capture vulnerability of Small Island Developing States (SIDS) specifically. These indicators are allocated across three categories: economic vulnerabilities, structural development vulnerabilities, and environmental vulnerabilities. See Sachs et al. (2021a).

Source: Authors, based on Sachs et al. (2021a) and Sachs et al. (2021b). *Notes*: $SDG2_i = \beta_0 + \beta_1 MVI_i + \varepsilon_i$; β_1 is negative and significant at the .01 level (β_1=-.65); β_0 is positive and significant at the .01 level (β_0=83.76); Adjusted R^2=.12; Sample: 142 countries across the world, including 14 SIDS of which 8 in the Caribbean region, 2 in the Pacific region, and 4 in the Atlantic/Indian region; SDG2 Score is the equal weighted average of four out of the eight indicators used to compute Goal2 of the SDG Index 2021 for which data coverage is good enough. The four indicators are: i) prevalence of undernourishment (%); (ii) prevalence of stunting in children under 5 years of age (%); (iii) prevalence of wasting in children under 5 years of age (%); and (iv) prevalence of obesity, BMI ≥ 30 (% of adult population). The list of SIDS and their respective SDG2 Score is provided in Table A1 in the Annex. SDG2 Score is measured from 0 to 100, where 100 is the best possible outcome.

Across the different types of vulnerability captured by the pilot MVI, economic vulnerabilities and structural development limitations (although to a lower extent) appear to have the greatest negative impact on the achievement of SDG 2 – Zero Hunger (Table A2 in the Annex)[2].

When looking across world regions, it emerges that there is considerable variability SIDS in reaching the SDG2 target (Figure 2 below). Based on the latest SDG Index and Dashboards (Sachs et al. 2021b), the Pacific and Caribbean SIDS are below the world average while SIDS in the Atlantic and Indian Ocean are the best performers led by Singapore. Notably the Pacific SIDS are among the worst performers together with the sub-Saharan African and South Asian regions.

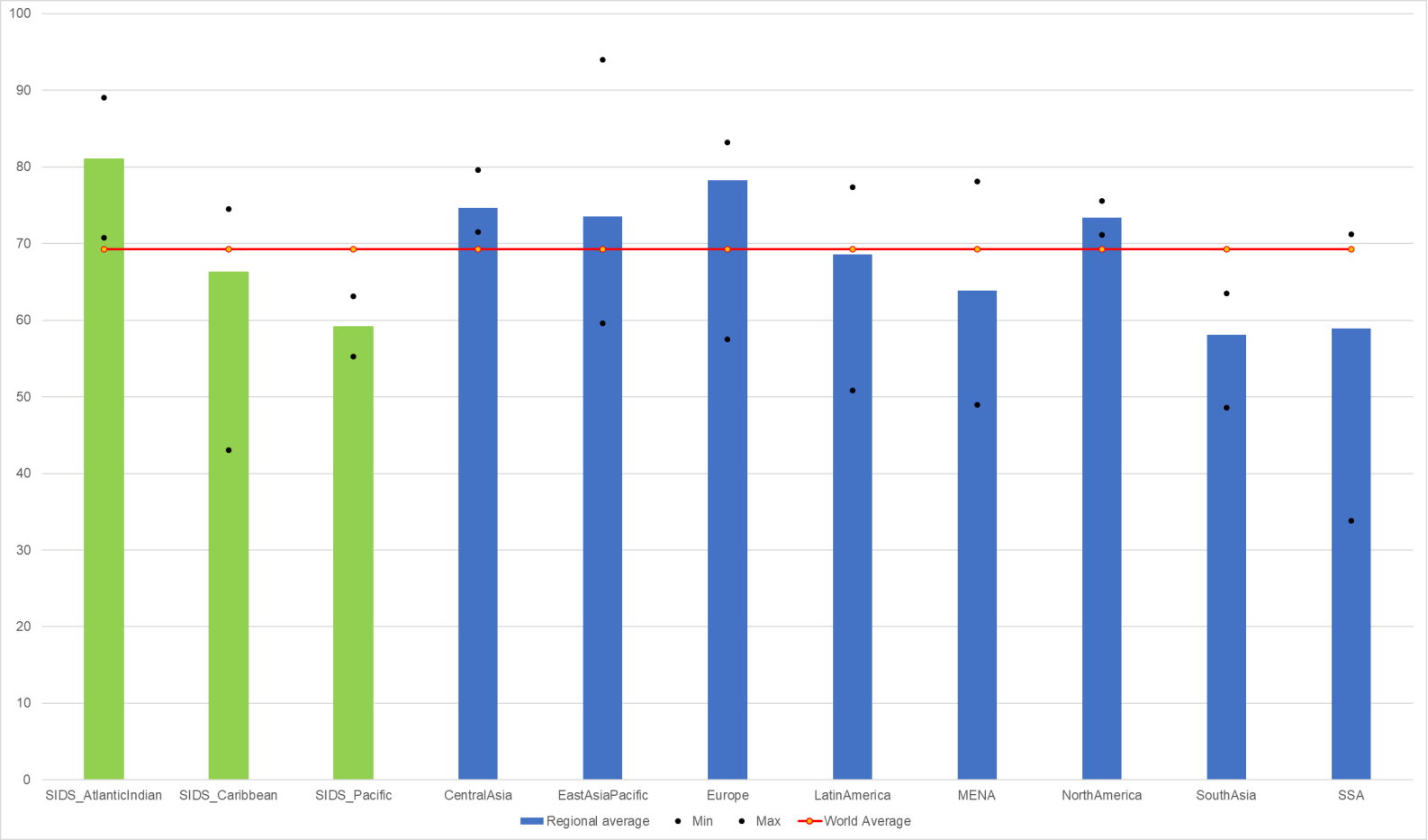
Nevertheless, the SDG2 overall score hides significant differences across regions and countries. Malnutrition is a complex and multi-faceted challenge. It encompasses many forms ranging from insufficient food consumption to meet minimum levels of dietary energy requirements, low body weight, and impaired child growth and development, to excess body weight and increased risk of noncommunicable diseases (NCDs) such as chronic respiratory diseases and diabetes. Although the Pacific SIDS, sub-Saharan Africa, and the South Asian region score very similarly in their progress towards the SDG2 target, challenges faced in terms of malnutrition and food security can vary significantly.

Sub-Saharan Africa and Southern Asia are the regions with the highest prevalence of undernourishment, stunting and wasting (FAO et al. 2021). On the other hand, although undernutrition and poor dietary diversity remain significant concerns in many SIDS resulting in stunting, wasting and micronutrient deficiencies such as anemia especially among women of reproductive age and children under five[3], Pacific Islands and to a lower extent the Caribbean SIDS are characterized by the highest prevalence rates of obesity and NCDs in the world. Pacific SIDS account for eight of the world's ten most obese nations (WHO 2021), and noncommunicable diseases represent the primary cause of illness and mortality in most SIDS (FAO 2017).

[2] In the MVI, the category of economic vulnerabilities includes indicators measuring a country's degree of exposure to unforeseen exogenous shocks and drops in economic resources from abroad. The category of structural development limitations includes proxies for geophysical vulnerability (e.g. physical size, water scarcity, availability of arable land, etc.). See Sachs et al. (2021a).

[3] WHO data on prevalence of anemia among children under five (%) and women of reproductive age (%) shows that anemia in Pacific SIDS is a *moderate* (20-39.9) to *severe* (> or = 40) public health problem depending on the country (WHO et al, 2001). According to the Papua New Guinea National Nutrition Policy 2016-2026, in Papua New Guinea nearly half of children under 5 years of age and more than a third of women aged 15 – 49 years are classified as anemic. Stunting rates among children under five are classified as *very high prevalence* (> or = 30) or as *high prevalence* (20-<30) in several countries including Papua New Guinea (49.5%), Solomon Islands (32.8%), Vanuatu (28.5%), Nauru (24%), Guinea-Bissau (27.6%), and Haiti (21.9%) (Global Nutrition Report 2016; de Onis et al. 2018). Wasting rates are instead classified as *high prevalence* (10-<15) in only a few SIDS such as Papua New Guinea (14.3%) and the Maldives (10.2%) (Global Nutrition Report 2016; de Onis et al. 2018).

Figure 2. Average SDG2 score, by regions



Source: Authors, based on Sachs et al. (2021b). *Note*: SDG2 Score is the equal weighted average of four out of the eight indicators used to compute Goal2 of the SDG Index 2021 for which data coverage is good enough.[4]

[4] The four indicators are: (i) prevalence of undernourishment (%); (ii) prevalence of stunting in children under 5 years of age (%); (iii) prevalence of wasting in children under 5 years of age (%); and (iv) prevalence of obesity, BMI ≥ 30 (% of adult population). SDG2 Score is measured from 0 to 100, where 100 is the best possible outcome.

The obesity challenge in SIDS

There are two main factors that lead to the current and increasingly high obesity rates in SIDS: declining domestic food production and changes in dietary preferences (FAO 2017). One other factor is the use of highly harmful fertilizers that are known to be linked to endocrine disorder and obesity.

The small size, the lack of arable land, the limited freshwater resources, the high vulnerability to natural disasters, and the fragile natural environment which is exposed more and more to the impacts of overexploitation of oceanic resources, marine pollution, and climate change, challenge local food production in many SIDS.

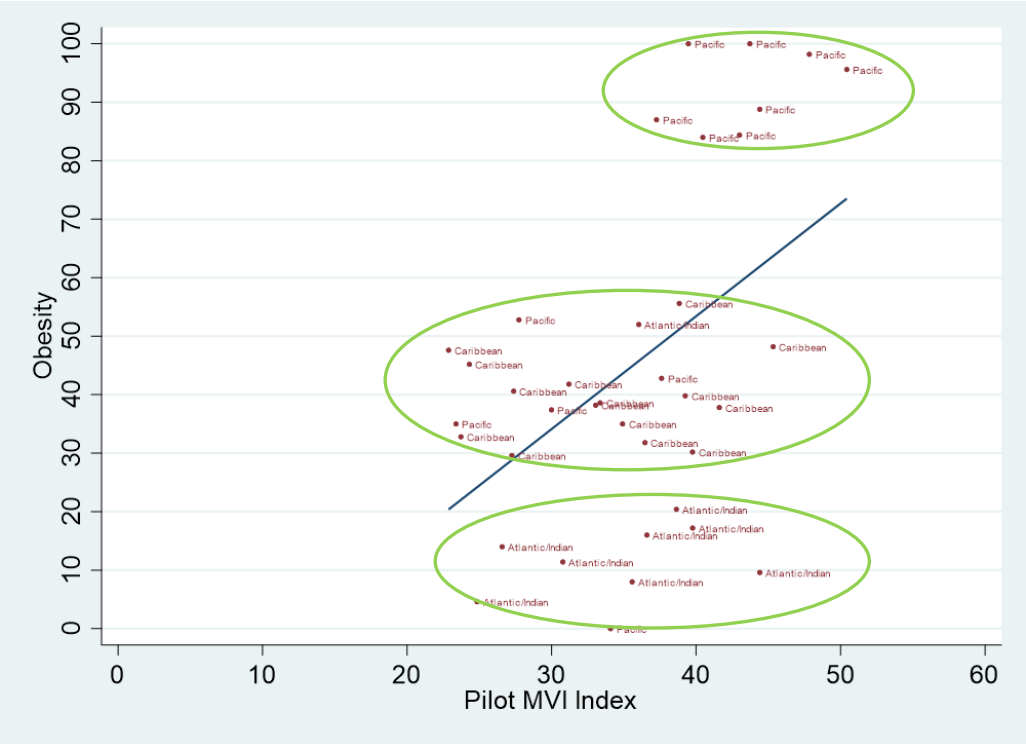
In the Pacific Islands, for example, subsistence agriculture and fishing are the main source of food and income especially in rural areas. However, the limited irrigation, the more frequent extreme weather events, and unreliable rainfall patterns due to climate change threaten the staples, fruits and vegetables grown predominantly in home gardens. Just to provide a few examples, in Vanuatu the tropical Cyclone Pam destroyed around 80 per cent of coffee, 80 per cent of leaf vegetables, 75 per cent of coconut and 70 per cent of taro crops in the worst affected areas in 2015 (Government of Vanuatu 2015). In Fiji, Cyclone Ami caused over USD 35 million in lost crops in 2003, and Cyclone Winston caused over USD 100 million in crop losses in 2016 (Barnett 2019). Ocean warming, ocean acidification, and overexploitation endanger coastal fishing while saltwater intrusion, higher rainfall, and associated flooding menace freshwater fishing. An analysis by Bell et al. (2021) shows that tuna fishing in ten SIDS in the Pacific Ocean is likely to be at substantial risk from ocean warming. Indeed, if ocean warming continues at current rates, the tuna catches in the combined waters of the analyzed ten Pacific SIDS are expected to decline by an average of 20% by 2050 due to a greater proportion of fish migrating in the high seas. Climate change which results in warmer temperatures and increased humidity can also impact the survival and patterns of parasites (e.g. worm larvae) and insects (e.g. mosquitoes or ticks) responsible of disease transmission to crops and livestock which are of high importance for food security in certain Pacific SIDS. For example, a recent study (Young 2020a) shows that in Papua New Guinea the spread of the African Swine Fever (ASF) across pigs can lead to significant costs and sharp fall in incomes for households that raise pigs and are estimated to be at least half of Papua New Guinea's 1.2 million rural households. According to Young (2020b), the economic losses attributable to fall army worm (FAW, a pest of crops – mainly cereal crops such as maize, rice, sugarcane and wheat crops) are likely to be substantial and even catastrophic in the worst scenario in which the pest would attack not only cereals but a wider range of crops including some of the food staple root crops, fruits, and vegetables.

All this has significant food security consequences and leads many SIDS to increase their reliance on imported food, which consists in highly processed food and drink products. The latter are low in nutritional value but high in fat, salt, and sugar and therefore lead to overweight and obesity in SIDS population.

The regression of the prevalence of obesity against the pilot MVI in SIDS highlights that in more vulnerable countries, there is a greater share of obese adult population (Figure 3). SIDS with a high degree of economic and environmental vulnerability appear to be more at risk from obesity (Table A3)[5]. As shown by the three clusters in Figure 3, the highest obesity rates are in the Pacific SIDS, followed by the Caribbean SIDS. Obesity is significantly lower in the Atlantic and Indian SIDS.

[5] In the MVI, the category of economic vulnerabilities includes indicators measuring a country's degree of exposure to unforeseen exogenous shocks and to drops in economic resources from abroad. The category of environmental vulnerabilities includes factors related to a country's vulnerability to natural hazards and climate change. See Sachs et al. (2021a).

Figure 3. Pilot MVI vs prevalence of obesity (%) in SIDS



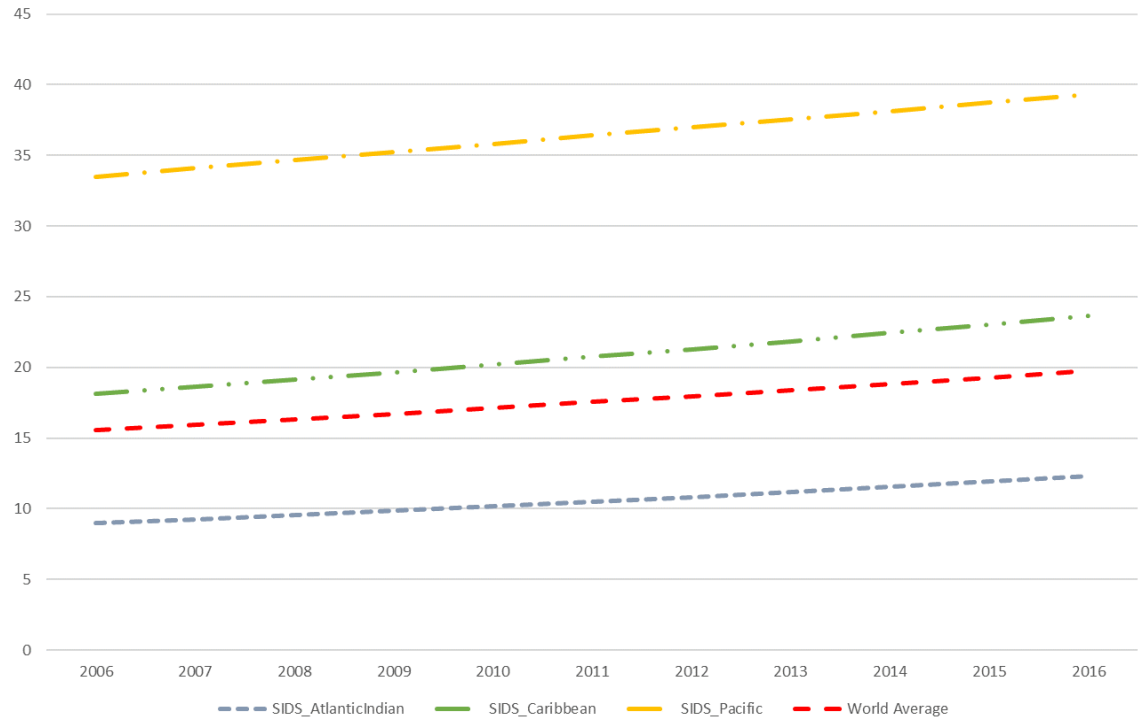
Source: Authors, based on Sachs et al. (2021a) and Sachs et al. (2021b). *Notes*: $Obesity_i = \beta_0 + \beta_1 MVI_i + \varepsilon_i$; β_1 is positive and significant at the .01 level (β_1=1.93); β_0 is negative and non-significant (β_0=-23.74); Adjusted R^2=.22; Sample: 37 SIDS; Obesity is defined as the prevalence of obesity, BMI ≥ 30 (% of adult population); Data for obesity refer to the latest available year (2016); Data for obesity has been normalized from 0 to 100, where 0 corresponds to the best outcome and 100 to the worst outcome.

The World Food Programme and the Secretariat of the Pacific Community (WFP and SPC 2018) find that in the Pacific SIDS region, adults' obesity rates (BMI ≥ 30) are over 45% in quite a few countries (i.e. Cook Islands, Kiribati, Federated States of Micronesia, Marshall Island, Nauru, Tokelau, Tonga, and Samoa). The study also underlines that in the Pacific SIDS region obesity is more widespread across women than men, and that child obesity is increasing. Hickey and Unwin (2020), instead, find that in the Caribbean SIDS, 33% of adults are obese, with twice as many obese women than men. A 2020 study of the biosecurity of fresh and saltwater in Samoa led by researchers from New York University (NYU) and NYU Abu Dhabi together with the National University of Samoa and published in the Molecules Journal[6] concluded that the very high level of obesity in country is also linked to the widespread use of 71 identified herbicide and pesticide chemicals, which have endocrine effects known to be contributing to endemic obesity. The findings point to the limited access that the Pacific SIDS have to organic farming technologies and practices to protect humans and the environment.

The rise in obesity rates in the Pacific and Caribbean SIDS is higher than the global average rise (Figure 4).

[6] https://www.mdpi.com/1420-3049/25/21/4871

Figure 4. Obesity rate (%) in SIDS, 2006-16



Source: Authors, based on Sachs et al. (2021b).

Such increase is mainly due to the fact that in these regions, over 80% of food is unhealthy imported food (WHO 2021) which has caused a dietary shift from domestic staples, fruits, and vegetables to heavily caloric processed foods, meat and dairy products. This is due not only to a behavioral change but also to the fact that highly processed food and drink products tend to be relatively cheap compared to healthier local food (Box 1).

While SIDS exports represent only 0.1%[7] of the global exports, the non-tourism exports are primarily agricultural commodities. According to World Bank data[8], Federated States of Micronesia's exports are 99% agricultural commodities, Sao Tome and Principe's 88%, Palau's 87%, Cabo Verde's 81%, most often at the expense of the local markets that, instead, sell unhealthy foods. The decline in tourism revenues due to the pandemic forces SIDS to increase food exports further depriving local population of fresh produce for consumption.

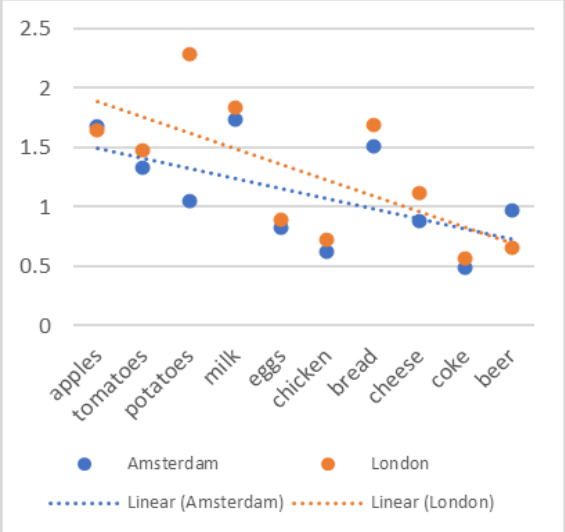
[7] https://dgff2021.unctad.org/sids-challenges__trashed/trade-and-economic-vulnerability/trade-in-goods/
[8] https://data.worldbank.org/indicator/TX.VAL.FOOD.ZS.UN

Box 1.1. How does unhealthy imported food out-compete healthier local options?

Healthy diets are driven by preferences, but also by other incentives, such as price. Due to the high cost of transport, food prices tend to generally be high in many SIDS, but this is the case even more strongly when looking at fresh produce. Imports of fresh produce are generally difficult, with transportation links being scarce and expensive. However, even locally produced items are often priced more highly, and their availability is highly seasonal.

In Jamaica, for example, the availability of basic staples such as tomatoes (which are produced locally) are highly variable depending on the season. Correspondingly, supermarket prices vary from less than USD 1 to USD 10 per pound, or tomatoes can even become completely unavailable.

Figure 1.1. Ratio of Kingston prices over foreign prices



In order to move beyond anecdotal evidence, data from Expatistan[1], which is dedicated to tracking price levels, can be used to compare price levels between locations. Using data from 31 August 2021, Figure 1.1 compares the price level of individual products between Kingston (Jamaica), Amsterdam (the Netherlands), and London (United Kingdom), respectively. The order in which the products are presented is an illustrative list from more to less healthy food. The data is expressed as a ratio of Kingston prices over foreign prices, and they clearly show that healthier products tend to be priced higher in Jamaica than in other locations. On the other hand, less healthy products, those that tend to have longer shelf lives, have lower prices in Jamaica than in the comparison markets.

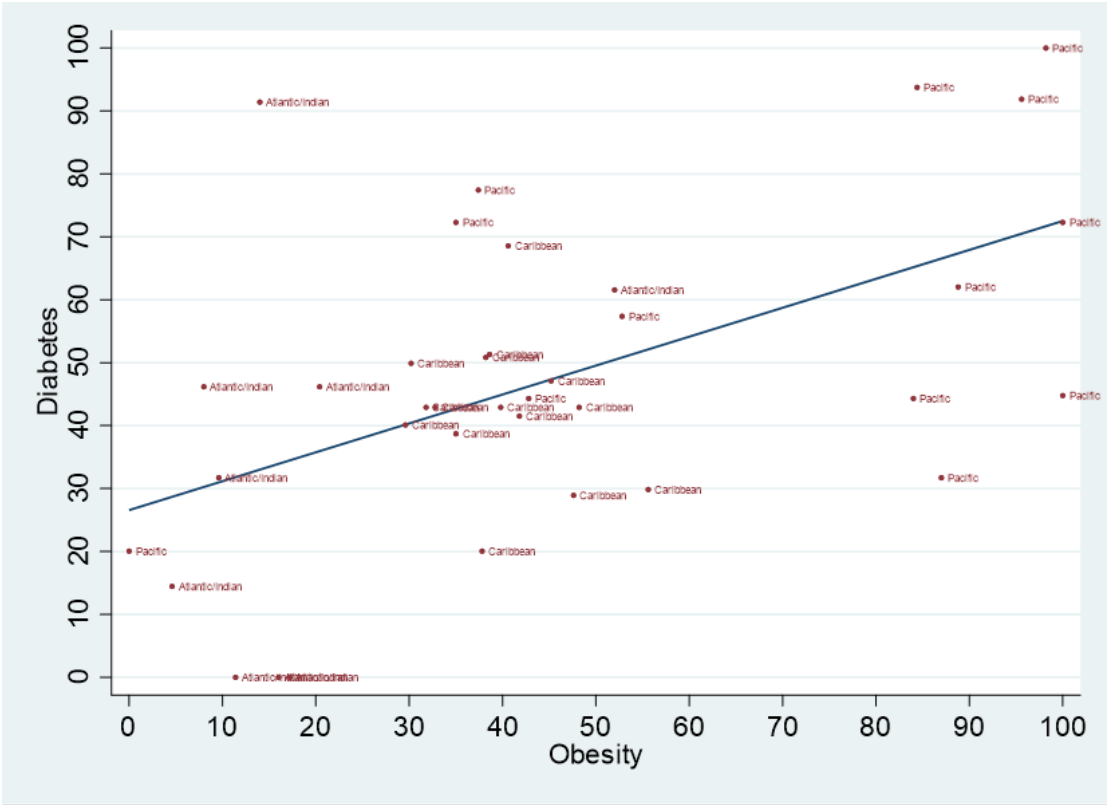
While further study may be warranted, this data provides an indication for the fact that unhealthy diets are not only a result of preference, but may also suffer from price incentives.

[1] https://www.expatistan.com/. The website tracks prices of a large range of products. In this case, all food items that are available for all three locations and can be purchased from a supermarket are used.

The spread of obesity in SIDS contributes to the emergence of noncommunicable diseases (NCDs) such as diabetes, asthma, and cardiovascular diseases, among others (World Food Programme and The Pacific Community 2018). As shown by Figure 5, there exists a positive relationship between the prevalence of obesity and diabetes prevalence in SIDS.

Although there are important variations across and within SIDS regions on how obesity affects diabetes probably due to differences in behavioral factors such as physical activity, among others, there is evidence that the challenge of NCDs is particularly severe in the Pacific SIDS. Seven out of the ten countries with the highest diabetes prevalence in the world are Pacific Islands (International Diabetes Federation 2019), and over 75% of deaths in the Pacific SIDS are caused by NCDs (FAO 2019).

Figure 5. Obesity rate (%) vs prevalence of diabetes (%) in SIDS



Source: Authors, based on Sachs et al. (2021b) and World Bank's World Development Indicators (WDI). *Notes*: $Diabetes_i = \beta_0 + \beta_1 Obesity_i + \varepsilon_i$; β_1 is positive and significant at the .01 level (β_1=.46); β_0 is positive and significant at the .01 level (β_0=26.58); Adjusted R^2=.26; Sample: 37 SIDS; Diabetes is defined as diabetes prevalence (% of population ages 20 to 79); Obesity is defined as the prevalence of obesity, BMI ≥ 30 (% of adult population); Data for diabetes and obesity refer to the latest available year (2019 and 2016, respectively); Data for diabetes and obesity have been normalized from 0 to 100, where 0 corresponds to the best outcome and 100 to the worst outcome.

NCDs represent a significant financial and economic burden in SIDS, especially in the Pacific Islands. On one hand, they add pressure to national budgets by increasing health costs. In the Pacific SIDS, public expenditure on health as a share of GDP is much higher than the global average for lower-middle income countries (Hou et al. 2016), and in many countries the costs for treating and managing NCDs represent more than half of the public expenditure on health (Secretariat of the Pacific Community 2011)[9]. On the other hand, NCDs lead to output losses by reducing the labor force because of people premature death. Recent estimates suggest that by 2040, mortalities due to NCDs will reduce labor force by 9-30% in twelve Pacific SIDS (Hou et al. 2016).

In addition, the increased prevalence of NCDs has a disproportionate impact on advancing gender equality for women and girls, as women and girls traditionally are caregivers in most Pacific countries. Women and girls have the added burden of caring for the elderly and sick, including those with NCD related disabilities (e.g. amputations) further adding to their domestic work burden and reducing their availability to participate in economic activities and activities to advance their learning and future prospects [10].

[9] Just for comparison, a recent study by Vandenberghe and Albrecht (2020) shows that NCDs in the European Union (EU) account for a share of 25% of the total health care budget.

[10] https://www.adb.org/sites/default/files/publication/177465/sdcc-balancing-burden.pdf

The way forward

Food security in SIDS is a policy priority which requires coordinating efforts from different stakeholders at both the local and international level.

To address the problem of obesity and related diseases in SIDS, adequate national legislation, policies, and initiatives should be implemented. Introducing healthy public procurement policies and nutrition labelling policies, restricting marketing of unhealthy food, taxing food high in fat, sugar, and salt, promoting school food and nutrition education programmes as well as information on healthy eating habits may limit imports of unhealthy food.

Promoting local consumption of traditional food for example by lowering local food price compared to imported processed food may contribute to change dietary behavior in favor of healthier food. Very importantly, by diversifying their economies, SIDS may be able to reduce food exports in favor of manufactured goods and better supply local markets with healthy food.

Supporting local food production by encouraging the adoption of nature-positive production and supply models is important to increase food security and at the same time to protect natural ecosystems, and to reduce biodiversity loss, pollution, water use, soil degradation and greenhouse gas emissions thus contributing to the achievement of the net-zero goal by 2050. Improving market conditions and supporting farmers may also play a key role in promoting local food production. Expansion of organic production to protect human and environmental health and reduce carbon emissions do require national policies and adequate investment.

To end other forms of malnutrition such as stunting and wasting among the vulnerable groups (particularly women and young children), pro-poor and inclusive policies as well as social protection programmes are needed in SIDS.

Tailored international financing mechanisms addressing vulnerabilities faced by SIDS (e.g., high vulnerability to natural disasters and climate change) may also play a key role in supporting investments and infrastructure vital for achieving the SDG2 – Zero Hunger target (Sachs and Massa 2021).

Finally, enhancing the availability and timeliness of data may help policymakers not only to strengthen the monitoring of SIDS' progress towards the SDGs but also to design adequate interventions promoting food security and tackling obesity and NCDs and target them where they are needed most.

With world's leaders soon to convene at the UN Secretary-General's Food Summit on 23 September 2021, consensus over a global pathway towards sustainable food systems and adequate financing is expected to emerge. For SIDS, the deliberations over the Multidimensional Vulnerability Index at the 76th UN General Assembly may open the door for more sustainable financing that is a prerequisite for, inter-alia, food security and nutrition.

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Annex

Table A1. SDG2 Score in selected SIDS

Country	Region	SDG2 Score*
Haiti	Caribbean	43.02
Vanuatu	Pacific	55.27
Fiji	Pacific	63.09
Suriname	Caribbean	64.90
Barbados	Caribbean	67.48
Guyana	Caribbean	67.72
Belize	Caribbean	68.79
Jamaica	Caribbean	69.40
Trinidad and Tobago	Caribbean	70.12
Dominican Republic (the)	Caribbean	70.34
Sao Tome and Principe	Atlantic/Indian	70.78
Bahrain	Atlantic/Indian	76.05
Mauritius	Atlantic/Indian	88.32
Singapore	Atlantic/Indian	89.04

Source: Authors, based on Sachs et al. (2021b). *Notes:* (*) SDG2 Score is the equal weighted average of four out of the eight indicators used to compute Goal2 of the SDG Index 2021 for which data coverage is good enough. The four indicators are: i) prevalence of undernourishment (%); (ii) prevalence of stunting in children under 5 years of age (%); (iii) prevalence of wasting in children under 5 years of age (%); and (iv) prevalence of obesity, BMI ≥ 30 (% of adult population). SDG2 Score is measured from 0 to 100, where 100 is the best possible outcome.

Table A2. Regression results: SDG2 – Zero Hunger vs Pilot MVI Pillars

Variable	SDG2 – Zero Hunger		
Economic Pillar	-0.52***		
Development Pillar		-0.24***	
Environmental Pillar			-0.38
Constant	80.08***	80.21***	69.84***
Observations	142	142	142
R2	0.17	0.05	0.02
Adj R2	0.16	0.04	0.01

Source: Authors, based on Sachs et al. (2021a) and Sachs et al. (2021b). *Notes*: $SDG2_i = \beta_0 + \beta_1 Pillar_i + \varepsilon_i$ where: $Pillar_i$ represents the Economic Pillar, Development Pillar, and Environmental Pillar of the pilot MVI respectively, for country *i*, and ε_i is the error term. SDG2 for country *i* is the equal weighted average of four out of the eight indicators used to compute Goal2 of the SDG Index 2021 for which data coverage

is good enough. The four indicators are: i) prevalence of undernourishment (%); (ii) prevalence of stunting in children under 5 years of age (%); (iii) prevalence of wasting in children under 5 years of age (%); and (iv) prevalence of obesity, BMI ≥ 30 (% of adult population). * p<.1; ** p<.05; *** p<.01

Table A3. Regression results: Prevalence of obesity (%) vs Pilot MVI Pillars

Variable	**Obesity rate (%)**		
Economic Pillar	1.73***		
Development Pillar		0.66	
Environmental Pillar			1.07**
Constant	-19.41	5.01	34.82***
Observations	37	37	37
R2	0.28	0.05	0.14
Adj R2	0.25	0.03	0.12

Source: Authors, based on Sachs et al. (2021a) and Sachs et al. (2021b). *Notes*: $Obesity_i = \beta_0 + \beta_1 Pillar_i + \varepsilon_i$ where: $Pillar_i$ represents the Economic Pillar, Development Pillar, and Environmental Pillar of the pilot MVI respectively, for country *i*, and ε_i is the error term. * p<.1; ** p<.05; *** p<.01

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