

Case Study

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Are 'Behaviour Change' Approaches to Obesity and Health Effective? A case Study from Samoa

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ABSTRACT

'Behaviour Change' approaches in public health strategies have been used in Pacific Island countries to address the problem of dietary and lifestyle changes that are believed to be the cause of rising rates of obesity and associated NCDs. We consider the limitations of this approach in the context of Samoa's socioeconomic situation and public health policy and propose that an 'obesogenic' environment and structural factors are causal and require policy measures that go beyond the scope of responsibilities of the Samoa Ministry of Health

Key words: Obesity, non-communicable diseases, economic behaviour change policies, strategic plans

INTRODUCTION

It has long been assumed that the high and rising rates of obesity in small Pacific Island countries are the result of people making unhealthy choices about exercise and the food they eat, which can be corrected by providing them with information about healthy choices. In the simplest clinical terms obesity is a result of a consistent prolonged imbalance between energy intake and expenditure but it is also the result of socioeconomic factors.¹ Today approximately 53 % of adults; 25 years to 65 years old, in Samoa are obese.^{2,3,4,5} Because obesity is a factor in the prevalence of non-communicable diseases (NCDs) in Samoa, as well as in other small Pacific island countries, it places a heavy burden on health service resources and the quality of life of those affected.^{6,7}

The assumption that Samoans can choose to eat a healthier diet and take more exercise underlies the 'behaviour change' approach that is advocated in local, regional and international strategies to combat the global obesity trend. Behaviour change approaches have been used in Samoa and other Pacific Islands since the 1970s, with little clinical evidence of success.^{8,9}

We suggest that without tackling the economic causes, progress will be unlikely. As McCarthy¹⁰ pointed out, summarizing a range of studies of rich countries: "Doctors tell patients to lose weight. Public-health campaigners urge the public to eat right and exercise more. Television programmes, newspapers, and magazines serve up a steady diet of slimming tips, and diet books abound. And, yet, more and more people grow

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fat." Another study¹¹ of obesity in rich countries concluded that: "Obesity results from market forces and technological advances that lower the costs of behaviours that promote obesity; successful efforts to prevent obesity will need to do just the opposite: make it easier and cheaper to engage in a healthy diet and regular physical activity."

Samoa's 'obesogenic' environment

The World Health Organization¹² points to four global factors driving obesity; rapid changes in health-related behaviour; global forces such as international free trade and expansion of markets; early life nutrition and growth, and genetic factors.^{13,14} As has been pointed out in many studies since the 1970s, dietary change is the most obvious cause of obesity in the Pacific Island. Samoans were rarely obese before the

1960s, as evidenced by ethnographic studies and old photographs in museums.^{15,16} Writing in 1984 and reflecting on earlier research on food and nutrition in the Pacific, Parkinson¹⁷ pointed out that increasing consumption of bread, rice, sugar and fatty meats was undermining the health of Pacific Islanders, and that fresh local food was often more expensive than those imported foods in terms of price and preparation time. Historical trends have made sugar an additive to most cheap industrially processed foods and beverages. As documented by Minz¹⁸ in his history of colonialism and the production of sugar, these cheap processed foods are now available for mass consumption by the poor throughout the world, including the Pacific Islands. Worldwide data shows that consumption sugar-sweetened-beverages is rising to high levels particularly in developing countries.¹⁹ Another highly informative study is traces how instant ramen noodles became a global industrial food into the 21st century.²⁰ In Samoa modernization of the economy since the 1960s accelerated by migration and monetary remittances has driven dietary change. The original diet of Samoans has largely replaced fresh local foods with processed imported foods such as canned and brined beef, canned pilchards, mutton flaps, factory-farmed chicken, turkey tails, heavily sugar sweetened beverages, bread and other flour-baked goods, and rice, to name a few.^{21, 22, 23} Sharing food is an integral part of Samoan culture and food is an essential part of every celebration, and imported food has supplanted many local foods. A typical gift of food in Samoa today is a meal given in a disposable container, of many foods, the more variety the more prestigious the gift. Many of those foods are imported, typically as chicken, salt beef, mussels, pasta or potato salad, orange and apple, as well as a slice of local taro and fish or pork. Statistics for 2018-2019 show that Samoa imports goods worth USD\$510m, of which food is a significant component.²⁴

A recent study of contemporary Samoa eating habits had identified three different dietary patterns. First, a 'modern' diet consisted of a high intake of imported and processed foods, including pizza, cheeseburgers, margarine, sugary drinks, desserts, snacks, egg products, noodles, nuts, breads and cakes. There was a low intake of traditional agricultural products and fish. Second, a 'mixed-traditional' dietary pattern which consisted of a high intake of non-traditional foods, such as introduced or imported fruits and vegetables, and soup, poultry and fish and processed, mainly imported foods, such as dairy products, breads and cakes. The third pattern identified was termed a 'mixed-modern'

diet consisting of mostly imported and processed foods, such as pizza, cheeseburgers, red meat, egg products, noodles, and grains, with some local food such as seafood and coconut, but low intake of fish, tea, coffee, soup, and traditional agricultural staples.²²

Links between food availability, food prices and obesity in Samoa were examined by Seiden *et al*²⁵ who found that the total energy availability from food increased by 47 %, with more than 900 extra calories available per capital per day between 1961 and 2007. Consequently, they found out that the mean body mass index (BMI) for men and women aged 35-44 years old also rose by 18 % between 1980 and 2007. Dietary change is even more concerning when it is considered that Samoans, like other Polynesians may be genetically predisposed to obesity and gout. For example in 2016, McGarvey and his colleagues²⁶ found that about half of Samoan people have a significant genetic variant on chromosome-5 that is likely to increase the risk of obesity. Another sensitive factor in Samoa's 'obesogenic' environment is that many leaders in the workplace, church, government and communities are morbidly obese, fostering the perception in the eyes of the public that power and influence are positively correlated with obesity.¹⁵

Aside from dietary change, in Samoa's pre-1960s economy considerable daily physical exertion was required to obtain food. Men paddled canoes far out to sea to catch fish and walked daily from their homes to inland plantations to cultivate crops and to carry them home, as well as many other tasks demanding physical energy. Women's work was always more sedentary than that of men, but although it seldom took them far from their village, women gleaned reefs for seafood and cultivated pandanus and other plants for making mats and other household items, and swept the open areas of their villages daily. In earlier times both men and women travelled on foot on malaga (visiting parties) to attend ceremonies or play cricket in distant villages. Today only a small proportion of households depend on subsistence production. In 2014, of 28,119 households in Samoa, 15,168 grew crops for home consumption and sale and of these only half (7,664) mainly depended on farming for most of their food²⁷. The decline of subsistence production and associated physical activity has been driven by society-wide economic forces far more powerful than individual choices. A study of cocoa farmers in 2018²⁸ found that households without several young men had difficulty maintaining their plantations, and as noted in an earlier study,²⁹ the

income from farming was insufficient to attract young men to engage in it if they could find options offering daily or weekly wages. Dependence on cash incomes, in rural villages as well as in urban settings, means that people buy most of their food from shops and that relatively few expend much physical exertion in farming and fishing. A recent study³⁰ of four representative villages in Samoa confirms this trend over the past 50 years, finding insignificant growth in the size of their populations, particularly the number of young adults, due to migration to urban areas and overseas.

Health and behaviour change

In a report on health trends the Pacific Islands for the Secretariat of the Pacific Community²¹ refers to 'lifestyle diseases'. The term implies that the prevalence of NCDs is fault of lazy individuals making bad food choices in their chosen lifestyle. Such assumption has long influenced the policy response of advocacy for behaviour change, urging Islanders to take exercise and return to their healthier traditional diets. Yet despite such messages, overweight and obesity and associated NCDs have continued to rise over time in Samoa and other Pacific Islands despite massive investment in behaviour change intervention strategies. These strategies have included posters, health talks, radio and television messages, school and village vegetable gardening projects, and medical advice.

It is time to ask: to what extent is individual behaviour actually a contributing factor to the development of overweight and obesity? Do people have choices to eat or not to eat less highly processed foods on a daily basis? A number of models or theories have been developed over the years that explain why people engage in certain health behaviours and how to encourage change³¹. A theory of 'reasoned action' was first proposed by Ajzen and Fishbein³² in 1972 which takes account of an individual's own beliefs about behaviour, and the social context that conditions normative beliefs about behaviour. In a later theory of 'planned behaviour' Ajzen³³ extended this theory to give more emphasis on the importance of the social norms which influence behaviour. A 'health belief model' was first developed by the U.S Public Health Services, a based on a behaviour change framework, still widely used throughout the world.³⁴ It assumes that a person's health behaviours depend on their perceptions of the likelihood that their behaviour will cause them to get an illness; the likely severity of the illness, if they get it; the benefits of engaging in behaviour that will prevent an illness; and, the barriers to engaging in preventive behaviour. This health belief

model is the basis of most interventions such as health messages in talks, pamphlets, posters, and radio and TV advertisements. It assumes that behaviour is a matter of individual choice, and that individuals will make healthy choices if they are given information about what those choices should be. These individualist models take insufficient account of global trends towards an "obesogenic environment"³⁵ in which people's choices are limited by structural factors. These factors include price, availability and access to food, urbanization, global trade, dependence on cash incomes, migration, remittances, poverty, and cultural expectations and values.³⁶

Government Policy, NCDs and Obesity

The Government of Samoa, like many other small island countries in the Pacific, recognizes the high national costs of NCDs and obesity leading to the development of National NCD Control policies.³⁷ The Samoa Ministry of Health (MOH) formulated two NCD Control policies in 2010 – 2015, and 2018 – 2023.³⁸ In addition, the Samoa National Health Promotion Policy 2010 – 2015 and the National Food and Nutrition Policy 2013-2018 have been put in place and had been implemented over the previous years. Moreover, the Samoa MOH is currently reviewing the nutrition policy 2013-2018 with a hope to bring forth a new and updated nutrition policy 2021-2025. The policy emphasis is on a range of health education measures to encourage behaviour change.

To achieve behaviour change more than messages will be needed, instead action to reduce the 'obesogenic' environment of Samoa will be needed.^{39, 40} Studies of obesity in rich countries such as Drewnowski and Darman⁴¹ have found that the poor are most likely to become obese on a diet of energy dense, processed and refined food and drinks and conclude that: "Food policy interventions at the national and international levels may be the most promising approach to making health foods affordable and accessible". In Samoa, most people have low incomes. The minimum wage of \$3.00 per hour is insufficient to feed a family well. There is political resistance to the notion that people in Samoa could be poor and typically the claim that there *are* poor people is met with the response that they should work harder or grow their own food, assuming all Samoan have access to farmland. According to the Asian Development Bank⁴² proportion of people in Samoa living below the national poverty line is 18.8%. As previously cited, over 40 years ago Parkinson pointed out that imported foods such as rice, bread and noodles are cheaper per kilojoule than taro and much quicker and easier

to prepare. Research by the Pacific Obesity Prevention in Communities³⁹ (OPIC) project found that while the stakeholders at public consultations supported the idea of policy change to address diet and obesity, there has been a significant gap between the interest in pursuing policy change and actual policy implementation.

Strong measures will be needed to incentivize people to eat fresh local food rather than imported food. To begin with food advertising should be controlled, for instance by banning street billboards advertising sugar sweetened beverages and television advertising of food such as quick-cook noodles, soft drinks, alcoholic drinks and drink mixes, ice-cream, biscuits and take-away foods. Emphasis must be placed on children; a ban should be placed on advertisements of sugary products featuring happy children, for these not only shape the tastes of children who see such advertisements, but encourage adults to show their love by giving children these products. There is evidence that efforts to encourage behaviour change towards healthy eating and exercise are most effective when those efforts are directed toward children^{43, 44}.

The government should increase taxation on sugar and foods with high sugar and salt content, as advocated by WHO Global Action Plan for the prevention and control of NCDs in 2013.⁴⁵ Taxes of this kind will send messages that incentivize the food industry to reformulate their products; reducing the sugar and salt contents to avoid paying the levy. So far in Pacific Islands and States, taxes on food have been to raise revenue rather than to improve public health, and in some countries there has been price control on sugar, salt in order for the poor to afford them, which is a perverse incentive in relation public health³⁹. Samoa's thriving local manufacturers produce beer, soft drinks, ice-cream and various snack foods, and hundreds of similar inexpensive products are imported. The government of Samoa has levied taxes on soft drinks, both locally made and imported since 1984 and have been increased over the years. However, the motivation for these taxes was unrelated to health promotion; they were initiated by the Ministry of Finance, primarily to increase government revenues and in response to budget deficits.³⁹ Since the 1990s economic doctrines have strongly supported the notion of free markets and the encouragement of private enterprise and free trade as a means towards economic development, with little consideration of the potential impacts on public health. Food industries have strongly opposed increased taxes

on their products and the time has come for governments to resist such lobbying in the interests of public health. So far economic measures by the government of Fiji and Samoa governments to prevent the importation of products considered bad for health such as mutton flaps and turkey have fallen foul of World Trade organization rules.^{39, 46}

Historically most of the efforts and aid expenditure to increase agricultural productivity have focused on export crops, and it is only in recent years that the focus has shifted towards improved food production for the local market. The Samoa Ministry of Agriculture and Fisheries started an 'Agriculture and Fisheries Productivity and Marketing Project' in 2019 with this objective.⁴⁷ In our observation supermarkets in Samoa rarely have a fresh produce section, and those that do, offer mainly expensive imported fruit and vegetables. The challenge facing Samoa is how to increase production and consumption of fresh local food. Fresh food is available at markets but there is a limited variety of produce other than traditional Samoan staple foods and there are seasonal shortages that raise prices. Because pests and plant diseases, the high cost of inputs, and the impact of periods of heavy rain, the cultivation of many fruits and vegetables is beset with uncertainties that reduce the economic incentives for production. There is a need to critically review agriculture policy with the goal of creating incentives to fresh local produce more accessible and affordable in Samoa, including the possibility of subsidizing fresh local food producers.

There are initiatives in other countries which should be studied by policy-makers for application in Samoa; for example the Guardian newspaper⁴⁸ offers two examples. First, the state of Oaxaca in Mexico has banned the sales of soft drinks and high calorie snack foods to children. It reported that the lawmaker who spearheaded this policy said that industry had been targeting the poor communities with cheap soft drinks, especially when there is no or little access to clean drinking water in these targeted communities. The second is a policy in the United Kingdom to be applied in 2022 that will to ban supermarkets from displaying sugar-sweetened-products at the checkout points. The UK also has a policy instructing the restaurant owners to reduce the calories in certain restaurant foods by 20%, such as pizzas, chips, crisps, pies, sausage rolls, and other fast foods.⁴⁹ Another measure, widely practiced in Japan, is holding pre-work morning exercise sessions at workplaces and schools.

CONCLUSION

The Samoa Ministry of Health is charged with responsibility for public health but the situation discussed in this article strongly suggests that government-wide collaborative efforts are urgently needed. Government needs to move beyond informing people about the individual behaviour changes needed to be healthy, towards actions that supports, empowers and incentivizes behaviour change by families, and communities. Like other Pacific Island developing countries Samoa carries an expensive double burden of disease, not only NCDs but endemic gastrointestinal, respiratory and other infectious diseases. The challenges we have outlined are structural. The influence of globalization and rapid economic change has created an 'obesogenic' environment in which the incidence and prevalence of NCDs and the cost of treating them will continue to rise unless a multi-sectorial approach is adopted to significantly reduce the prevalence of obesity.

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Conflict of interest

None

REFERENCES

1. Gortmaker SL, Swinburn BA, Levy D, et al. changing the future of obesity: science, policy and action. *Lancet* 2011; 378: 838-47
2. World Health Organization. STEPS survey: risks factors of NCS: Samoa 2013. World Health Organization 2013. Accessed Jan 3, 2021. [Http://:Users/rleach/Downloads/Samoa-Finak-Fact-Sheet-2013/PDF](http://Users/rleach/Downloads/Samoa-Finak-Fact-Sheet-2013/PDF).
3. Western Pacific regional action plan for the prevention control of non-communicable diseases: 2014-2020. World Health Organization. 2014. Accessed Jan 3 2021. http://www.wpro.who.int/publications/PUB_9789290223337/en/
4. McGarvey ST, Seiden A. Health, well-being, and social context of Samoan migrant populations. *NAPA Bull.* 2010; 34:213-28.
5. Hawley NL, McGarvey ST. Obesity and diabetes in Pacific Islanders: the current burden and the need for urgent action. *Curr Diab Rep.* 2015; 15(29). Accessed April 14, 2021. [Doi:https://doi.org/10.1007/s11892-015-0594-5](https://doi.org/10.1007/s11892-015-0594-5)
6. Lin S, Naseri T, Linhart C, Morrel S, Taylor R, McGarvey ST, Magliano D, Zimmet P. Trends in diabetes and obesity in Samoa over 35 years, 1978-2013. *Diabetic Medicine* 2016. doi:10.1111/dme.13197
7. McLennan AK, Jayaweera H. Non-communicable diseases and risk factors in migrants from South Asian countries: Literature review and scoping report. University of Oxford. 2014. Accessed January 20, 2021. <https://www.compas.ox.ac.uk/wp-content/uploads/RR-2014-Non-Communicable-Diseases-South-Asians.pdf>
8. Non-Communicable Control Policy: 2018-2023. Samoa Ministry of Health. 2018. Accessed June 1, 2021. <https://www.health.gov.ws/wp-content/uploads/2019/09/Samoa-NCD-Control-Policy-2018-2023.pdf>
9. Anderson I. The economic costs of NCDs in Pacific Islands: A Rapid stock take of the situation in Samoa, Tonga, and Vanuatu. The World Bank. 2013. Accessed January 6, 2021. <https://openknowledge.worldbank.org/bitstream/handle/10986/17851/865220WPOEcono0Box385176B000PUBLIC0.pdf>
10. McCarthy M. World report: the economics of obesity. *The Lancet* 2004; 2004. Accessed June 30. [DOI:https://doi.org/10.1016/S0140-6736\(04\)17613-7](https://doi.org/10.1016/S0140-6736(04)17613-7)
11. Finkelstein EA, Strombotne KL. The economics of obesity. *Am J Clin Nutr* 2010; 91:1502S-24S. Accessed June 30, 2021. <https://doi.org/10.3945/ajcn.2010.28701E>
12. World Health Organization. Obesity and overweight: Fact Sheet number 311 Geneva: WHO; 2015. Accessed January 2021. <http://www.who.int/mediacentre/factsheets/fs311/en/>
13. World Health Organization. Obesity and overweight: Fact sheet 2014. Geneva: WHO, 2014. Accessed Dec 2020. [Http://www.wpro.who.int/mediacentre/factsheets/obesity/en/](http://www.wpro.who.int/mediacentre/factsheets/obesity/en/).
14. McGarvey ST. Cardiovascular disease risk factors in Samoa and American Samoa, 1990-1995. *Pacific Health Dialogue* 2001; 891): 157-162
15. Lameko V. Obesity in Samoa: culture, history and dietary practices. *Journal of Samoan Studies.* 2020;10:30-48

16. McLennan A, Ulijaszek SJ. Obesity why understanding colonial history and social change is important. *Public Health Nutrition* 2014; 18 (8) 1499-1555
17. Parkinson S. Nutrition Trends in Some South Pacific Islands. In RV Cole Ed. *Women in Development in South Pacific countries: Barriers and Opportunities*. Australian National University Development Studies Center: Canberra, 1985.
18. Minz SW. *Sweetness and power: the place of sugar in modern history*. Elisabeth Sifton Books, Viking; 1985
19. Global Action Plan for the global strategy for the prevention and control of NCDs: 2013-2020. WHO. 2013. Accessed February 10, 2021. <http://whqlibdoc.who.int/publications/2013/eng.pdf>
20. Gewertz D, Fujikura T, Errington F. *Noodle Narratives: The Global Rise of an Industrial Food into the Twenty-First Century*. University of California Press: California, 2013.
21. Coyne T. *Lifestyle diseases in pacific communities: technical report*. Secretariat of the Pacific Communities. 2000. Accessed March 23, 2021. <https://phd.spc.int/programmes/non-communicable-diseases>
22. Wang D, Hawley N, Thompson A, "et al." Dietary pattern are associated with metabolic outcomes among adults Samoans in a cross-sectional study. *The Journal of Nutrition* 2017. Accessed June 1, 2021. <Http://jn.nutrition.org>
23. Baylin A, Deka R, Tuitele J, "et al." INSIG2 variants, dietary patterns and metabolic risk in Samoa. *European Journal of Clinical Nutrition* 2013; 67: 101-107
24. Simoes A. Samoa's exports and imports. Observatory of Economic Complexity, 2019. Accessed June 1, 2021. <https://oec.world/en/profile/country/ws>
25. Seiden A, Hawley NL, Schultz D, et al. Long-term trends in food availability, food prices, and obesity in Samoa. *Am J Hum Biol* 2012; 24:286-95.
26. McGarvey ST et al. Newly found, 'thrifty' genetic variant influences Samoan obesity. *Brown University News*. July 25, 2016. Accessed December 20, 2020. <https://www.brown.edu/news/2016-07-25/samoagene>
27. Samoa Bureau of Statistics. *Report on Samoa Agricultural Survey*. Government of Samoa, Apia, 2016.
28. Schoeffel P, Meleisea A. 2016. *Pacific Horticultural and Agricultural Market Access Program (Phama)* URS Australia Pty Ltd, 2016.
29. O'Meara TJ. *Samoan Planters: tradition and economic development in Polynesia (Case Studies in Cultural Anthropology)*. Chicago, Holt Rinehart and Winston Inc, 1990.
30. Arthur T N. *Village Development, Socioeconomic Change and The MIRAB Model 1975-2019: Case Studies Of Four Villages In Samoa*. PhD Thesis, National University of Samoa, 2019.
31. Edberg M. *Essentials of health behaviour: An introduction to Social and Behavioural Theory Applied to Public Health*. Jones & Bartlett Publishers, Inc; 2007.
32. Ajzen I, Fishbein M. Attitudes and normative beliefs as factors influencing behavioural intentions. *Journal of Personality and Social Psychology* 1972; 21(1):1-9.
33. Ajzen I. (1985). From intention to action: A theory of planned behavior. In: J. Kuhl J, Beckmann J. ed. *Action control: From cognition to behavior*. Springer-Verlag; 1985: 11-40.
34. Rosenstock IM, Strecher VJ, Becker MH. Social learning theory and the Health Belief Model. *Health Educ Q* 1988;15(2): 175-83
35. Swinburn B., Eager G, Raza F. Dissecting obesogenic environments: The development and application of a framework for identifying and prioritizing environmental interventions for obesity. *Preventive Medicine* 1999; 29(6): 563-70.
36. Ulijaszek S. 2005. Modernization, migration and nutritional health of Pacific Island populations. *Environ Sc* 2005; 12: 167-76
37. *Health Sector Plan: 2018-2023*. Samoa Ministry of Health. 2018. Accessed June 2, 2021. <Http://samoanministryofhealth.gov/>
38. *National non-communicable diseases control policy: 2017-2022*. Samoan Ministry of Health, Apia, 2017.
39. Thow AM, Snowdon W, Schultz J, Leeder S, Vivili P, Swinburn BA. The role of policy in improving diets: experiences from the Pacific Obesity Prevention in Communities

- food policy project. *Obesity Reviews* 2011; 12(Suppl.2.): 68-74.
40. Clarke D, McKenzie T. Legislative interventions to prevent and decrease obesity in Pacific Island countries. Allen and Clarke, Policy and Regulatory Specialists Limited. 2007. Date accessed January 25, 2021. [Http://allenclarke.nz/tobacco/control/](http://allenclarke.nz/tobacco/control/)
 41. Drewnowski A, Darmon N. The economics of obesity: dietary energy density and energy cost. *Am J Clin Nutr* 2005;82(suppl):265S-73S
 42. ADB. ADB and Samoa: poverty data. Asian Development Bank. Metropolitan Manila, Philippines, 2019. Access July 2, 2021. <https://www.adb.org/publications/samoa-fact-sheet>
 43. Matan M. Weight loss diets for the prevention and treatment of obesity. *New Engl J Medicine* 2009.360: 923-925.
 44. Westley H. Thinly living. *BMJ* 2007. 335:1236
 45. Global Action Plan for the global strategy for the prevention and control of NCDs: 2008-2013. WHO. 2008. Accessed February 10, 2021. <http://whqlibdoc.who.int/publications/2008/eng.pdf>
 46. Fa'alili-Fidow J, McCool J, Percival T. Trade and health in Samoa: views from the insiders. *BMC Public Health* 2014; 14: 309. Accessed November 2, 2020. <http://www.biomedcentral.com/1471-2458/14/309>
 47. World Bank. Samoa: agriculture and fisheries productivity and marketing project: ID P165873. The World Bank Group, Washington DC, 2019. Accessed June 25, 2021. <https://www.worldbank.org/en/news/loans-credits/2019/07/02/samoa-agriculture-fisheries-productivity-and-marketing-project>
 48. Agren D. Mexico State of Oaxaca bans sale of sugary drinks and junk food to children. *The Guardian*. Published August 6, 2020. Accessed February 20, 2021. https://www.theguardian.com/food/2020/aug/06/mexico-oaxaca-sugary-drinks-junk-food-ban-children?CMP=Share_iOSApp_Other
 49. Walker P. Unhealthy snacks to be banned from checkouts at supermarkets in England. *The Guardian*, 2020. Accessed Dec 30, 2020. https://www.theguardian.com/business/2020/dec/28/unhealthy-snacks-to-be-banned-from-checkouts-supermarkets-in-england?CMP=Share_iOSApp_Other