

# Soft drink consumption in Pacific Island Countries and Territories: a review of trade data

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## ABSTRACT

**Introduction:** Pacific Islands Countries and Territories (PICTs) have some of the highest rates of obesity and diabetes in the world. Research has demonstrated a strong link between sugar-sweetened beverage (SSB) consumption and subsequent risk of overweight, obesity, dental caries and type II diabetes. To address the impact of SSBs on non-communicable diseases, it is crucial to understand the level of SSB consumption in PICTs.

**Methods:** The volume of soft drinks imported and exported was requested from PICTs to estimate the litres of soft drink consumption per head of population. Analysis was confined to PICTs who did not produce their own soft drinks because production data was limited. The Harmonised Commodity Description and Coding System (HS) category 22.02 was used which includes both diet and sugar-sweetened soft drinks. The trade data estimates were then compared with school survey data to explore how the data sources corresponded given the strengths and weaknesses of each.

**Results:** Soft drink import volumes were a feasible way of estimating total soft drink consumption in PICTs and look at trends over time. Seven out of eleven non-producing PICTs contacted were able to provide volume of soft drinks imported. In 2011, estimates of soft drink consumption per person were 84L in Palau, 47L in the Commonwealth of the Northern Mariana Islands (CNMI), 41L in Niue, 31L in Tonga, 22L in Federates States of Micronesia, 8L in Tuvalu and 1L in Kiribati.

**Conclusions:** Trade data is a feasible way of monitoring soft drink consumption and may be useful to evaluate the impact of changes in government policy on importation of soft drinks. Data quality could be maximised by including export data, adjusting for visitor numbers and cross-checking exports from corresponding countries. To monitor SSB consumption, a wider range of categories could be included such as categories for sugar-sweetened juice and sweetened-milk drinks.

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## Introduction

Pacific Islands Countries and Territories (PICTs) have some of the highest rates of obesity and diabetes in the world. Non-communicable disease (NCD) is widely acknowledged as a regional health and economic priority. Sugar-sweetened beverages (SSBs) are an important risk factor for weight gain, obesity, dental caries and diabetes. There is limited analysis available about the level of sugary drink consumption in the Pacific, particularly among adults. Several PICTs however have asked school students about soft drink consumption. Both the Global School-based Student Health Survey (GSHS) and the Youth Risk Behavior Surveillance System (YRBSS) health surveys target a nationally representative sample of school students ask about consumption of non-diet soft drinks.<sup>1,2</sup>

## SSBs as a risk factor

There is a clear evidence for SSB consumption as a risk factor for weight gain, obesity, dental caries and also independently as a risk factor for type II diabetes and other NCDs such as coronary heart disease.

Positive correlation between SSB consumption and weight gain is shown in cross-sectional studies,<sup>3</sup> prospective cohort studies with long-term follow-up,<sup>4</sup> and evidence from experimental and intervention studies. Meta-analysis has found a significant relationship between SSB intake and weight gain. The effect size was larger in experimental studies than in observational cross-sectional or longitudinal studies.<sup>5</sup>

Consumption of SSBs independently increases the risk of developing metabolic syndrome and diabetes, besides the risk created by weight gain. The likely mechanism is the high glycaemic index and sugar load, which may cause inflammation, -cell dysfunction and insulin resistance. A meta-analysis identified seven studies evaluating the link between SSB consumption and diabetes, with a total of 310,819 participants and 15,043 cases of diabetes. There was a 26% greater risk of diabetes for the highest versus the lowest SSB consumers. An increase in SSB consumption of one drink per day was associated with a 15% increase in the risk of developing diabetes<sup>6</sup>. The overall risk of developing metabolic syndrome was calculated to be 20% greater for the highest than the lowest quantile of SSB intake.

## Historical trends

Increases in consumption of SSBs and processed food closely match the rise in rates of obesity<sup>7,8</sup> and NCDs. The increase in NCDs in the PICTs began after the Second World War. Mortality patterns that had been dominated by communicable diseases were improved by healthcare, public sanitation and pharmaceuticals. For example, diabetes was not mentioned in a health survey conducted in Nauru in 1932; but by 1962 it was reported in 1% of the population and by 1975 a full survey conducted on Nauruans aged 15 years and older found that over a third of the population had diabetes<sup>9</sup>. In the Pacific, modernisation

was accompanied by changes in diet, as imported goods replaced traditional foodstuffs. Globalisation and urbanisation aggravated many of the risk factors for NCDs.<sup>10</sup>

In the US, sales of SSBs increased substantially over the same period as the obesity epidemic burgeoned.<sup>7</sup> SSBs are the major source of added sugar in the diet.<sup>8</sup> A number of epidemiological studies have shown a positive association between SSBs and overweight/obesity; and experimental studies of these effects, as well as the other health effects of SSBs, are beginning to cast light on the negative health consequences of SSB consumption.

## High rates of obesity and diabetes

The Pacific region is significantly impacted by the obesity epidemic: the prevalence of overweight in 2008 was over 90% in Cook Islands and Nauru - the highest in the world<sup>11</sup>. The rate at which obesity is increasing in the region is also the highest in the world<sup>11</sup>.

There are high rates of diabetes in the Pacific and NCDs contribute to 75% of premature mortality. Cardiovascular disease is the leading cause of death in five of the PICTs, with rates ranging from 501 per 100,000 population in Fiji, followed by

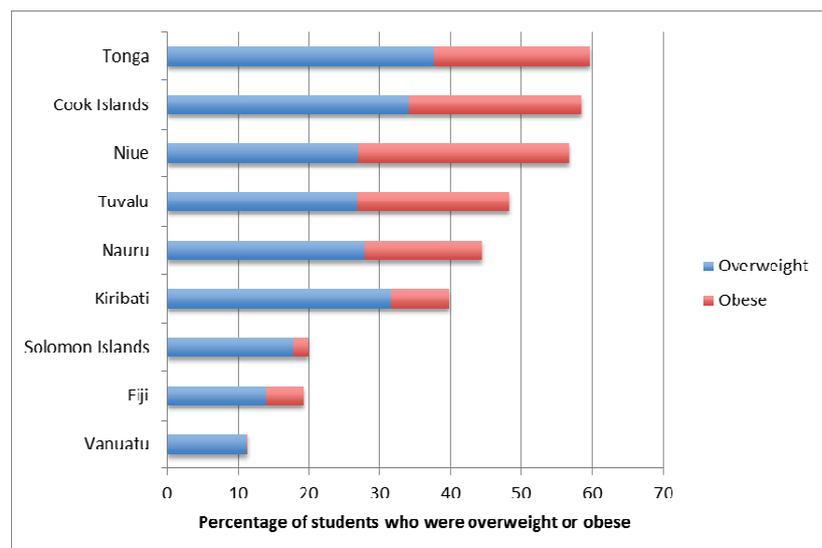


Figure 1 - Overweight and obesity in school health survey findings, 2010-13, GSHS<sup>2</sup>

374 in the Marshall Islands and 331 in Tonga<sup>12</sup>.

Overweight and obesity is a problem among youth as well as adults. Polynesian and Micronesian countries seem to be more affected than the Melanesian ones (Figure 2 and 3). Tonga has an estimated 58% overweight or obese 13-17 year olds.<sup>2</sup> Ten years earlier slightly fewer Tongan school students aged 11-16 years were overweight or obese (45%). This figure however remained the highest of 34 countries<sup>13</sup>.

## School survey data

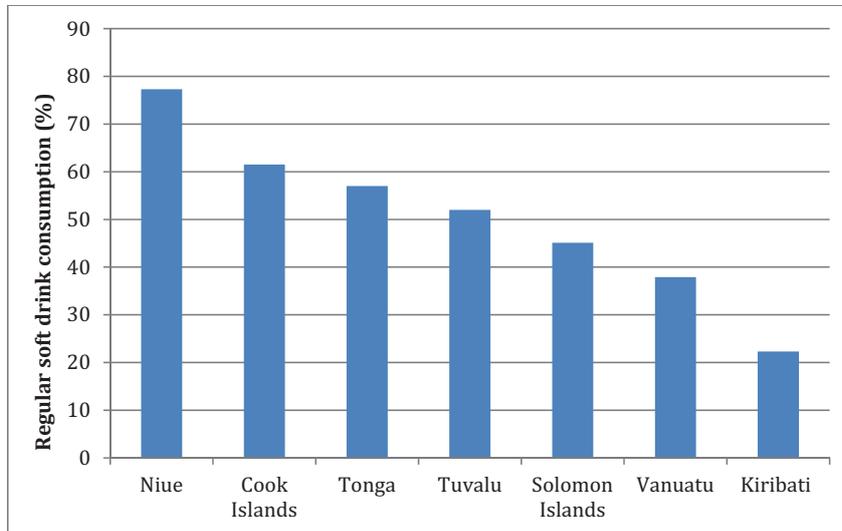
Data from national school surveys in the Pacific show how regular consumption of soft drinks among these age groups is common (Figure 2 and 3).

The GSHS is run by the World Health Organisation and the Centre for Disease Control, and gathers information pertaining

to health behaviours and risk factors from students aged between 13 and 17 years. A similar survey, the Youth Risk Behaviour Surveillance System (YRBSS)<sup>1</sup> is conducted by the Centre for Disease Control to monitor health-endangering behaviours amongst youth in grades 9 to 12 (approximately 14-18 years

## Aims

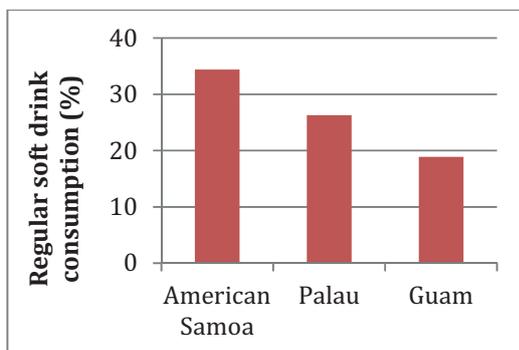
Given the health consequences of SSB consumption and therefore its effects on population health, our goal was to assess the feasibility and appropriateness of using trade data as a measure of SSB consumption, particularly soft drink consumption. Such a measure is important given the increasing attention towards SSBs, within the population health community, as a target for policy intervention; and the limited data currently available on consumption. The benefit of using trade data as a proxy for consumption is that the data is already collected, and it is usually available and complete. Trade measures could help to estimate population consumption, determine the efficacy of interventions, and measure the progress towards an SSB free Pacific. This methodology has also been used in the tobacco control literature, with the cited benefits that the data set is complete and highly relevant to actual consumer consumption.<sup>14</sup>



**Figure 2** - Prevalence of students 13-15yo who usually drank carbonated soft drinks one or more times per day during the past 30 days, GSHS, 2010-13<sup>2</sup>

old) in US states and territories. A question is included about actual soft drink consumption over the past week.

The lower level of consumption reported by students in the YRBSS compared with the GSHS may be due the question in the YRBSS asking more specifically about actual consumption in the past 7 days, whereas the GSHS asks about 'usual' consumption levels over the past 30 days and may be more



**Figure 3** - Prevalence of students grade 9-12 who drank a can, bottle, or glass of soda or pop one or more times per day in 7 days before the survey, YRBSS<sup>1</sup>, 2011-13<sup>1</sup>

prone to overestimate real consumption. Figure 3 shows how the YRBSS survey data measured a lower level of soft drink consumption than most of the GSHS surveys.

The YRBSS estimates that approximately one-quarter of students in American Samoa, Guam and Palau are consuming soft drinks on a daily basis<sup>1</sup>. The US proportion of 28% is similar reflecting the high level of consumption in both the continental US and US associated PICTs<sup>1</sup>.

## Methods

We requested both import and export soft drink data measured in litres from the PICTs. When export data was provided by PICTs (as relevant and available) it was subtracted from the import data. The resulting net import volume of soft drinks in 2011 was used to estimate soft drink consumption in litres per total population (SPC prism pocketbook 2013). We chose to limit the analysis to PICTs who were not soft drink producers, because we did not have access to complete soft drink production data. The soft drink consumption estimates (L/population) were compared with school survey estimates of soft drink consumption in students.

## Soft drink definition

The Harmonised Commodity Description and Coding System (HS) is an internationally standardised system for classifying trade goods. Analysis was limited to the HS code 22.02 which accounts for sweetened beverages (Text box 1). The definition includes caloric-sweetened and artificially-sweetened beverages (such as diet coke). Anecdotal evidence suggests that the level of diet soft drink consumption is not high in PICTs so this is likely to have a limited impact on the results. Our analysis does not include the fruit juice category HS 20.09 because it includes non-sweetened fruit juice (as well as caloric-sweetened fruit juice). This category would include many non-SSBs, so this analysis focussed exclusively on soft drinks.

The data collected does not constitute all SSBs, nor is it composed entirely of SSBs. It does however provide an estimate of soft drink consumption that could be useful to track changes in the level of consumption over time.

**Definition of soft drink used for import data (HS 22.02):**

“Waters, including mineral waters and aerated waters, containing added sugar or other sweetening matter or flavoured, and other non-alcoholic beverages, not including fruit or vegetable juices”

**Includes:**

1. Sugar sweetened soft drinks (not juice see below) e.g. carbonated soft drinks, sports drinks and energy drinks
2. Non-caloric sweetened soft drinks e.g. diet coke

**Excludes:**

1. Unsweetened and unflavoured water (HS 22.01)
2. Fruit and vegetable juices (sugar and non-caloric sweetened) (HS 20.09)
3. Sweetened milk drinks (HS 04.02)
4. Alcoholic beverages >0.5% volume (HS 22.03-8)

**Text box 1:** Soft drink definition used to analyse trade data (Harmonised coding system)

## Data collection

An economic statistician at SPC sent an email to country contacts in nineteen PICTs, eight of which were soft drink producers. A template was provided containing columns for imports and exports, local production and closing stocks of soft drinks for the preceding five years. Over the following few months, email exchanges were conducted to facilitate the collection of this data. Of the nineteen PICTs asked, twelve provided importation volumes of soft drinks up to 2011 or 2012 coded as HS 20.02. One additional country provided value of soft drink imports only and was excluded from our analysis. The only two countries that provided export data were soft drink producing countries (Vanuatu and Fiji).

Five of the twelve countries with available data were producers of soft drinks: Cook Islands, Fiji, Samoa, Solomon Islands and Vanuatu. We requested production data for these countries to allow us to estimate population consumption. Calculated data on consumption was provided from Fiji, which is discussed below. In four countries, no production data was available. The five soft-drink producing PICTs that provided data were therefore excluded from the following analysis.

Analysis was carried out for the seven remaining PICTs whose soft drink consumption relied solely on imports, for which data was available. In each PICT, the importation volume of soft drinks was converted to ‘consumption per person’ using the population figures from 2013 available on the SPC Prism website.

## Results

Using importation data was a feasible way of estimating total soft drink consumption per person in non-producing PICTs. Seven of the eleven non-producing PICTs contacted were able to provide importation data by volume. No export data was available. This is most likely because soft drinks are uncommonly

re-exported from these PICTs. If countries did export the calculated consumption figures may be overestimated.

In 2011, the estimated soft drink consumption based on imports ranged from 84L/person in Palau to of 8L/person in Tuvalu and 1L/person in Kiribati. The majority of countries had more moderate estimates for soft drink consumption with 22L/person in Federates States of Micronesia, 31L in Tonga (median), 41L in Niue and 47L in CNMI.

The graph below demonstrates reasonably consistent levels of imports from year to year (Figure 4). The most dramatic changes were increases in importation to Palau, Niue and the Federated States of Micronesia between 2011 and 2012.

## Comparison to school survey data

Although youth may have different soft drink intake from adults, a comparison of school survey data with importation data may give some understanding about whether the import data is consistent with school survey data (Figure 6).

The association between regular youth soft drink consumption and greater soft drinks imports was not perfectly correlated. However, there was a positive association when confined to the four GSHS surveys. The Palau YRBSS survey had relatively low rates of regular soft drink consumption among school students (26%) but relatively high importation rates (84L/person). There are many possible explanations.

There is one main reason not to expect a perfect linear association between national estimates of importation and student consumption of soft drinks. School surveys focus on youth whereas the import data aims to account for the total population’s level of consumption. The age pattern of consumption may vary between countries. For example, it is possible in Palau adults have a greater consumption level than adults in the other countries presented. Other potential biases in both the school survey data and our data may differ between countries.

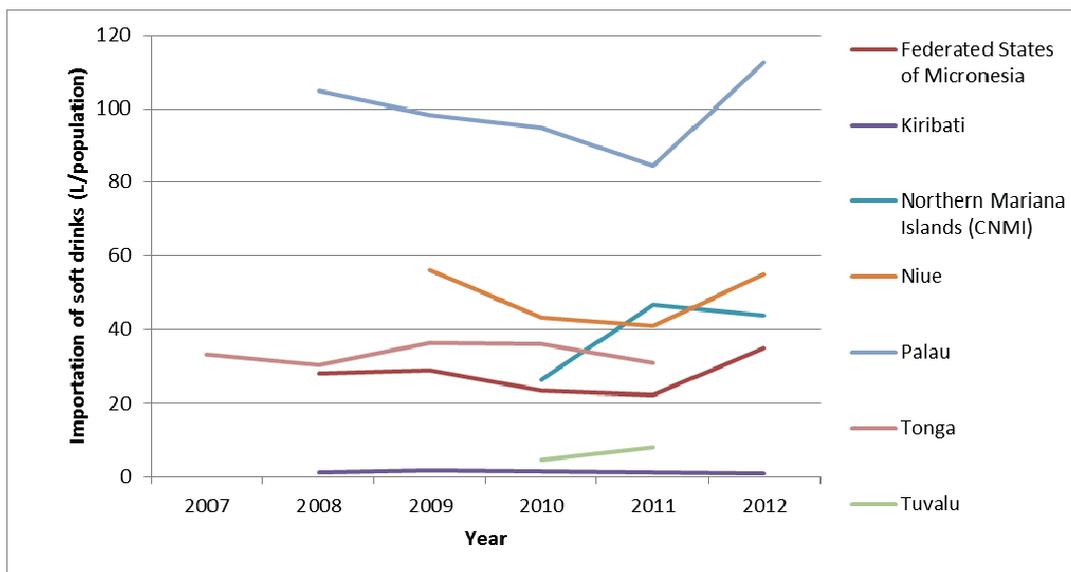


Figure 4 - Soft drink imports per capita among Pacific Island countries and territories without soft drink production, 2007-2012

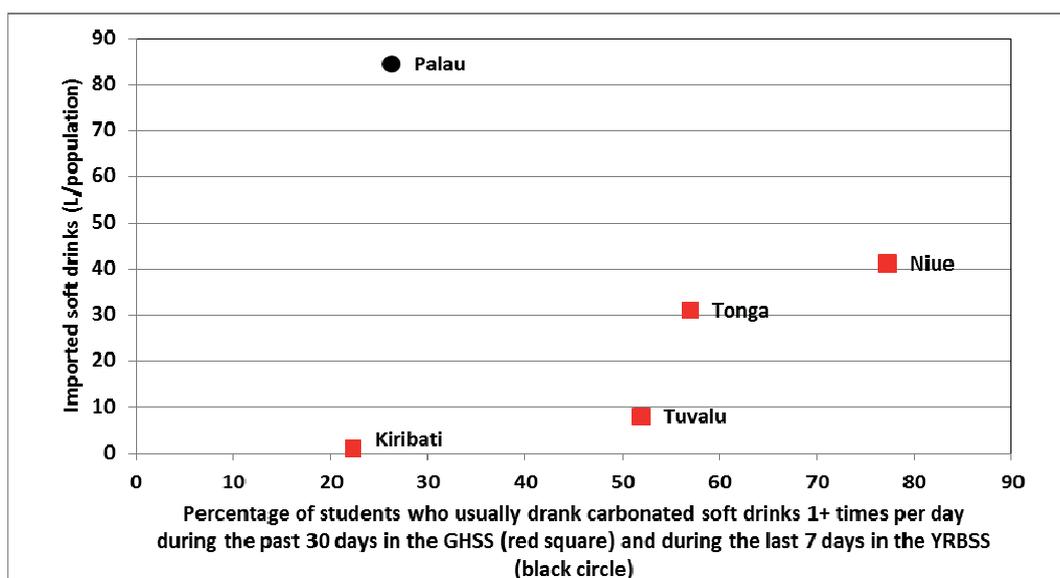


Figure 5 - Importation of soft drinks in the Pacific region (2011) compared to regular soft drink consumption among high school students (2010-13) in two surveys: the YRBSS1 grade 9-12, and the GSHS2 13-15yo. Note: surveys used different questions.

The impact of data quality and visitor numbers is discussed further below. Imports may be counted differently between countries but they do use the same harmonised coding system.

In Kiribati the importation rate was low (1L/person) and the proportion of school students regularly consuming soft drinks was low but greater than might be expected (22%) given the importation data. It is possible that the GSHS question leads to overestimation of true consumption because it asks about usual consumption over 30 days rather than actual consumption which may be more accurate. Anecdotal evidence suggests that soft drink consumption is indeed very low in Kiribati

and soft drinks are not affordable for much of the population. It was encouraging that the importation data in Kiribati was consistent with the 2006 Household income and expenditure survey figures on soft drink spending.

### Soft drink production in Fiji

Although we were not able to get production data from the soft drink producing nations in the Pacific, Fiji has done some analysis of their own data. The Fijian Bureau of Statistics (FiBOS) has records on local soft drink production, imports and exports at least until 2008. The series in Figure 6 represents local

production minus exports, plus imports, divided by the population. It demonstrates a doubling of soft drink consumption over one decade in Fiji. Fiji's level of consumption of 33L/person (2008) is similar to the median of 31L/person in our estimated consumption levels from the non-producing nations (2011-12). The Fiji data includes consumption by overseas visitors, intermediary consumption of industries and they include end of year stocks. This is also the case for the data we have presented.

In the same way that our import data is similar to Fiji's import data, school survey results about soft drink consumption in a Fiji study are similar to the rate of regular consumption in other PICTs

Fiji's import data is similar to the overall import data collected for our study. School survey results about SSB consumption in Fiji are also comparable to the rate of regular consumption by youth in other PICTs (Figure 2, Figure 3). In 2005/06, among a selection of Fiji high school students, 33% reported regular consumption of soft drinks on at least 4 of the last 5 school days.<sup>15</sup>

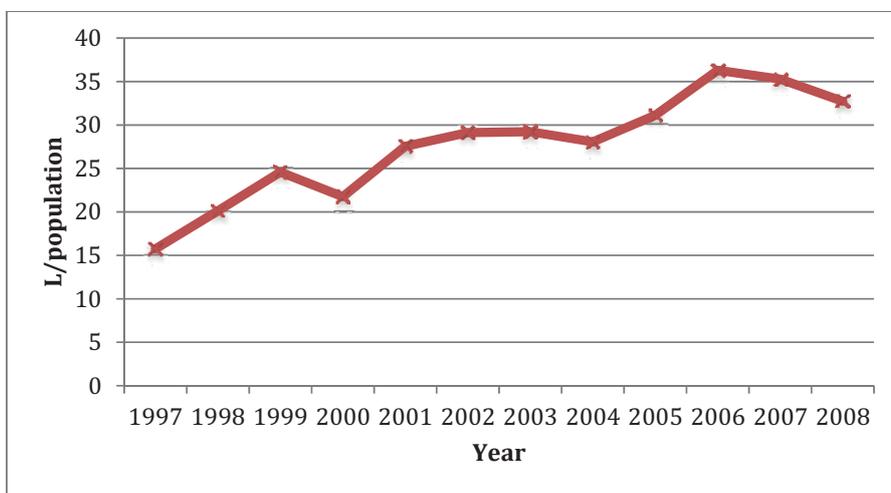


Figure 6 - Estimated soft drink consumption as calculated by the Fijian Bureau of Statistics, 1997-2008

**Discussion**

Collecting country data on import volumes was a feasible way of estimating the total soft drink consumption per person in PICTs, at least in a proportion of countries where the data is available and the country was not producing soft drinks.

The trade data suggest that despite the fact that many PICTs have low-middle income, soft drink consumption in these countries is comparable to some high income countries.<sup>16</sup> Our importation estimates for soft drink consumption (1-84L/person) were less than consumption estimated in 2002 for the United States (216 L/person), Australia (100 L/person) and New Zealand (84 L/person), although the methodology for these estimates was different.<sup>16</sup> The median consumption in our analysis was 31L/person in Tonga; equivalent to two soft drinks imported each week for every person, of any age.

New Zealand's Ministry of Health recommends that if soft drinks are consumed, they should be consumed only occasionally (less than once per week).<sup>17</sup> The Australian Department of Health and Ageing recommends avoiding regular consumption of soft drinks.<sup>18</sup> The daily consumption of one soft drink, as reported by some high school students, equates to a consumption of 122 litres per year. This is also well outside the recommended intake from the Australian and New Zealand Government's

dietary recommendations.<sup>17,18</sup>

There were increasing trends of soft drink imports in Palau, Niue and the Federated States of Micronesia from 2011-2012 however more time points are required before it can be determined if this is a true trend. A caveat on using imports as a proxy for consumption is that they do not take into account end of year stocks. This may cause some fluctuation between years that are not real fluctuations in consumption.

Trade data was generally consistent with school health survey data which suggests that regular consumption in PICTs is common among youth (22-77%). It should be noted that even Kiribati, with the lowest amount of trade in soft drinks, has one fifth of high school students reportedly consuming soft drinks at an unhealthy level. Therefore even when the estimated importations are low, there may remain a risky level of consumption in some sectors of the population. Importation data does not indicate who is drinking the soft drinks.

For import dependent countries, trade has important implications for soft drink consumption. Key trade partners importing to PICTs in this analysis were New Zealand (to Niue and Tonga), United States (to Palau, Federated States of Micronesia), Japan (to Federated States of Micronesia), Hong Kong (to CNMI) and Singapore (to Tonga).<sup>21</sup>

**Strengths and limitations**

The strength of this study is that it utilises existing records to estimate consumption of soft drinks over time. We have demonstrated how trade data could be more widely used to assess the impact of changes in government policy on the importation of soft drinks.

Fiji has already demonstrated this and published a picture of the changing consumption levels over time. However several caveats should be considered.

**Availability**

For some PICTs the volume of soft drink imports was not available. Soft drink consumption estimates depend on countries being able to provide importation data by volume. Seven of eleven non-producing PICTs approached provided usable data. It was helpful that Fiji was able to provide already calculated consumption data.

Soft drink consumption estimates were strengthened by requesting data on re-exported soft drinks and by requiring local soft drink production data for producing countries. Re-export of soft drinks was not provided for the estimates presented here and it is assumed to be negligible. If there was any exporting our data may overestimate consumption.

**Quality**

Checking the quality of the data is crucial. Sometimes there were discrepancies that had to be checked with the data providers. Data was quite difficult to collect, because some countries did not have their customs data stored and easily retrievable,

and others had their data recorded in currency value but not volume. The interpretation of the data is complicated further because it is dependent on the way that customs have entered the products' HS codes, which may be different from year to year. Cross-checking exports from corresponding countries may assist in maximising data quality.

### Visitors

Consumption of soft drinks by visitors may make a significant contribution to the consumption data for those countries that have high levels of visitors. The three highest soft drink importing countries in our analysis had high numbers of visitors relative to the size of their population. This includes CNMI where for a population of 55,600 there were approximately 341,000 visitors in 2011; and Niue where for a population of 1,500 there were 6,100 visitors (SPC PRISM). In Palau the population is 17,800 and visitor numbers were 63,600. High visitor numbers relative to the population is likely to have increased our estimates for soft drink consumption for the resident population in these PICTs. The extent of this effect is unclear but it should be kept in mind when making comparisons across countries. Visitor numbers may also be related to increased soft drink availability for the resident population. For the other countries in our analysis with proportionately lower visitor numbers, this is less likely to impact on the consumption figures.

### Diet Drinks

An important limitation in this study is that at the 4 digit level used, the Harmonised coding system (HS) does not allow us to distinguish between diet and sugar-sweetened soft drinks, so our figures also include diet beverages. Historically this has been a small proportion of the market but it is likely to increase over time and consideration should be given to how this may affect the importation data or whether more detailed HS codes will allow greater precision to select only SSBs.

### Fruit Drinks

Public health interest extends to all SSBs. This study relies on soft drinks only to inform the wider picture of SSB consumption. The inclusion of fruit juice categories and sweetened milk-based drinks could be considered in the future. It has been demonstrated that youth in Fiji and Tonga are consuming similar quantities of fruit drinks as carbonated soft drinks.<sup>15</sup> Furthermore, there is anecdotal evidence that significant amounts of cordial is drunk in PICTs, which is made by mixing water and sugar with purchased powder. Fruit drinks and cordial are recognised as forms of SSBs.

### Implications for practice and policy

Collection of SSB consumption data in PICTs should be strengthened. Accurate consumption data is crucial to assessing the contribution of SSBs to public health and monitoring the effectiveness of interventions that are put in place that address this.

Our analysis demonstrates that trade data can be used to monitor soft drink consumption in PICTs, and that this may be particularly useful over time as shown in Fiji and Tokelau.<sup>19</sup> In Tokelau an analysis of shipping manifests shows reductions in soft drinks imported over time in line with a ban on their importation.<sup>19</sup> The trade data methods described in this analysis are important for PICTs to consider in monitoring soft drink

consumption. This is not a new idea. Importation of soft drinks was used thirty plus years ago in the Pacific to evaluate nutrition programmes and interventions.<sup>20</sup>

Attempts should be made to maximise the quality of trade data used to estimate SSB consumption. There may be some variation in recording soft drink imports by customs in different countries or from year to year. A useful way of ensuring the quality of trade data in the PICTs may be to work with their customs services to ensure appropriate recording or cross-check export data from corresponding countries. Adjustments for export data, diet drinks, and visitor numbers should be considered.

Nationally representative surveys are important sources of self-reported SSB consumption. Standardised questions on soft drink consumption are already routinely included in school surveys albeit with differences in the questions selected. Ideally these questions would be used consistently over time and validated for their precision in testing true levels of consumption. In addition to school surveys with soft drink questions; the STEPS survey and other health surveys could include standardised questions on a broader category of SSB consumption.

Another method of monitoring soft drink consumption is via the Household Income and Expenditure Surveys (HIES). The majority of PICTs (19/22) already collect household expenditure and this data could be analysed to assess the volumes of SSBs purchased. Repeat HIES surveys could be a cost-effective way of tracking the volume of soft drink consumption and other SSBs.

The inflow of soft drinks into the PICTs comes at a high cost to Pacific populations, through the reduced productivity and healthcare costs of those suffering from the health consequences of SSB consumption. Soft drinks are an obvious target for intervention, as the negative health consequences of their consumption is detailed and growing and they are clearly implicated in the pathogenesis of NCDs, particularly through overweight and obesity.

Analysis of trade data can help to inform future PICT policies that aim to address SSB consumption. Trade data may be one of the simplest ways to monitor trends in PICT's soft drink consumption over time. Health and expenditure survey data however have added value because they allow for individual and household level analysis to determine consumption by different strata of society, such as income.

### Conclusion

Trade data is a feasible way of monitoring soft drink consumption and may be helpful for monitoring trends over time in SSB consumption in PICTs. Many non-producing PICTs had import volume data available for soft drinks. Many producing countries were limited by production data availability and so consumption was not able to be accurately estimated for these countries. Trade data quality could be maximised by cross-checking exports from corresponding countries, ensuring export data is subtracted from imports, excluding diet drinks from the analysis where possible, and adjusting for visitor numbers. The broader category of SSB consumption could be monitored by including imports of sugar-sweetened juice and milk drinks.

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## Bibliography

1. Youth Risk Behavior Surveillance System (YRBSS): Adolescent School Health. 2014. (Accessed August, 2014, at <http://www.cdc.gov/healthyyouth/yrbs/index.htm>.)
2. Global School-based Student Health Survey (GSHS). 2014. (Accessed August, 2014, at <http://www.cdc.gov/gshs/>.)
3. Malik VS, Schulze MB, Hu FB. Intake of sugar-sweetened beverages and weight gain: a systematic review. *The American journal of clinical nutrition* 2006;84:274-88.
4. Hu FB, Malik VS. Sugar-sweetened beverages and risk of obesity and type 2 diabetes: epidemiologic evidence. *Physiology & behavior* 2010;100:47-54.
5. Vartanian LR, Schwartz MB, Brownell KD. Effects of soft drink consumption on nutrition and health: a systematic review and meta-analysis. *American journal of public health* 2007;97:667-75.
6. Malik VS, Popkin BM, Bray GA, Despres JP, Willett WC, Hu FB. Sugar-sweetened beverages and risk of metabolic syndrome and type 2 diabetes: a meta-analysis. *Diabetes care* 2010;33:2477-83.
7. Duffey KJ, Popkin BM. Shifts in patterns and consumption of beverages between 1965 and 2002. *Obesity (Silver Spring)* 2007;15:2739-47.
8. Malik VS, Hu FB. Sweeteners and Risk of Obesity and Type 2 Diabetes: The Role of Sugar-Sweetened Beverages. *Current diabetes reports* 2012.
9. Foliaki S, Pearce N. Prevalence and causes of diabetes in Pacific people. *Pacific health dialog* 2003;10:90-8.
10. Curtis M. The Obesity Epidemic in the Pacific Islands. *Journal of Development and Social Transformation* 2004;1:37 - 42.
11. Finucane MM, Stevens GA, Cowan MJ, et al. National, regional, and global trends in body-mass index since 1980: systematic analysis of health examination surveys and epidemiological studies with 960 country-years and 9.1 million participants. *The Lancet* 2011;377:557-67.
12. Ian Anderson EJ. The economic costs of non-communicable diseases in the Pacific Islands: World Bank; 2012.
13. Smith BJ, Phongsavan P, Havea D, Halavatau V, Chey T. Body mass index, physical activity and dietary behaviours among adolescents in the Kingdom of Tonga. *Public Health Nutrition* 2007;10:137-44.
14. Scollo M, Winstanley M. Production and trade data as a basis for estimating tobacco consumption. In: *Tobacco in Australia: Facts and Issues*. 4th ed. Melbourne: Cancer Council Victoria; 2012.
15. Utter J FG MM, Vanualailai N, Kremer, P, Scragg R, Swinburn B. . Lifestyle and Obesity in South Pacific Youth: Baseline Results from the Pacific Obesity Prevention in Communities (OPIC) Project in New Zealand, Fiji, Tonga and Australia. Auckland: University of Auckland; 2008.
16. Global Market Information Database: International Statistics NationMaster.com, aggregates compiled by NationMaster 2002. (Accessed August, 2014, at [www.nationmaster.com/country-info/stats/Lifestyle/Food-and-drink/Soft-drink/Consumption](http://www.nationmaster.com/country-info/stats/Lifestyle/Food-and-drink/Soft-drink/Consumption).)
17. Food and Nutrition Guidelines for Healthy Children and Young People (Aged 2-18 years): A background paper: New Zealand Ministry of Health; 2012.
18. Dietary Guidelines for all Australians: Australian Government National Health and Medical Research Council; 2003.
19. Rush E, Pearce L, Drewnowski A. Foods Imported into the Tokelau Islands: 10th May 2008 to 1 April 2012; 2012.
20. Rody N. Things go better with coconuts—Program strategies in Micronesia. *J Nutr Educ* 1978;10:19-22.
21. Guillaume, G., & Zignago, S. (2010). BACI: International Trade Database at the Product-Level. The 1994-2007 Version. Retrieved August 22, 2014, from The Observatory of Economic Complexity: <http://atlas.media.mit.edu/>