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Estimated Global, Regional, and National Disease Burdens Related to Sugar-Sweetened Beverage Consumption in 2010

Gitanjali M. Singh, PhD[1], **Renata Micha, PhD**[1], **Shahab Khatibzadeh, MD**[2], **Stephen Lim, PhD**[3], **Majid Ezzati, PhD**[4], and **Dariush Mozaffarian, MD, DrPH**[1,*] **on behalf of the Global Burden of Diseases Nutrition and Chronic Diseases Expert Group (NutriCoDE)**

[1]Friedman School of Nutrition Science & Policy, Tufts University, Boston, MA

[2]Department of Global Health and Population, Harvard School of Public Health, Boston, MA

[3]Institute for Health Metrics and Evaluation, University of Washington, Seattle, WA

[4]Departments of Global Environmental Health and Biostatistics and Epidemiology, School of Public Health, Imperial College London, London, United Kingdom

Abstract

Background—Sugar-sweetened beverages (SSBs) are consumed globally and contribute to adiposity. However, the worldwide impact of SSBs on burdens of adiposity-related cardiovascular diseases (CVD), cancers, and diabetes has not been assessed by nation, age, and sex.

Methods and Results—We modeled global, regional, and national burdens of disease associated with SSB consumption by age/sex in 2010. Data on SSB consumption levels were pooled from national dietary surveys worldwide. The effects of SSB intake on BMI and diabetes, and of elevated BMI on CVD, diabetes, and cancers were derived from large prospective cohort pooling studies. Disease-specific mortality/morbidity data were obtained from Global Burden of Diseases, Injuries, and Risk Factors 2010 Study. We computed cause-specific population-attributable fractions for SSB consumption, which were multiplied by cause-specific mortality/morbidity to compute estimates of SSB-attributable death/disability. Analyses were done by country/age/sex; uncertainties of all input data were propagated into final estimates. Worldwide, the model estimated 184,000(95%UI=161,000–208,000) deaths/year attributable to SSB consumption: 133,000(126,000–139,000) from diabetes, 45,000(26,000–61,000) from CVD, and 6,450(4,300–8,600) from cancers. 5.0% of SSB-related deaths occurred in low-income, 70.9% in middle-income, and 24.1% in high-income countries. Proportional mortality due to SSBs ranged from <1% in Japanese >65y to 30% in Mexicans <45y. Among the 20 most populous countries, Mexico had largest absolute (405 deaths/million adults) and proportional (12.1%) deaths from SSBs. A total of 8.5(2.8, 19.2) million disability-adjusted life years (DALYs) were related to SSB intake (4.5% of diabetes-related DALYs).

Correspondence: Gitanjali M. Singh, PhD, Tufts University, Friedman School of Nutrition, 150 Harrison Avenue, Boston, MA 02115, Phone: 617-416-6437, Fax: 617-432-1111, Gitanjali.Singh@Tufts.edu.

* complete group list in the Acknowledgments

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Conclusions—SSBs, are a single, modifiable component of diet, that can impact preventable death/disability in adults in high, middle, and low-income countries, indicating an urgent need for strong global prevention programs.

Keywords

diet; obesity; diabetes; cardiovascular disease

INTRODUCTION

Adiposity-related chronic diseases, including type 2 diabetes, cardiovascular diseases (CVD), and cancers, cause more than 17 million global deaths each year.[1] Consumption of sugar-sweetened beverages (SSB) increases adiposity and long-term weight gain.[2–4] In addition, SSB intake appears to increase risk of diabetes independently of adiposity,[5] likely related to adverse metabolic and glucose-insulin effects. Yet, despite dramatic increases in both global sales of SSBs[6] and the global pandemic of obesity,[7, 8] comprehensive quantitative estimates of the impact of SSB intake on obesity-related diseases in nations worldwide by age and sex have not been available. Few published reports of country-level SSB consumption exist,[9–18] and these prior national reports have used disparate data sources and methods that are not easily compared. In addition, previous studies have not systematically assessed how SSB intake impacts major chronic diseases worldwide by region, country, age, and sex. Comprehensive, accurate estimates of the burdens of chronic obesity-related diseases due to SSB consumption, including the uncertainty in such estimates, are essential for informed national, regional, and global policies.

As part of our work in the 2010 Global Burden of Diseases Nutrition and Chronic Diseases Expert Group (NutriCoDE), we systematically reviewed, compiled, and extracted national data on SSB consumption worldwide and addressed issues of consistency, comparability, bias, and missingess in the collated data. We also derived and incorporated into our analysis the best available estimates of the effects of SSB intake on obesity and diabetes, and of obesity on diabetes, CVD, and cancers, including heterogeneity in these effects by age and sex. Our analysis further included data on age-, sex-, and cause-specific mortality in all nations worldwide. We used a comparative risk assessment analytical framework to quantify global, regional, and national disease burdens related to to SSB consumption, assessing both the direct and obesity-mediated effects of SSBs on chronic disease.

METHODS

To quantify the number of adult deaths worldwide related to to SSB intake, we used a comparative risk assessment framework[19–21] that captures geographical, gender, and age variation in SSB consumption, in the effects of SSB consumption on diabetes and BMI, in the effects of BMI on disease outcomes, and in cause-specific mortality (Table 1, Figure 1). We estimated both the direct effects of SSB consumption on diabetes burdens and the BMI-mediated effects of SSB consumption on CVD, diabetes, and cancer burdens.

Global SSB consumption data by country, age, and sex

As part of the Global Burden of Diseases, Risk Factors, and Injuries 2010 study, we identified national surveys or, if unavailable, subnational surveys on SSB intake in adults through systematic searches of multiple literature databases and direct contact with experts worldwide, as described elsewhere.[22] SSBs were defined as any sugar-sweetened sodas, fruit drinks, sports/energy drinks, sweetened iced tea, or homemade SSBs such as frescas, which contained at least 50 kcal per 8oz serving; 100% fruit juice was excluded. In total, we compiled data on SSBs from 62 dietary surveys including 611,971 individuals conducted between 1980 and 2010 across 51 countries(Supplemental Table 1).[22] Eighty-eight percent of the surveys were nationally-representative, and all but one had data on both men and women. Forty-five surveys (72%) were from low and middle-income countries, and 18 (28%) were from high-income countries. Together, these surveys provided data on SSB intake in countries representing 63% of the world's adult population (Table 1).[22] We also identified annual country-level data relevant to SSB intake between 1980 and 2010 for 187 countries in our analysis using food balance sheet data on per-capita sugar availability from the United Nations Food and Agriculture Organization (FAO).[23]

From each survey, we extracted data on survey location, time period, representativeness, sampling design, dietary assessment method, and the age and sex-specific distributions (mean, SD) of SSB intake and corresponding strata-specific sample size, using a standardized electronic spreadsheet. We evaluated the quality of population sampling and diet assessment methods and checked data for plausibility. SSB consumption data were adjusted for total energy using the residual method to reduce measurement error and account for differences in physical activity and metabolic rate.[24]

To combine individual-level intake data with country-level food availability data, to address issues of data incomparability, and to capture the uncertainty in estimates of beverage intake due to measurement error, sampling uncertainty, and modeling uncertainty, we used established age-integrating Bayesian hierarchical modeling methods. The primary model inputs were survey-level quantitative data, including country-, time-, age-, and sex- specific consumption levels (mean and standard deviation); data on the numbers of subjects in each strata; survey-level indicator covariates for sampling representativeness, dietary assessment method, and type of dietary metric; country-level year-specific data relevant to sugar availability from the FAO; and country, region (21 regions), and super-region (7 groupings of regions) random effects (Table 1).[19, 22] Model outputs were country-, age-, sex-, and year-specific estimates of mean SSB consumption and its uncertainty. In our present analysis, we used data on SSB consumption produced by this model for the year 2010.

Direct and BMI-mediated effects of SSB intake on CVD, diabetes, and cancers

We incorporated into our analysis the best available estimates for etiologic effects of SSBs on BMI and type 2 diabetes and of BMI on CVD (ischemic heart disease, stroke), type 2 diabetes, and cancers (oesophageal, colon, pancreatic, breast, uterine, kidney, gall bladder) (Table 1, Table 2).[25, 26]

Effects of SSB intake on BMI—Long-term effects of SSB intake on BMI in adults were derived from meta-analysis of 3 large prospective U.S. cohort studies that have evaluated the effects of changes in SSB intake on changes in weight gain, namely, the Nurses' Health Study, the Nurses' Health Study II, and the Health Professionals Follow-up Study, with a combined sample size of 120,877 participants (Table 1). Each serving per day increase in SSB intake was associated with a 0.10 (95% CI: 0.05, 0.15) kg/m^2 increase in BMI in individuals with BMI < 25 and a 0.23 (95% CI: 0.14, 0.32) kg/m^2 increase in BMI in individuals with BMI ≥ 25 (Table 2).[26] These estimates are consistent with a recent meta-analysis of 7 prospective cohorts (174,252 individuals) which reported an 0.12–0.22 kg increase in weight per serving/day of SSBs over a 1 year period, and a meta-analysis of 5 trials (292 participants) which found a 0.85 kg (95%CI: 0.50, 1.2 kg) increase in body weight when SSBs were added to the diet.[27] These estimates are also broadly supported by results from two recent large randomized trials of the effects of SSB intake on weight gain in children, one of which reported BMI reductions of about 0.57 kg/m^2 for a 1.7 serving/day reduction in SSB intake over a 1 year period, and the other of which reported significant reductions in weight gain, body fat change and BMI z-score for each 104 kcal reduction in sugary beverage intake per day over an 18 month period.[2, 3]

Effects of SSB intake on diabetes—Effects of SSB consumption on diabetes were based on a meta-analysis of 8 prospective cohorts with a total of 310,819 participants and 15,043 cases of type 2 diabetes (Table 1, Table 2).[28] In this meta-analysis, individuals in the highest category of SSB intake (1–2 servings/day) had a 26% greater risk of developing type 2 diabetes when compared with those in the lowest category of SSB intake (none or <1 serving per month) (risk ratio 1.26, 95% CI: 1.12–1.41). The association between SSB intake and risk of type 2 diabetes in this meta-analysis was consistent across gender and ethnic groups, which included African Americans, Caucasians, and Asians. Although there was heterogeneity among studies (I^2 = 66%), all but one showed positive associations between SSB intake and risk of type 2 diabetes, with the strength of the association increasing with study size and duration. Three cohorts included adjustment for BMI, most appropriate for our modeling of direct (non-obesity mediated) effects; but these also adjusted for total energy intake, which could result in underestimation of true effects. Results from this meta-analysis are supported by other large studies, including a sub-cohort of the European Prospective Investigation into Cancer and Nutrition (EPIC), which included 15,374 participants and 11,684 cases of type 2 diabetes, and reported a hazard ratio of 1.18 (95%CI: 1.06, 1.32) for the association of SSBs with type 2 diabetes.[2930]

Sensitivity analyses—To determine whether relative risks for individual dietary components derived from prospective cohorts might overestimate the impact on chronic disease due to residual confounding by other dietary factors, we performed three sensitivity analyses based on studies of overall dietary patterns.[26] Briefly, we compared the predicted risk of CHD calculated from the effects of individual dietary components on CHD from cohort data with the observed risk of CHD in dietary pattern studies, including 1) prospective cohort studies on the association of overall dietary patterns with incident CHD, 2) randomized controlled feeding trials quantifying the effects of overall dietary patterns on

SBP and LDL-C, and 3) a large randomized clinical trial evaluating the impact of an overall dietary pattern on incident CVD events.

Effects of BMI on CVD, diabetes, and cancers—Evidence for effects of BMI on CVD, diabetes, and site-specific cancers was obtained from published analyses of large international pooling studies[25, 31] (Table 1, Table 2). The effects of BMI on CVD and diabetes were obtained from pooled analysis of 163 international cohorts with 2.43 million participants and 70,000 cases. At the reference median age of 60, the relative risk (RR) of BMI on cardiovascular diseases, such as ischemic heart disease, stroke, and hypertensive heart disease ranged from 1.44 (95%CI 1.40, 1.48) to 1.90 (95%CI: 1.17–3.07) per 5 kg/m^2 increase in BMI, and the corresponding pooled effect for diabetes was 2.32 (95%CI: 2.04, 2.63). The effects of BMI on seven site-specific cancers (breast, uterine, esophageal, pancreatic, colon, kidney, and gall bladder) were based on pooled analysis of 221 international cohorts with 282,137 cases.[31] Effects of SSB on CVD and cancers were assumed to be mediated only through changes in BMI, while effects of SSB on diabetes were assumed to be mediated through both BMI and non-BMI related pathways.[28, 32–34]

A J-shaped relationship between BMI and all-cause mortality has been observed in some population-based studies, and such non-linearities are primarily due to effect modification by smoking or reverse-causation due to underlying chronic disease (such as chronic respiratory disease or cancer) in which weight loss may precede death by a decade or more. Among the international pooling projects used in estimating the etiologic effects of BMI on CVD and diabetes for the present analysis, 21 kg/m^2 was the lowest empirically observed minimum beyond which no additional benefits of lowering BMI were found.[25] In our analyses, we therefore restricted benefits of SSB reduction up to a BMI of 21 kg/m^2, beyond which we did not include additional benefits of further weight reduction.

We used the same risk estimates in men and women and across different races based on evidence that proportional effects of BMI are generally similar by sex and race,[25, 35] except for specific cancers for which we used separate risk estimates in men vs. women based on evidence for differing effects of BMI by sex[31] (Table 2). In our analysis, we included age-specific relative risks for the effects of BMI on CVD and diabetes, based on prior work demonstrating decreasing proportional effects at older ages.[25]

Cause-specific mortality by country, age, and sex

Data on mortality from 235 causes were compiled as part of the 2010 GBD study (Table 1).[1] Briefly, data were obtained on causes of death for 187 countries from 1980 to 2010 based on vital registration, verbal autopsy, mortality surveillance, censuses, surveys, hospitals, police records, and mortuaries; and assessed for completeness, diagnostic accuracy, missing data, stochastic variations, and probable causes of death. As described elsewhere, statistical modeling strategies estimated cause-specific mortality, including different permutations of covariates and assessment of model performance with specific models selected based on data quality and out-of-sample testing of prediction error and the validity of 95% UIs.[1] Cause-specific mortality fractions within each age-sex group were constrained to sum to total mortality based on draws from the uncertainty distributions. The final mortality dataset

included cause-, age-, and sex-specific mortality for 187 countries between 1990 and 2010. In this analysis we used age-, sex-, and country-specific data for 2010 on deaths due to diabetes (E10–E14), ischemic heart disease (ICD-10 codes I20–I25), ischemic stroke (I63, I65–I67, I69.3), hypertensive heart disease (I11), and breast (C50), uterine (C54–C55), esophageal (C15), pancreatic (C25), colon (C18–C21), kidney (C64), and gall bladder (C23) cancer.

Statistical analysis

Estimation of deaths attributable to SSB consumption—We quantified disease burdens due to SSB consumption in 2010 in 187 countries by age and sex by incorporating the data described above into a comparative risk assessment analytical framework (Figure 1). We included in our analysis the direct effects of SSB on diabetes and BMI, as well as the BMI-mediated effects of SSBs on diabetes, CVD (CHD, stroke) and cancers (breast, uterine, esophageal, colon, pancreatic, kidney, gall bladder). All analyses evaluated SSB consumption, effects of SSBs on diabetes and BMI, effects of BMI on diseases, and cause-specific mortality across 16 age- and sex-specific strata within each country (men and women ages 20–24, 25–34, 35–44, 45–54, 55–64, 65–74, 75–84, and 85+ y). We also accounted for stronger effects of SSB intake on BMI in overweight vs. normal adults[26] by partitioning effects in each age, sex, and country-specific strata according to the proportion of the population who were normal weight or overweight.[7, 8] Our analyses did not involve ecologic correlations, i.e. simple comparisons of SSB intakes and disease rates, as these would be limited by substantial confounding. We have instead quantitatively assessed and incorporated into our analysis age- and sex-specific data on SSB consumption, external evidence on causal effects of SSBs on disease risk, and validated data on country, age, sex, and cause-specific mortality.

For diabetes and each BMI-related disease endpoint, we calculated the disease-specific population-attributable fraction (PAF) due to SSB consumption:

$$\frac{\int_{x=0}^{m} RR(x)P(x)dx - \int_{x=0}^{m} RR(x)P'(x)dx}{\int_{x=0}^{m} RR(x)P(x)dx} \quad (1)$$

where x = SSB consumption level; P(x)= current distribution in the age and sex stratum; P’(x)= alternative distribution (zero consumption); RR(x)= relative risk of mortality at SSB consumption level x; and m = maximum exposure level. Mortality attributable to SSB consumption was calculated by multiplying the calculated PAF by the observed number of cause-specific deaths (Figure 1). Analyses were done separately for each country, age, and sex group, and assessed as both absolute and proportional mortality.

Estimation of DALYs attributable to SSB consumption—Disability-adjusted life years (DALYs) are summary metrics of population health that measure how many years of healthy life are lost due to death and disability.[36] DALYs are the sum of two components: the years of life lost due to premature mortality (YLL) and the years lived with disability (YLD). YLLS are computed by multiplying the number of deaths at each age by a standard

life expectancy at that age in the given population. YLDs are estimated as the prevalence of different disease sequelae multiplied by the disability weight for each sequela.[37] Disability weights are selected on the basis of surveys of the general population about the loss of health associated with the health state related to the disease sequelae.[38] The estimation of cause-specific DALYs by country, age, and sex, has been described elsewhere.[36–38] DALYs attributable to SSB consumption were calculated by multiplying the total DALYs due to CVD, diabetes, and cancers by the country, age, and sex specific PAFs, which were calculated as described above.[36, 37]

Estimation of uncertainty—We used Monte Carlo simulation to quantify the uncertainty in the attributable deaths and DALYs, propagating the uncertainty from SSB intake data (which includes both measurement and sampling error and modeling uncertainty), and uncertainty from the relative risks into our final estimates. We drew 1,000 times from the distribution of SSB consumption for each country-age-sex group as characterized by its mean and standard error. For each mean exposure, population-representative standard deviations were predicted using coefficients from regressions performed on all available dietary survey data in our collection, in which standard deviation was the dependent variable and mean was the independent variable.[39, 40] Independent of exposure, we generated 1,000 draws of the etiologic relative risks of SSB intake on diabetes and BMI, and of BMI on adiposity-related diseases. These simultaneous draws were entered into the analysis to generate 1,000 mortality estimates for each country- age- and sex-group, of which we report the mean and 95% uncertainty intervals (UI). All analyses were performed using R software, version 2.15.0.

RESULTS

In 2010, the mean global consumption of SSBs among adults was 0.58 servings/day (95%UI: 0.37, 0.89). The mean intake varied substantially in men and women across different ages and world regions, highest in countries in Latin America and the Caribbean and lowest in parts of East Asia. Detailed findings on SSB consumption patterns across the world have been reported.[22]

Mortality related to SSB consumption

Global mortality related to SSB consumption—In 2010, the model attributed a total of 184,000 (95%UI: 161,000, 208,000) deaths globally to SSB intake (Table 3), representing 5.3% (95%UI: 5.0, 5.5%) of all diabetes deaths, 0.4% (95%UI: 0.3, 0.6%) of BMI-related CVD deaths, and 0.3% (95%UI: 0.2, 0.3%) of all BMI-related cancer deaths. Most of these deaths (72.3% or 133,000; 95%UI: 126,000, 139,000) were due to diabetes, 24.2% (45,000; 95%UI: 29,000, 61,000) were due to CVD, and 3.5% (6,450; 95%UI: 4,300, 8,600) were due to BMI-related cancers. Half of all SSB-attributable deaths were in women. Three in 4 (75.9%) of all deaths attributable to SSB consumption occurred in low- and middle-income countries. Globally, absolute mortality from SSBs was greatest in adults over age 65 y, at 167 (95%UI: 141, 195) deaths per million adults. Conversely, proportional mortality was highest among adults aged 20–44 y, in whom 14.0% (95%UI: 12.9, 15.0%) of all diabetes and adiposity-related deaths were attributable to SSB consumption.

Regional mortality related to SSB consumption—Across 9 major world regions, Latin America and the Caribbean had the highest absolute mortality related to SSB consumption (48,000 per million adults; 95%UI: 41,000, 54,000), while Australia and New Zealand had the lowest (560; 95%UI: 440, 700) (Table 3). Among age and sex groups in these regions, men over 65 y in Latin America and the Caribbean had the highest SSB-related absolute mortality (582 deaths per million men, 95%UI: 485, 681), with women over 65 in this region close behind (552 deaths per million women, 95%UI: 460, 644). Adults 65+ y in the U.S. and Canada had the next highest SSB-attributable mortality: 379 (95%UI: 285, 478) per million men and 300 (95%UI: 227, 386) per million women. Women aged 20 to 44 y in Western Europe and Australia/New Zealand had the lowest mortality: 2 (95%UI: 1, 3) deaths per million.

Although older adults had the highest absolute mortality attributable to SSBs, younger adults had the highest proportional mortality (Table 3). Among adults aged 20–44 y in Latin America/Caribbean, 1 in 7 (13.9%; 95%UI: 11.7, 16.1%) of all diabetes and adiposity-related deaths in men and 1 in 9 (10.9%; 95%UI: 9.3, 12.4%) of all such deaths in women were attributable to SSBs. Considering only deaths due to diabetes, 1 in 3 such deaths in men aged 20 to 44 y in both Latin America/Caribbean and U.S./Canada were due to SSBs. Among all diabetes deaths, the percent related to SSB consumption exceeded 10% among adults age 20–44 y in every world region except South Asia.

National mortality related to SSB consumption—Across all countries worldwide, proportional mortality related to SSB intake varied substantially (Figure 2, Supplemental Table 3). Proportional deaths were highest in Mexican men aged 20 to 44 y, in whom 1 in 3 (33.6; 95%UI: 26.4, 39.5%) diabetes and BMI-related deaths were linked to SSB consumption. Proportional mortality also exceeded 20% in adults aged 20–44 in Kiribati, Gabon, Marshall Islands, Belize, Barbados, and Tonga. Proportional mortality attributable to SSBs was lowest in adults age 65+ y in several East Asian countries, approaching zero in some cases.

Among larger nations (population >1 million), the SSB-related mortality rate was highest in Mexico (405 deaths per million adults; 95% UI: 345, 462) and lowest in Bangladesh (1; 95% UI: 0,2 deaths per million adults) (Supplemental Table 3). In total, Mexico had an estimated 24,000 (95%UI: 21,000, 28,000) SSB-related deaths in 2010, while Bangladesh had 72 (95%UI: 40, 104) such deaths. Among the 20 countries with highest SSB-related deaths, at least 8 of these countries were in Latin America and the Caribbean across all age and sex subgroups (Figure 3).

Out of the 20 most populous countries in the world, the death rate related to SSB intake was highest in Mexico in all age-sex groups, followed by the US, Indonesia, and Brazil (Supplemental Figure 1). In these 20 countries, most SSB-related deaths were due to diabetes, except in Russia and Egypt in which most SSB-related deaths were due to CVD. Overall, the US ranked 2nd in SSB-related deaths among the 20 most populous countries, with an absolute death rate of 125 (95%UI: 101, 149) per million adults, or 25,000 total deaths (95%UI: 20,000, 30,000) related to SSB consumption in 2010 (Supplemental Table 3).

Morbidity related to SSB consumption

Global DALYS related to SSB consumption—In 2010, a total of 8,526,456 (95%UI: 2,769,953, 19,244,657) DALYs were attributable to SSBs, of which 49.5% were due to CVD, 41.4% were due to diabetes, 4.5% were due to BMI-related cancers, and 4.9% to musculoskeletal disorders (Table 4). Globally, 0.7% (95%UI: 0.3, 1.5%) of total DALYs were related to SSB consumption; 1.6% (95%UI: 0.5, 4.5%) of CVD DALYs, 4.5% (1.7, 8.9%) of diabetes DALYs, 0.2% (95%UI: 0.1, 0.7%) of obesity-related cancer DALYs, and 0.4% (95%UI: 0.1, 1.3%) of musculoskeletal DALYs were attributable to intake of SSBs. Lower-middle income countries had the largest absolute number of SSB-related DALYs, a total of 4,243,602 (95%UI: 998,925, 9,058,923) DALYs, or 2,931 (95%UI: 690, 6258) per million adults. Upper middle income countries had the highest percent of diabetes-related DALYS that were related to SSB consumption (6.1%, 95%UI: 2.5, 11.7) (Table 4).

As with SSB-related mortality, the absolute number of DALYs attributable to SSBs was highest in men over age 65, at 6,230 (95%UI: 2,300, 16,095) DALYs per million. Men under age 45 had the highest percent of CVD-related DALYs caused by SSBs (2.9%, 95% UI: 1.0, 6.9%), as well as the highest percent of diabetes-related DALYS caused by SSBs (6.1%, 95%UI: 2.3, 12.1%).

Regional DALYs related to SSB consumption—Among nine world regions, the greatest absolute SSB-related burdens were in South Asia, with 3,528 (95%UI: 686, 7070) DALYs per million adults and U.S./Canada (3,265, 95%: 1934, 4982), while Australia/New Zealand had the least (609, 95%UI: 364, 1028). In Latin America/Caribbean, almost 1 in 10 diabetes-related DALYs were related to SSB consumption (9.7%, 95%UI: 4, 18.3%), which also accounted for about 1 in 12 diabetes-related DALYs in U.S/Canada (8.5%, 95%UI: 3.9, 14.3%). The percent of all diabetes-related DALYs caused by SSB consumption was highest in men under age 45 in U.S./Canada (12.9%, 95%UI: 5.8, 21.8%) and Latin America/ Caribbean (12.4%, 95%UI: 5.0, 23.2%).

National DALYs related to SSB consumption—Of the world's 20 most populous countries, Mexico had the greatest number of SSB-attributable DALYs per million adults (3,960, 95%UI: 1,516, 13,990), while China had the lowest (584, 95%UI: 42, 2462). In Mexico, almost 1 of every 6 diabetes-related DALYs was attributable to SSB intake (15.8%, 95%UI: 7.0, 27.5%). In the United States, a total of 32,997 (95%UI: 2,279, 73,697) DALYs were related to SSBs consumption in 2010, or 2,087 (95%UI: 2,050, 5,180) per million adults, and 1.1% (95%UI: 0.6, 1.6 %) of all DALYs in the U.S. were attributable to SSBs.

DISCUSSION

These findings, based on a model that incorporated individual-level national surveys of SSB consumption, country-level food availability data, the adiposity-mediated and direct effects of SSBs on chronic diseases, and cause-specific deaths and disability by age, sex, and country, provide current estimates of the worldwide annual mortality and morbidity related to SSB consumption. In total, our model attributed more than 180,000 global deaths in 2010 to SSB consumption, with 72.3% from diabetes, 24.2% from CVD, and 3.5% from cancers. In addition, more than 8.5 million DALYs were linked to SSB consumption globally. To our

knowledge, this investigation represents the first comprehensive, systematic assessment of the worldwide burdens of diabetes, CVD, and cancers attributable to SSBs.

Our findings demonstrate remarkable geographic heterogeneity in SSB-related mortality and morbidity, with substantial absolute and proportional burdens in Latin America and the Caribbean, and nearly none in East Asia. In Caribbean and Latin American countries, such as Mexico, homemade sugary beverages (e.g., “frescas”) are often made and consumed in addition to commercially produced SSBs; these high intakes are compounded by some of the highest rates of both obesity and diabetes in the world.[7, 8, 41] The low cost of SSBs, lax regulation of advertising, and poor access to clean drinking water in some Latin American and Caribbean countries could contribute to the high SSB intakes in these regions and are natural targets for policy-driven interventions.[42, 43] While the global proportion of deaths related to SSB consumption may seem low at first glance at about 1.2% of all diabetes, CVD, and cancer deaths, we found great variability in national and regional burdens, with SSB-attributable proportional mortality in Mexican men aged 20–44 as high as 33%. Importantly, our findings demonstrate that 75% of deaths and 85% of DALYs related to sugary beverages occur in low and middle income countries, highlighting the need for effective interventions to reduce SSB consumption in not only richer but also lower income countries. Furthermore, our model estimates the effect of removing all SSBs independent of any collateral effects that such a change might have. However, it is possible that reduction in SSB intake could additionally influence other dietary behaviors, such as switching to healthier beverages and otherwise improving diet quality. Therefore, the number of deaths and DALYs that could be prevented by reducing SSB consumption globally may be greater than what is estimated by our current model.

The absolute burdens of deaths attributable to SSB consumption are lower than for some risk factors for chronic diseases, including metabolic risk factors, such as BMI,[39] and other dietary factors, such as excess dietary sodium[40] and insufficient consumption of fruits and vegetables[44]. Roughly 2.4 million chronic disease deaths in 2010 were due to elevated BMI[39], with the BMI-mediated chronic disease mortality due to SSB consumption accounting for about 1 in 12 of those deaths. However, SSBs are but one contributor to the obesity epidemic, which is also related to multiple additional factors such as consumption of refined carbohydrates, other dietary sugars, inadequate physical activity, genetics/epigenetics, and psychosocial/environmental factors. In light of this, the number of SSB-related deaths is considerable given that it is only a single component of diet. In 2010 about 2.7 million deaths were attributable to elevated intake of dietary sodium[40] and 4.7 million due to inadequate fruit and vegetable consumption[44]; yet, compared with sodium which is nearly ubiquitous across the food supply, or fruits and vegetables which represent large and diverse classes of foods, SSBs represent only a single class of beverage. While substantial increases in global consumption of fruits and vegetables would require major long-term changes to agricultural systems, policies, transport and storage infrastructures, food manufacturing, and sociocultural priorities and norms, SSBs could be decreased without any new investments or technological advances in agriculture, transport, storage, manufacturing, or marketing.

The burdens due to SSB are also relatively unique due to their predominant proportional impact on the young. Throughout much of the world, intakes at younger ages are far higher than later in life. Consequently, the proportional mortality due to SSBs is remarkably high among younger adults, exceeding 1 in 10 of all diabetes and obesity-related deaths in nearly every region of the world. Younger adults also comprise the largest proportion of the workforce in most countries, producing tremendous economic losses related to SSB intakes in these age groups.[45] Our findings suggest that ~ 1 in 20 diabetes-related DALYs in adults under age 44 are attributable to SSB intake, highlighting the considerable social and financial impacts of SSB consumption from not only health care costs of managing diabetes but also losses of wages and productivity.

While we demonstrated an inverse age effect in proportional disease burdens due to SSBs, it remains to be seen whether this pattern represent an effect of aging (i.e., due to people decreasing their intakes as they get older) or a birth cohort or generational effect (i.e., due to more recent generations consuming higher intakes than older generations). If the latter is even partly contributing, then global mortality and morbidity due to SSBs may steeply rise as current generations age into higher risk of chronic diseases while continuing their higher intakes of SSBs.

This investigation had several strengths. We utilized global dietary data based on individual-level, largely nationally representative surveys, and assessed and adjusted for comparability, consistency, bias, and missing data across surveys. We evaluated and incorporated the best available evidence for effects of SSBs on BMI and diabetes and of BMI on adiposity-related diseases. We performed sensitivity analyses to assess the potential for overestimation of effects of individual diet components on chronic disease through comparison with dietary pattern studies based on both observational data and randomized trials. These sensitivity analyses indicated that the effects of dietary patterns on CHD predicted from the effects of individual dietary components on CHD were very similar to those observed both in prospective cohort studies evaluating associations of overall dietary patterns on CHD and randomized controlled studies of the impact of dietary patterns on CVD risk factors and CHD. Therefore, in combination, these sensitivity analyses confirm that the effects of single dietary factors on chronic diseases, such as those used in this study, are unlikely to overestimate the effects of diet on NCDs due to residual confounding from other dietary components. Our analytical framework incorporated variation by age, sex, and country in SSB intakes, etiologic effects of SSBs on disease, and cause-specific mortality and morbidity, and also propagated uncertainty from each of these inputs into the final mortality estimates. Notably, our analyses did not simply involve comparisons of SSB intakes and disease rates, which would be limited by substantial confounding and ecologic fallacy, but quantitatively assessed and incorporated age- and sex-specific data on SSB consumption, external evidence on causal effects of SSBs on disease risk, and validated data on country, age, sex, and cause-specific mortality.

Limitations should be considered. We did not identify national surveys on SSB consumption in some countries, especially those in South Asia and Sub-Saharan Africa, which limits the statistical certainty of estimates in these regions. Yet, no prior global data on individual-level SSB intakes have been compiled[19], and the dietary survey data we collected covered

62% of the world's population. We implemented hierarchical modeling methods with multiple informative time-varying covariates to account for missing data and to quantify its effects on uncertainty. Given our focus on chronic disease mortality, we did not collect SSB intakes in children and adolescents, among whom SSB consumption is likely higher than in young adults. Conversely, although current morbidity and future mortality due to SSBs may be appreciable even in youth, current mortality levels would be very low, producing little impact on our estimated burdens of deaths. Whereas effects of SSB intake on weight gain have been confirmed by randomized controlled trials and gene-diet interactions,[2–4] the impact of BMI on chronic diseases was based on prospective observational studies, which might be overestimated due to residual confounding or underestimated due to measurement error. Yet, these data represent the best available evidence for effects of adiposity on chronic diseases, and the magnitude and causality of these effects are supported by extensive experimental and shorter-term clinical interventions.[25] In this analysis, we included only the BMI-mediated effects of SSB intake on CVD and cancers as these effects have been well-established.[25, 27] However, SSB intake has been associated, independent of weight gain, with increases in inflammatory biomarkers and triglycerides as well as development of hypertension and hyperuricemia, which may indicate direct effects on outcomes related to these pathways, such as CVD and cancers.[32, 46–49] Therefore, the death and DALY burdens presented here could be an underestimate of the true burden of SSB-related disease.. Our analyses included diabetes mortality, but since diabetes is not often listed as the proximal cause of death, the total number of diabetes deaths reported here could be an underestimate. However, as many who have diabetes in life ultimately die of CVD causes, we include CVD mortality in our analyses thereby mitigating possible underestimation of total SSB-related mortality.

Using a comparative risk assessment model, we found that in 2010, 184,000 deaths and 8.5 million DALYs worldwide were attributable to consumption of sugary beverages, with three-quarters of these burdens occurring in low and middle income countries and highest proportional burdens among adults aged 20 to 44 years of age. These results indicate the need for population-based efforts to reduce SSB consumption throughout the world through effective health policies and targeted interventions directed at stemming obesity-related disease.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

Acknowledgments

The Global Burden of Diseases Nutrition and Chronic Disease Expert Group (NutriCoDE) authorship group includes:

Core Group:

Dariush Mozaffarian, MD, DrPh, Renata Micha, PhD, and Peilin Shi, PhD, all at Tufts University Friedman School of Nutrition Science & Policy, Boston, MA, USA; Majid Ezzati, PhD, Imperial College London, London, UK; Saman Fahimi, MD, MPH, University of Cambridge, Cambridge, UK; Shahab Khatibzadeh, MD, MPH, Harvard School of Public Health, Boston, MA, USA; John Powles, MB, BS, MA, FFPH, University of Cambridge, Cambridge, UK.

Other Members:

Ibrahim Elmadfa, PhD, Institute of Nutritional Sciences, University of Vienna, Vienna, Austria; Mayuree Rao, BA, The Warren Alpert Medical School of Brown University, Providence, RI, USA; Pattra Wirojratana, Harvard School of Public Health, Boston, MA, USA; Gitanjali Singh, PhD, Tufts University Friedman School of Nutrition Science & Policy, Boston, MA USA.

Dietary Exposure Imputation:

Stephen S. Lim, PhD, Institute for Health Metrics and Evaluation, University of Washington, Seattle, Washington, USA; Kathryn G. Andrews, MPH, African Leaders Malaria Alliance, Dar es Salaam, Tanzania; Rebecca E Engell, BA, Institute for Health Metrics and Evaluation, University of Washington, Seattle, Washington, USA.

Dietary Exposures – Corresponding Members (alphabetical order):

Pamela A. Abbott, PhD, University of Aberdeen, United Kingdom; Morteza Abdollahi, MD, MPH, National Nutrition and Food Technology Research Institute Iran; Enrique Abeyá Gilardon, MD, MPH, Ministerio de Salud, Argentina; Habibul Ahsan, MD, University of Chicago, USA; Mohannad Abed Alfattah Al Nsour, MD, Eastern Mediterranean Public Health Network (EMPHNET), Jordan; Suad N. Al-Hooti, MSc, Kuwait Institute for Scientific Research, Kuwait ; Carukshi Arambepola, MD, Faculty of Medicine, University of Colombo, Sri Lanka; Hubert Barennes, PhD, Institut Francophone pour la Médecine Tropicale, Lao PDR; Simon Barquera, PhD, Instituto Nacional de Salud Publica (INSP), Mexico; Ana Baylin, MD, DrPH, University of Michigan, US; Wulf Becker, PhD, National Food Agency, Sweden; Peter Bjerregaard, MD, DrMedSci, National Institute of Public Health, University of Southern Denmark, Denmark; Lesley T. Bourne, PhD, Environment and Health Research Unit, Medical Research Council, South Africa; Neville Calleja, MD, MFPH, Department of Health Information & Research, Malta; Mario V. Capanzana, PhD, Food and Nutrition Research Institute, Philippines; Katia Castetbon, PhD, Institut de Veille Sanitaire, France; Hsing-Yi Chang, DrPH, National Health Research Institutes, Taiwan; Yu Chen, PhD, New York University School of Medicine, United States; Melanie J. Cowan, MPH, WHO, Switzerland; Stefaan De Henauw, MD, PhD, Ghent University, Department of Public Health, Belgium; Eric L. Ding, ScD, Harvard Medical School and Harvard School of Public Health, USA; Charmaine A. Duante, MSc, Food and Nutrition Research Institute, Department of Science and Technology, Philippines; Pablo Duran, PhD, Dirección Nacional de Maternidad e Infancia, Ministerio de Salud de la Nación, Argentina; Ibrahim Elmadfa, Professor, Institute of Nutritional Sciences, University of Vienna, Austria; Heléne Enghardt Barbieri, National Food Agency, Uppsala, Sweden; Farshad Farzadfar, MD, ScD, Tehran University of Medical Sciences, Iran; Dulitha N. Fernando, PhD, Faculty of Medicine, University of Colombo, Sri Lanka; Aida Filipovic Hadziomeragic, MD, MSc, Institute of Public Health of Federation of Bosnia and Herzegovina, Bosnia and Herzegovina; Regina M. Fisberg, PhD, Faculty of Public Health, University of São Paulo, Brazil; Simon Forsyth, BA (UQ), School of Population Health, University of Queensland, Australia; Didier Garriguet, MSc, Statistics Canada, Canada; Jean-Michel Gaspoz, MD, MPH, Geneva University Hospitals and Faculty of Medicine of Geneva, Switzerland; Dorothy Gauci, Post Graduate Diploma (Epidemiology), Department of Health Information and Research, Malta; Brahmam N.V. Ginnela, MB, BS, DPH, National Institute of Nutrition, Indian Council of Medical Research, India; Idris Guessous, MD, Geneva University Hospitals, Switzerland; Martin C. Gulliford, FFPH, King's College London, UK; Wilbur Hadden; Christian Haerpfer, PhD, University of Aberdeen, United Kingdom; Daniel J. Hoffman, PhD, Rutgers, the State University of New Jersey, USA; Anahita Houshiar-Rad MSc, National Nutrition and Food Technology Research Institute Shahid Beheshti University of Medical Sciences, Iran; Inge Huybrechts, PhD, Ghent University, Department of Public Health, Belgium ; Nahla C. Hwalla, PhD, American University of Beirut, Lebanon; Hajah Masni Ibrahim, SM, Ministry of Health, Brunei; Manami Inoue, MD, PhD, Epidemiology and Prevention Division, Research Center for Cancer Prevention and Screening, National Cancer Center, Japan; Maria D. Jackson, PhD, University of the West Indies, Jamaica; Lars Johansson, PhD, Norwegian Directorate of Health, Norway; Lital Keinan-Boker, MD, PhD, Ministry of Health, Israel; Cho-il Kim, PhD, Korea Health Industry Development Institute, Republic of Korea; Eda Koksal, PhD, Gazi University, Turkey; Hae-Jeung Lee; Yanping Li, PhD, Harvard School of Public Health, USA; Nur Indrawaty Lipoeto, PhD, Andalas University, Indonesia; Guansheng Ma, PhD, National Institute for Nutrition and Food Safety, Chinese Center for Disease Control and Prevention, China; Guadalupe L. Mangialavori, MS RD, Ministerio de Salud de la Nación (National Health Ministry), Argentina; Yasuhiro Matsumura, PhD, Bunkyo University, Japan; Stephen T. McGarvey, PhD, Brown University, USA; Mei Fen Chan; Gert B.M. Mensink, PhD, Robert Koch Institute, Germany; Rafael A. Monge-Rojas, PhD, Costa Rican Institute for Research and Education and Nutrition and Health (INCIENSA), Costa Rica; Abdulrahman O. Musaiger, PhD, Arab Center for Nutrition, Bahrain; Nagalla Balakrishna, PhD, National Institute of Nutrition, Hyderabad, India; Androniki Naska, PhD, Dept. of Hygiene, Epidemiology and Medical Statistics, University of Athens Medical School, Greece; Marga C. Ocke, PhD, National Institute for Public Health and the Environment, Netherlands; Maciej Oltarzewski, MSc, National Food and Nutrition Institute, Poland; Philippos Orfanos, MSc, Dept. of Hygiene, Epidemiology and Medical Statistics, University of Athens Medical School, Greece; Marja-Leena Ovaskainen, PhD, National Institute for Health and Welfare, Finland; Wen-Harn Pan, PhD, Division of Preventive Medicine and Health Services Research, Institute of Population Health Sciences, National Health Research Institutes, Taiwan; Demosthenes B. Panagiotakos, PhD, Harokopio University, Greece; Gulden A. Pekcan, PhD, Hacettepe University Department of Nutrition and Dietetics, Turkey; Stefka Petrova, MD, PhD,

National Center of Public Health and Analyses, Bulgaria; Noppawan Piaseu, PhD, Mahidol University, Thailand; Christos Pitsavos, MD, Athens University Medical School, Greece; Luz Gladys Posada, RD, MS, Universidad de Antioquia, Colombia; Leanne M. Riley, MSc, WHO, Switzerland; Luz Maria Sánchez-Romero, MD MSc, National Institute of Public Health, Mexico; Rusidah BT. Selamat, MSc, Nutrition Division, Ministry of Health, Malaysia; Sangita Sharma; Abla Mehio Sibai, PhD, American University of Beirut Faculty of Health Sciences, Lebanon; Rosely Sichieri, MD, PhD, State University of Rio de Janeiro, Brazil; Chansimaly Simmala, MD, Institut of Tropical Medecin, Laos; Laufey Steingrimsdottir, PhD, Professor, Iceland; Gillian Swan; Elżbieta Halina. Sygnowska, MSc PhD, National Institute of Cardiology, Poland; Lucjan Szponar, MD; PhD, National Food and Nutrition Institute, Poland; Heli Tapanainen, MSc, National Institute for Health and Welfare, Finland; Robert Templeton; Anastasia Thanopoulou, MD, PhD, Diabetes Center, 2nd Department of Internal Medicine, National University of Athens, Hippokration General Hospital, Greece; Holmfridur Thorgeirsdóttir, MSc, Directorate of Health, Iceland; Inga Thorsdottir; Antonia Trichopoulou, MD, Hellenic Health Foundation, Greece; Shoichiro Tsugane, MD, PhD, National Cancer Center, Japan; Aida Turrini, MD, National Research Institute on Food and Nutrition, Italy; Sirje Vaask, PhD, Tallinn University of Technology, Estonia; Coline van Oosterhout, National Institute for Public Health and the Environment, Netherlands; J Lennert Veerman, PhD, The University of Queensland, Australia; Nowak Verena; Anna Waskiewicz, MSc, PhD., Institute of Cardiology, Department of Cardiovascular Diseases Epidemiology, Prevention and Health Promotion, Poland; Sahar Zaghloul, PhD., National Nutrition Institute, Egypt; Gábor Zajkás, MD, National Institute of Food and Nutrition Sciences, Hungary.

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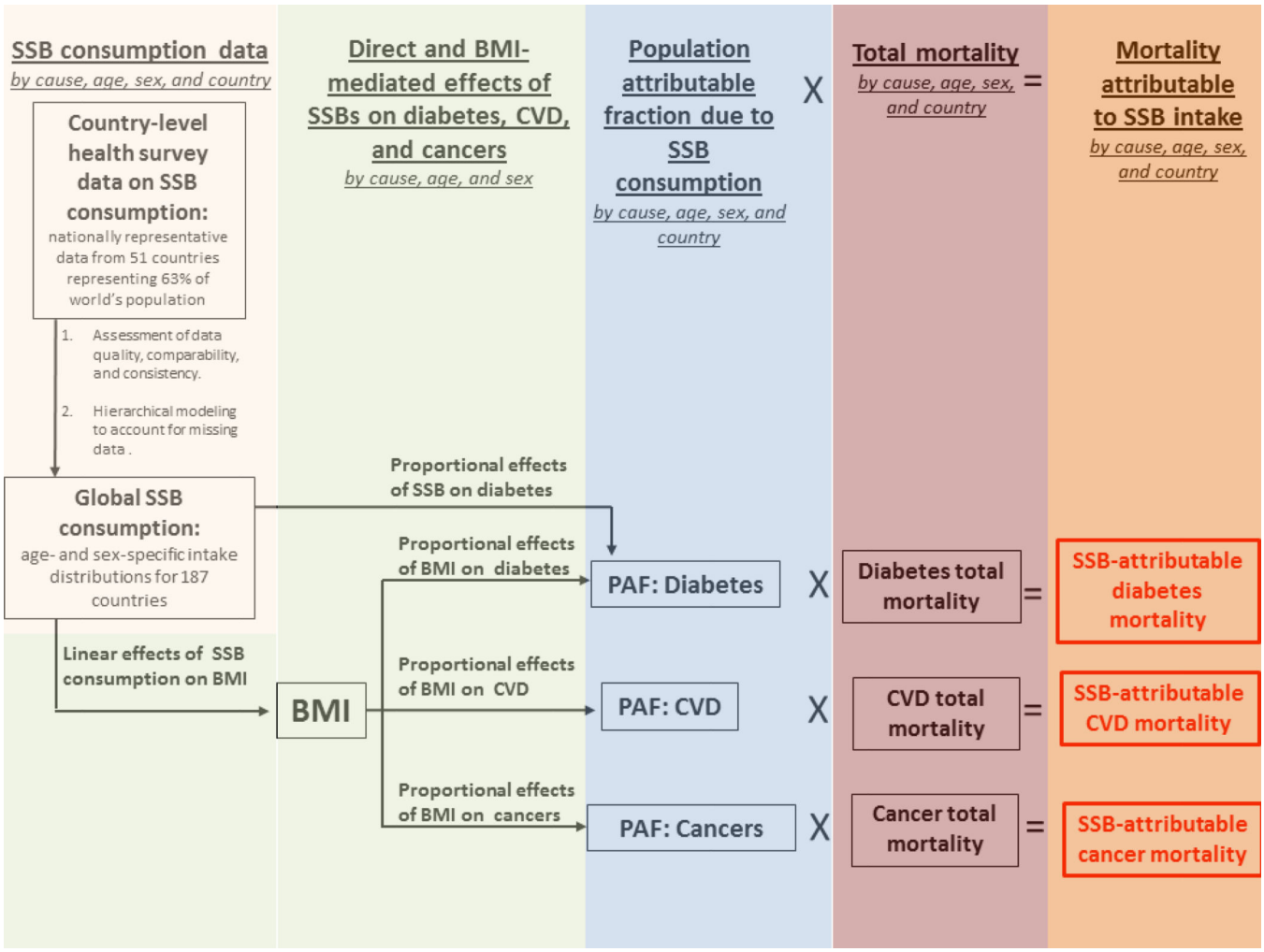

Figure 1.
Schematic diagram of the relationships between data sources used in the comparative risk assessment modeling framework on which this analysis is based.

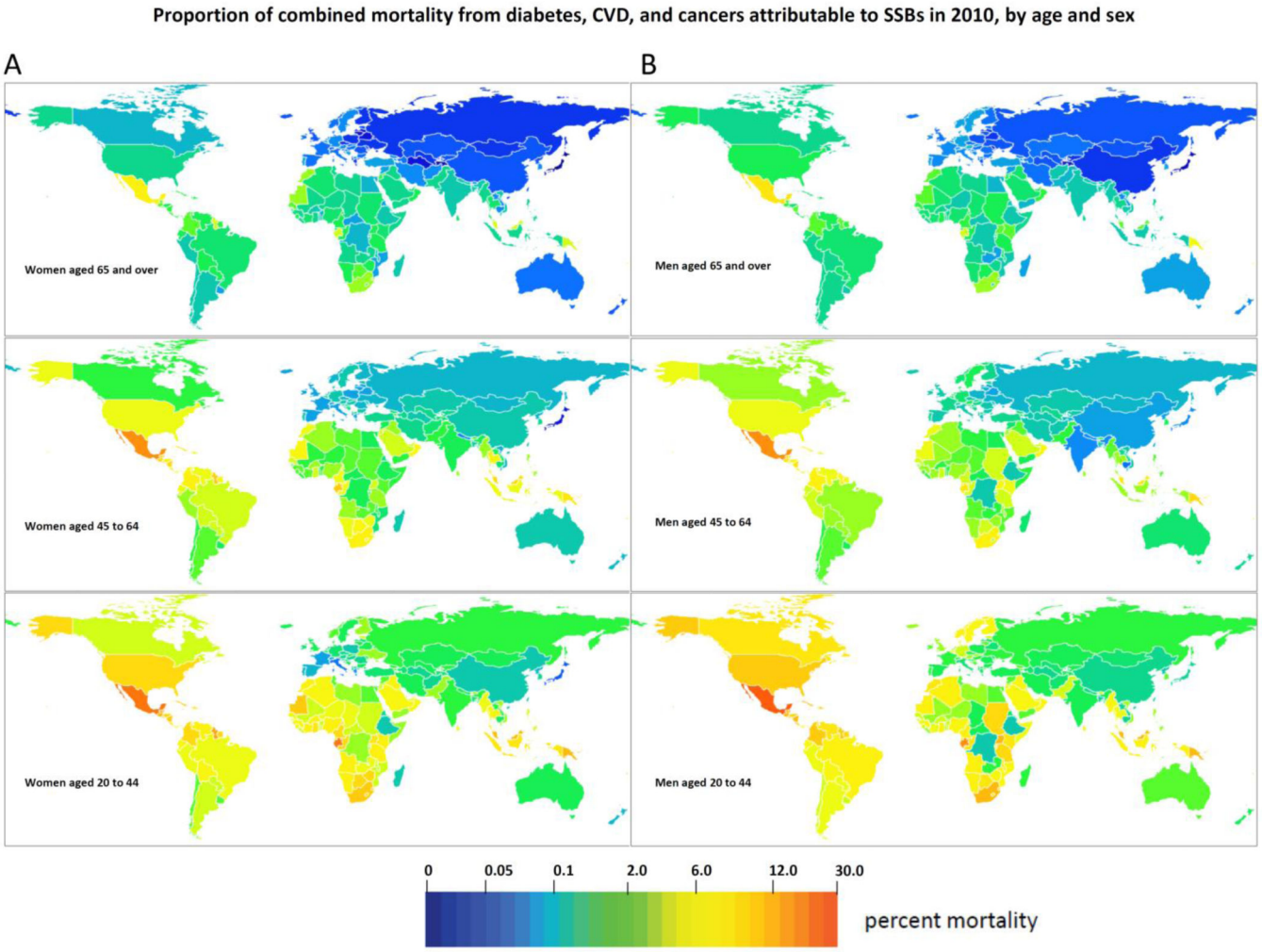

Figure 2.

Proportion* of combined mortality from diabetes, CVD, and cancers that is attributable to SSBs in 2010 in three age strata for A) women, and B) men. The color scale of each map indicates the proportional mortality for the given age-sex stratum in each country of the world, highlighting the inverse age gradient.*Proportional mortality was determined by summing SSB-attributable mortality across the outcomes of interest (diabetes, CVD, and cancers), and then dividing by the total number of deaths caused by these outcome within the population of interest.

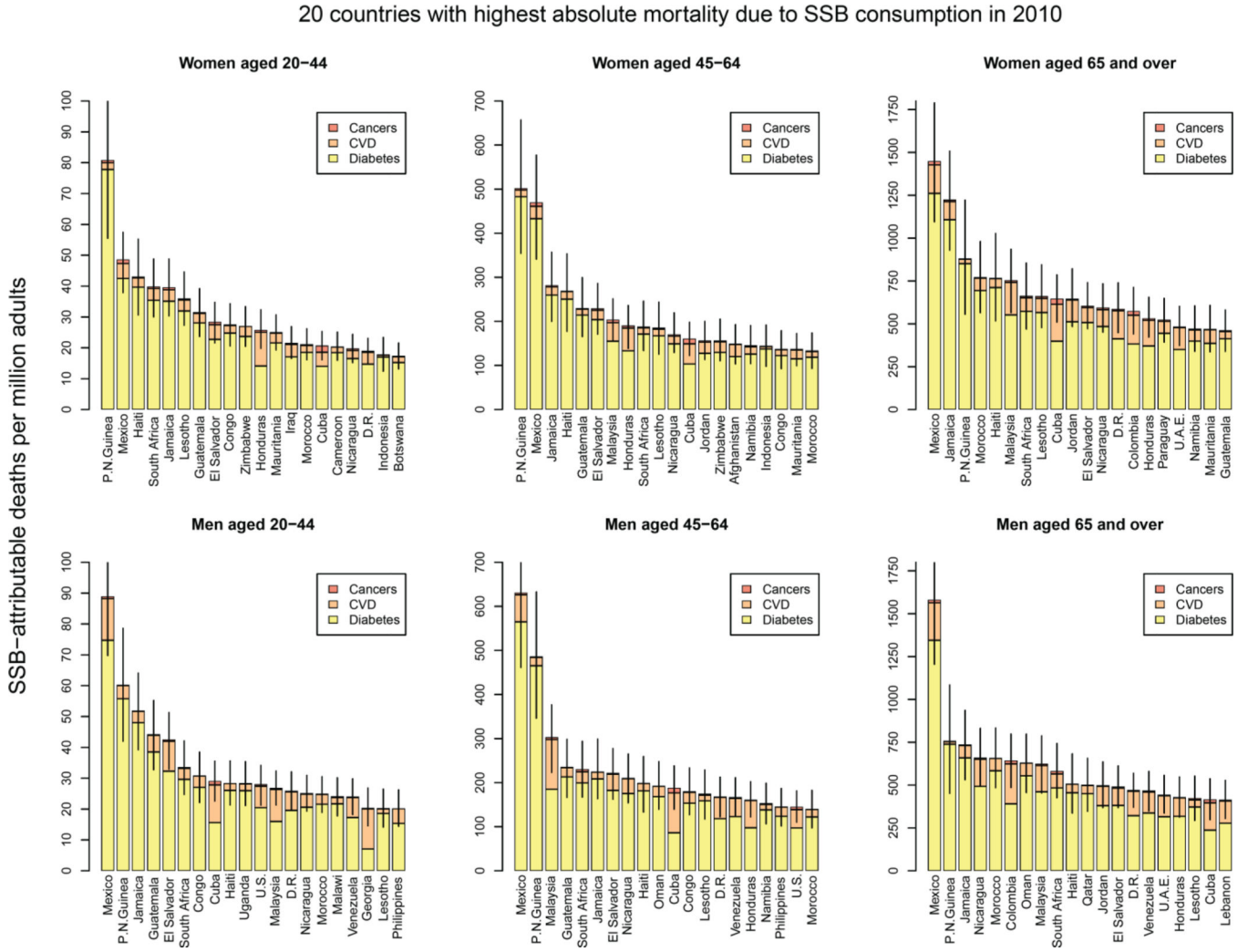

Figure 3.

The twenty countries* with highest absolute SSB-attributable mortality in 2010. Mortality is standardized per million adults**. The 20 countries selected in each age-sex group are those with highest SSB-attributable mortality AND with populations of at least one million. Note that y-axis scales differ in each panel.*The 47 smaller countries that were excluded because their populations were less than 1 million were: Andorra, Antigua and Barbuda, Bahamas, Bahrain, Barbados, Belize, Bhutan, Brunei Darussalam, Cape Verde, China (Macao SAR), Comoros, Cyprus, Djibouti, Dominica, Equatorial Guinea, Fiji, French Polynesia, Gabon, Gambia, Grenada, Guadeloupe, Guinea-Bissau, Guyana, Iceland, Kiribati, Luxembourg, Maldives, Malta, Marshall Islands, Martinique, Mauritius, Micronesia, Montenegro, Netherlands Antilles, Réunion, Saint Lucia, Saint Vincent and the Grenadines, Samoa, São Tomé and Príncipe, Seychelles, Solomon Islands, Suriname, Swaziland, Timor-Leste, Tonga, Trinidad and Tobago, Vanuatu.** Population-standardized absolute mortality was calculated by dividing attributable deaths by the adult population of the entity of interest (i.e. country, region, or age-sex groups within a country or region) and then multiplying by one million.

Table 1

Description of data sources and modeling methods used to estimate adult SSB consumption levels, the effects of SSB intakes on BMI and diabetes, and total cause-specific mortality by country, age, and sex. These represent the primary data used in analyses to compute mortality attributable to SSB consumption by age, sex, and country in 2010.

Data source and description	Data coverage		Statistical methods used for pooling and modeling data from diverse global sources		
			Modelling approach	**Covariates**	**Validity**
SSB consumption by country, age, and sex	*Individual-level survey data*	*National food availability data*			
Total consumption of sugar-sweetened beverages containing over 50 kcal/8oz serving, including sodas, fruit drinks, sports/energy drinks, and sweetened iced tea.	A total of 780 age- and sex-specific data points, 88% nationally representative, were collected from 51 countries and represented 63% of the world's adult population. 16% of all data were from multiple dietary recall surveys, 20% of all data were from food-frequency questionnaires, 17% of data were from single dietary recall surveys, and 47% of data were from household availability surveys.	Total annual per-capita sugar availability in each of 187 countries worldwide based on availability of sugar, sugar beet, sugar cane, non-centrifugal sugar, and sugar crops. These data are based on U.N. Food and Agriculture Organization (FAO) food balance sheets which capture a country's net annual food availability, accounting for imports and exports.	DisMod3[a], a Bayesian hierarchical method, was used to pool data from multiple sources and model missing data using informative time-varying covariates, borrowing information across geographical region and time period while also incorporating uncertainty due to measurement error and model specification. Models were fit using a randomized MCMC algorithm based on the Adaptive Metropolis step function.	Both study-specific and national-level covariates were incorporated in the model. Study-level covariates included information on national representativeness of data points, method/metric of data collection, and sex. Country-level information included country, region, and super-region random effects. Other country-level covariates such as gross domestic product were tested but did not improve prediction.	Models were assessed for convergence of MCMC iterations and were validated using goodness-of-fit tests. Final model results were assessed for plausibility by subject-matter experts.
Relative risks by age and sex					
Effects of SSB on diabetes					
Published meta-analyses of 8 prospective cohort studies	Data were from U.S., European, and Asian cohorts including 310,819 particpants and 15,043 cases of type II diabetes.[b]		Systematic review and meta-analysis were used to identify and pool relevant data from cohort studies. Given that the effects of SSB on incidence of diabetes are attenuated with age, we extrapolated the effect estimate into 10-year age groups from age 20–100 using an age pattern derived from the average percent change in relative risk for CVD and	Included studies considered adjustment for potential confounding by age, sex, and various lifestyle factors, such as smoking, alcohol use, and physical activity, as well as various dietary habits. For most a positive association persisted, suggesting an independent	Standard methods of assessing publication bias, such as Begg and Eggers tests and visual inspection of funnel plots indicated no evidence of such bias in this analysis. Cochrane's Q test and the I^2 statistic revealed statistically significant

Data source and description	Data coverage	Statistical methods used for pooling and modeling data from diverse global sources		
		Modelling approach	**Covariates**	**Validity**
		diabetes across four metabolic risk factors. diabetes across four metabolic risk factors.	effect of SSBs on incident diabetes.	heterogeneity, which was reduced in sensitivity analyses excluding smaller studies of shorter duration.
Linear effects of SSB on BMI				
Original meta-analysis of 3 prospective cohort studies (NHS I, NHS II, HPFS)	Data were from U.S. cohorts including 120,877 participants.	The association of change in BMI with change in SSB consumption was assessed using multivariate linear regression accounting for within-person repeated measures. Results across the three cohorts were pooled by an inverse-variance weighted meta-regression as described in earlier work.[c] Separate linear effects were estimated for BMI < 25 and BMI ≥25 since the rate of increase in BMI due to SSB intake varies based on an individual's baseline BMI.	Analyses were adjusted for age, baseline BMI, and changes in other lifestyle behaviors such as diet, smoking, physical activity, alcohol consumption, sleep duration, and TV watching.	Change in SSB consumption resulted in a statistically significant change in BMI across all three cohorts, and the magnitude of change in BMI was consistent across all cohorts. This is the only analysis thus far to examine effects of change in SSB consumption on change in adiposity.
Effects of BMI on CVD and diabetes				
Published pooled analysis of 3 international pooling projects (APCSC, PSC, ERFC)	Data were from East Asian, North American, and European pooling projects comprising a total of 163 cohorts, 2.43 million participants, and 70,000 CVD events.[d]	Relative risks from the pooling projects were interpolated and extrapolated into standard age groups using log-linear models. Age-specific relative risks were pooled using random-effects models. Trends in age-specific relative risks from pooled analyses were compared to trends in original cohort data to ensure validity of pooled results.	Effect modification by race/ethnicity and sex were assessed but were not found to be statistically significant.	Trends in age-specific relative risks from pooled analyses were compared to trends in original cohort data to ensure validity of pooled results. The I^2 test did not reveal significant heterogeneity between studies for any age group.
Effects of BMI on site-specific cancers				
Published meta-analysis of 221 cohort studies.	Data were from North American, East Asian, European, and Australian cohorts with a total of 282,137 incident cases of cancer over 133,000,000 person-years of follow-up.[e]	Systematic review and random-effects meta-analysis	Effect modification by race/ethnicity, sex, and age were assessed for cancers other than breast and ovarian, but were not found to be statistically significant.	Between-study heterogeneity varied by cancer, from low to moderate (0–55%), and there was no evidence of publication bias in inspection of funnel plots.
Cause-specific total mortality by country, age, and sex[f]				
Vital registration with medical certification of cause of death	Data represented 2798 site years from 130 countries	Cause of Death Ensemble Modelling (CODEm), a modeling strategy encompassing four families of statistical models, was used to pools mortality data from diverse sources, aggregate deaths	Covariates were selected from a database of mortality predictors based on the cause of death being modelled. Covariates were tested for predictive ability	Models were validated using out-of-sample predictive validity tests in which 30% of data was witheld from initial model fits. Predicted trends

Data source and description	Data coverage	Statistical methods used for pooling and modeling data from diverse global sources		
		Modelling approach	**Covariates**	**Validity**
Verbal autopsy (sample registration, demographic surveillance sytems)	Data represented 486 site years from 66 countries, 10% nationally representative	hierarchically and capture uncertainty due to model parameter estimation, model specification, and fundamental sources of error.	prior to inclusion in a given model.	were then compared against trends in the existing held-out data.
Cancer registries	Data represented 2715 site-years from 93 countries			
Survey/census data	Data were from 56 national surveys			
Sibling history	Data represented 1557 survey years from 61 countries			
Burial/mortuary data	Data represented 32 site years from 11 countries			
Hospital records	Data represented 21 site-years			
Police records	Data represented 1129 site-years from 122 countries			

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[c] Mozaffarian D, Hao T, Rimm EB, Willett WC, Hu FB. Changes in diet and lifestyle and long-term weight gain in women and men. NEJM, 2011: 364:2392-404.

[d] Singh GM, Danaei G, Farzadfar F, et al. The age-specific quantitative effects of metabolic risk factors on cardiovascular diseases and diabetes: a pooled analysis. PLoS One, 2013; 8:e65174.

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Table 2

Sources and magnitudes of the effects of SSBs on diabetes, SSB on BMI, and BMI on chronic disease outcomes.

Risk factor	Type of effect estimate	Source of effect estimate	Unit of effect estimate	Sex	Effect size by age group						
					25–34	35–44	45–54	55–64	65–74	75–84	85+
SSB-diabetes	relative risk	published meta-analysis of 8 prospective cohort studies[β]	per SSB serving/day	Both	1.41 (1.19, 1.66)	1.39 (1.18, 1.63)	1.32 (1.15, 1.51)	1.26 (1.12, 1.41)	1.21 (1.10, 1.33)	1.16 (1.08, 1.24)	1.08 (1.04, 1.12)
SSB-BMI (for baseline BMI < 25)	linear effect	original meta-analysis of 3 prospective cohort studies[†]	kg/m^2 increase in BMI per SSB serving/day	Both	0.10 (0.05, 0.15)	0.10 (0.05, 0.15)	0.10 (0.05, 0.15)	0.10 (0.05, 0.15)	0.10 (0.05, 0.15)	0.10 (0.05, 0.15)	0.10 (0.05, 0.15)
SSB-BMI (for baseline BMI ≥ 25)	linear effect	original meta-analysis of 3 prospective cohort studies[†]	kg/m^2 increase in BMI per 8 oz SSB serving/day	Both	0.23 (0.14, 0.32)	0.23 (0.14, 0.32)	0.23 (0.14, 0.32)	0.23 (0.14, 0.32)	0.23 (0.14, 0.32)	0.23 (0.14, 0.32)	0.23 (0.14, 0.32)
BMI-ischemic stroke	relative risk	pooled analysis of APCSC, PSC, and ERFC international pooling projects[‡]	per kg/m2 increase in BMI	Both	2.09 (1.81, 2.40)	1.86 (1.67, 2.08)	1.67 (1.53, 1.81)	1.50 (1.40, 1.60)	1.35 (1.28, 1.41)	1.21 (1.16, 1.26)	1.04 (0.96, 1.12)
BMI-ischemic heart disease	relative risk	pooled analysis of APCSC, PSC, and ERFC international pooling projects[‡]	per 5 kg/m2 increase in BMI	Both	1.79 (1.56, 2.06)	1.66 (1.51, 1.84)	1.55 (1.46, 1.64)	1.44 (1.40, 1.48)	1.35 (1.32, 1.38)	1.26 (1.20, 1.32)	1.14 (1.04, 1.26)
BMI-hypertensive heart disease	relative risk	pooled analysis of APCSC, PSC, and ERFC international pooling projects[‡]	per 5 kg/m2 increase in BMI	Both	2.30 (0.66, 7.95)	2.15 (0.80, 5.78)	2.02 (0.97, 4.21)	1.90 (1.17, 3.07)	1.81 (1.45, 2.26)	1.63 (1.53, 1.74)	1.45 (1.05, 2.01)
BMI-diabetes	relative risk	pooled analysis of APCSC, PSC, and ERFC international pooling projects[‡]	per 5 kg/m2 increase in BMI	Both	3.55 (2.41, 5.23)	3.07 (2.28, 4.15)	2.66 (2.15, 3.30)	2.32 (2.04, 2.63)	2.03 (1.95, 2.11)	1.70 (1.61, 1.79)	1.38 (1.23, 1.56)
BMI-breast cancer	relative risk	meta-analysis of 221 cohort studies[§]	per 5 kg/m2 increase in BMI	Female	1.12 (1.08, 1.16)	1.12 (1.08, 1.16)	1.12 (1.08, 1.16)	1.12 (1.08, 1.16)	1.12 (1.08, 1.16)	1.12 (1.08, 1.16)	1.12 (1.08, 1.16)

Risk factor	Type of effect estimate	Source of effect estimate	Unit of effect estimate	Sex	Effect size by age group						
					25–34	35–44	45–54	55–64	65–74	75–84	85+
BMI-colon cancer	relative risk	meta-analysis of 221 cohort studies§	per 5 kg/m2 increase in BMI	Female	1.07 (1.03, 1.12)	1.07 (1.03, 1.12)	1.07 (1.03, 1.12)	1.07 (1.03, 1.12)	1.07 (1.03, 1.12)	1.07 (1.03, 1.12)	1.07 (1.03, 1.12)
				Male	1.20 (1.17, 1.24)	1.20 (1.17, 1.24)	1.20 (1.17, 1.24)	1.20 (1.17, 1.24)	1.20 (1.17, 1.24)	1.20 (1.17, 1.24)	1.20 (1.17, 1.24)
BMI-pancreatic cancer	relative risk	meta-analysis of 221 cohort studies§	per 5 kg/m2 increase in BMI	Female	1.12 (1.03, 1.23)	1.12 (1.03, 1.23)	1.12 (1.03, 1.23)	1.12 (1.03, 1.23)	1.12 (1.03, 1.23)	1.12 (1.03, 1.23)	1.12 (1.03, 1.23)
				Male	1.07 (0.93, 1.23)	1.07 (0.93, 1.23)	1.07 (0.93, 1.23)	1.07 (0.93, 1.23)	1.07 (0.93, 1.23)	1.07 (0.93, 1.23)	1.07 (0.93, 1.23)
BMI-esophageal cancer	relative risk	meta-analysis of 221 cohort studies§	per 5 kg/m2 increase in BMI	Female	1.51 (1.31, 1.74)	1.51 (1.31, 1.74)	1.51 (1.31, 1.74)	1.51 (1.31, 1.74)	1.51 (1.31, 1.74)	1.51 (1.31, 1.74)	1.51 (1.31, 1.74)
				Male	1.52 (1.33, 1.74)	1.52 (1.33, 1.74)	1.52 (1.33, 1.74)	1.52 (1.33, 1.74)	1.52 (1.33, 1.74)	1.52 (1.33, 1.74)	1.52 (1.33, 1.74)
BMI-uterine cancer	relative risk	meta-analysis of 221 cohort studies§	per 5 kg/m2 increase in BMI	Female	1.59 (1.5, 1.68)	1.59 (1.5, 1.68)	1.59 (1.5, 1.68)	1.59 (1.5, 1.68)	1.59 (1.5, 1.68)	1.59 (1.5, 1.68)	1.59 (1.5, 1.68)
BMI-kidney cancer	relative risk	meta-analysis of 221 cohort studies§	per 5 kg/m2 increase in BMI	Female	1.34 (1.25, 1.43)	1.34 (1.25, 1.43)	1.34 (1.25, 1.43)	1.34 (1.25, 1.43)	1.34 (1.25, 1.43)	1.34 (1.25, 1.43)	1.34 (1.25, 1.43)
				Male	1.24 (1.15, 1.34)	1.24 (1.15, 1.34)	1.24 (1.15, 1.34)	1.24 (1.15, 1.34)	1.24 (1.15, 1.34)	1.24 (1.15, 1.34)	1.24 (1.15, 1.34)
BMI-gall bladder cancer	relative risk	meta-analysis of 221 cohort studies§	per 5 kg/m2 increase in BMI	Female	1.59 (1.02, 2.47)	1.59 (1.02, 2.47)	1.59 (1.02, 2.47)	1.59 (1.02, 2.47)	1.59 (1.02, 2.47)	1.59 (1.02, 2.47)	1.59 (1.02, 2.47)
				Male	1.09 (0.98, 1.2)	1.09 (0.98, 1.2)	1.09 (0.98, 1.2)	1.09 (0.98, 1.2)	1.09 (0.98, 1.2)	1.09 (0.98, 1.2)	1.09 (0.98,1.2)

References:

β Malik VS, Popkin BM, Bray GA, Despres JP, Hu FB. Sugar-sweetened beverages, obesity, type 2 diabetes mellitus, and cardiovascular disease risk. Circulation, 2010;121:1356–64.; A meta-analysis of 8 prospective cohorts (310,819 participants, 15,043 incident cases of diabetes), comparing the highest (1–2 servings/d) vs. lowest (<1 serving/mo) category of intake. Three cohorts included adjustment for BMI, most appropriate for our modeling of direct (non-obesity mediated) effects; but these also adjusted for total energy intake, which could result in underestimation of true effects. A more recent meta-analysis of 6 cohorts, published after finalization of our dietary RRs, reported a similar pooled dose-response association per daily SSB serving of 1.20 (95% CI: 1.12, 1.29)[30]

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‡ Singh GM, Danaei G, Farzadfar F, et al. The age-specific quantitative effects of metabolic risk factors on cardiovascular diseases and diabetes: a pooled analysis. PLoS One, 2013, 8:e65174.

§Renehan AG, Tyson M, Egger M, Heller RF, Zwahlen M. Body-mass index and incidence of cancer: a systematic review and meta-analysis of prospective observational studies. Lancet, 2008;371:569-78

Table 3

Global and regional deaths related to SSB consumption in 2010.

	Population characteristics			Number of deaths attributable to SSBs (95% UI)				Deaths per million adults attributable to SSBs (95% UI)				Proportion of deaths attributable to SSBs (95% UI)			
	Population (millions)	Mean SSB intake (servings/ day)	Mean BMI (kg/m^2)	CVD‡	Diabetes§	Cancers$^{\beta}$	Total†	CVD‡	Diabetes§	Cancers$^{\beta}$	Total†	CVD‡	Diabetes§	Cancers$^{\beta}$	Total†
Globe															
Women															
Ages 20 to 44	987	0.8 (0.3, 1.3)	25 (23, 26)	1299 (891, 1725)	7760 (7152, 8337)	268 (186, 351)	9327 (8392, 10254)	1 (0, 2)	8 (7, 8)	0 (0, 0)	9 (9, 10)	1.3 (0.9, 1.7)	14.2 (13.1, 15.3)	0.3 (0.2, 0.4)	4.0 (3.6, 4.4)
Ages 45 to 64	654	0.4 (0.2, 0.6)	27 (25, 29)	4764 (3229, 6342)	27473 (25067, 29900)	1154 (778, 1555)	33391 (29786, 37045)	7 (5, 10)	42 (38, 46)	2 (1, 3)	51 (46, 57)	0.8 (0.5, 1.0)	8.5 (7.7, 9.2)	0.3 (0.2, 0.4)	2.6 (2.3, 2.9)
Ages 65 and older	293	0.3 (0.1, 0.5)	26 (23, 29)	13739 (8905, 19263)	33385 (30527, 36169)	1854 (1204, 2537)	48978 (41292, 56966)	47 (30, 66)	114 (104, 124)	6 (4, 9)	167 (141, 195)	0.3 (0.2, 0.4)	3.4 (3.1, 3.7)	0.2 (0.2, 0.3)	0.8 (0.6, 0.9)
Women overall	1930	0.5 (0.2, 0.8)	26 (24, 28)	19802 (13133, 27332)	68618 (64410, 72881)	3276 (2160, 4427)	91695 (80923, 103015)	10 (7, 14)	35 (33, 38)	2 (1, 3)	47 (42, 53)	0.4 (0.2, 0.5)	5.1 (4.7, 5.4)	0.3 (0.2, 0.4)	1.2 (1.0, 1.3)
Men															
Ages 20 to 44	1020	0.9 (0.4, 1.4)	24 (23, 26)	3045 (2071, 4043)	10291 (9426, 11115)	189 (131, 251)	13525 (11887, 15214)	3 (2, 4)	10 (9, 11)	0 (0, 0)	13 (12, 15)	1.3 (0.9, 1.7)	13.5 (12.4, 14.6)	0.3 (0.2, 0.4)	3.8 (3.4, 4.3)
Ages 45 to 64	645	0.4 (0.2, 0.7)	26 (24, 27)	9846 (6499, 13274)	28713 (26343, 31181)	1221 (839, 1626)	39780 (34247, 45183)	15 (10, 21)	45 (41, 48)	2 (1, 3)	62 (53, 70)	0.7 (0.5, 1.0)	7.9 (7.2, 8.6)	0.3 (0.2, 0.4)	2.0 (1.7, 2.2)
Ages 65 and older	231	0.3 (0.1, 0.5)	25 (23, 27)	12027 (7851, 16371)	25159 (23081, 27343)	1749 (1191, 2318)	38935 (32988, 45331)	52 (34, 71)	109 (100, 118)	8 (5, 10)	168 (143, 196)	0.3 (0.2, 0.4)	3.5 (3.2, 3.8)	0.2 (0.1, 0.3)	0.8 (0.6, 0.9)
Men overall	1890	0.6 (0.2, 0.9)	25 (23, 27)	24918 (16357, 33582)	64163 (60411, 67903)	3159 (2170, 4198)	92240 (80161, 105248)	13 (9, 18)	34 (32, 36)	2 (1, 3)	49 (42, 56)	0.5 (0.3, 0.6)	5.5 (5.2, 5.8)	0.2 (0.2, 0.3)	1.2 (1.1, 1.4)
Both sexes overall	3830	0.5 (0.2, 0.9)	25 (23, 27)	44680 (29087, 60715)	132652 (125924, 139384)	6449 (4333, 8637)	183781 (160625, 208002)	12 (8, 16)	35 (33, 36)	2 (1, 3)	48 (42, 54)	0.4 (0.3, 0.6)	5.3 (5.0, 5.5)	0.3 (0.2, 0.3)	1.2 (1.0, 1.3)
Country Income level															
High income	763	0.5 (0.3, 0.6)	27 (25, 28)	14034 (8571, 20249)	27812 (24197, 31548)	3056 (1897, 4279)	44901 (34663, 56077)	18 (11, 27)	36 (32, 41)	4 (2, 6)	59 (45, 73)	0.5 (0.3, 0.8)	5.8 (5.3, 6.3)	0.3 (0.2, 0.4)	1.1 (0.9, 1.3)
Upper-middle income	1530	0.7 (0.3, 1.1)	26 (24, 28)	20727 (13597, 28337)	60118 (54138, 66061)	2606 (1734, 3516)	83451 (69469, 97914)	14 (9, 19)	39 (35, 43)	2 (1, 3)	55 (45, 65)	0.5 (0.3, 0.6)	7.2 (6.6, 7.7)	0.3 (0.2, 0.3)	1.3 (1.2, 1.5)
Lower-middle income	1210	0.6 (0.2, 1.0)	25 (23, 27)	8939 (576, 1490)	36886 (33412, 40536)	650 (424, 896)	46475 (34412, 42921)	1 (0, 2)	30 (28, 34)	1 (0, 2)	38 (28, 35)	0.3 (0.2, 0.4)	3.8 (3.5, 4.1)	0.2 (0.1, 0.2)	1.1 (1.0, 1.2)
Low income	323	0.3 (0.1, 0.5)	22 (20, 24)	1021 (576, 1490)	7965 (7395, 8532)	124 (67, 183)	9109 (8039, 10205)	3 (2, 5)	25 (23, 26)	0 (0, 0)	28 (25, 32)	0.2 (0.1, 0.3)	3.5 (3.3, 3.7)	0.1 (0.1, 0.2)	1.2 (1.1, 1.3)

	Population characteristics			Number of deaths attributable to SSBs (95% UI)				Deaths per million adults attributable to SSBs (95% UI)				Proportion of deaths attributable to SSBs (95% UI)			
	Population (millions)	Mean SSB intake (servings/ day)	Mean BMI (kg/m^2)	CVD‡	Diabetes§	Cancersβ	Total†	CVD‡	Diabetes§	Cancersβ	Total†	CVD‡	Diabetes§	Cancersβ	Total†
Australia and New Zealand															
Women															
Ages 20 to 44	3.6	0.4 (0.2, 0.6)	26 (25, 27)	1 (1, 2)	6 (5, 8)	1 (1, 2)	9 (7, 11)	0 (0, 1)	2 (1, 2)	0 (0, 0)	2 (1, 3)	1.5 (0.9, 2.1)	12.1 (9.0, 15.2)	0.3 (0.2, 0.4)	1.6 (1.2, 2.0)
Ages 45 to 64	3.35	0.2 (0.1, 0.3)	29 (28, 30)	7 (4, 10)	26 (19, 34)	7 (4, 10)	40 (30, 51)	2 (1, 3)	8 (6, 10)	2 (1, 3)	12 (9, 15)	0.8 (0.5, 1.2)	6.7 (4.9, 8.8)	0.2 (0.1, 0.4)	1.0 (0.7, 1.2)
Ages 65 and older	1.94	0.1 (0.1, 0.2)	28 (27, 29)	70 (38, 110)	107 (81, 132)	18 (11, 25)	195 (146, 253)	36 (19, 57)	55 (42, 68)	9 (5, 13)	100 (75, 130)	0.3 (0.1, 0.4)	2.6 (2.0, 3.3)	0.2 (0.1, 0.3)	0.5 (0.4, 0.7)
Overall	8.89	0.2 (0.1, 0.4)	27 (26, 28)	79 (45, 122)	139 (111, 168)	26 (15, 36)	244 (189, 310)	9 (5, 14)	16 (13, 19)	3 (2, 4)	27 (21, 35)	0.3 (0.2, 0.5)	3.1 (2.5, 3.8)	0.2 (0.1, 0.3)	0.6 (0.4, 0.7)
Men															
Ages 20 to 44	3.57	0.4 (0.2, 0.6)	27 (26, 28)	5 (3, 7)	10 (7, 13)	1 (0, 1)	16 (12, 20)	1 (0, 2)	3 (2, 4)	0 (0, 0)	5 (3, 6)	1.5 (0.9, 2.1)	12.1 (8.5, 15.6)	0.3 (0.2, 0.4)	2.7 (2.0, 3.4)
Ages 45 to 64	3.28	0.2 (0.1, 0.3)	29 (28, 30)	26 (16, 37)	52 (38, 66)	8 (5, 11)	86 (65, 107)	8 (5, 11)	16 (12, 20)	2 (1, 3)	26 (20, 33)	0.9 (0.5, 1.2)	6.9 (5.1, 8.7)	0.2 (0.1, 0.3)	1.4 (1.1, 1.8)
Ages 65 and older	1.64	0.1 (0.1, 0.2)	28 (27, 29)	70 (39, 103)	126 (98, 155)	20 (12, 28)	215 (163, 272)	43 (24, 63)	77 (60, 95)	12 (7, 17)	132 (100, 166)	0.3 (0.2, 0.5)	3.1 (2.4, 3.8)	0.2 (0.1, 0.3)	0.7 (0.5, 0.9)
Overall	8.48	0.2 (0.1, 0.4)	28 (27, 28)	101 (61, 146)	188 (155, 222)	29 (17, 40)	317 (249, 389)	12 (7, 17)	22 (18, 26)	3 (2, 5)	37 (29, 46)	0.4 (0.2, 0.6)	3.8 (3.2, 4.5)	0.2 (0.1, 0.3)	0.8 (0.7, 1.0)
Both sexes overall	17.4	0.2 (0.1, 0.4)	28 (27, 28)	180 (107, 263)	327 (280, 371)	54 (33, 75)	561 (444, 694)	10 (6, 15)	19 (16, 21)	3 (2, 4)	32 (26, 40)	0.3 (0.2, 0.5)	3.5 (3.0, 4.0)	0.2 (0.1, 0.3)	0.7 (0.5, 0.9)
Canada and U.S.															
Women															
Ages 20 to 44	45	1.6 (1.2, 2.0)	26 (26, 27)	133 (77, 199)	690 (500, 850)	40 (23, 58)	863 (660, 1057)	3 (2, 4)	15 (11, 19)	1 (0, 2)	19 (15, 23)	4.6 (2.7, 6.9)	30.8 (22.4, 38.0)	0.9 (0.5, 1.3)	9.2 (7.1, 11.3)
Ages 45 to 64	46.1	0.8 (0.6, 1.0)	29 (28, 30)	645 (388, 936)	2621 (1921, 3363)	222 (132, 321)	3488 (2605, 4342)	14 (8, 20)	57 (42, 73)	5 (3, 7)	76 (57, 94)	2.1 (1.3, 3.1)	15.6 (11.4, 20.0)	0.6 (0.4, 0.9)	4.2 (3.2, 5.3)
Ages 65 and older	25.6	0.6 (0.4, 0.7)	28 (27, 29)	2531 (1365, 4106)	4729 (3583, 5888)	437 (261, 630)	7698 (5816, 9888)	99 (53, 160)	184 (140, 230)	17 (10, 25)	300 (227, 386)	0.6 (0.3, 1.0)	6.0 (4.5, 7.4)	0.5 (0.3, 0.7)	1.3 (1.0, 1.7)
Overall	117	1.0 (0.8, 1.2)	28 (27, 28)	3310 (1903, 5176)	8040 (6670, 9441)	699 (421, 992)	12049 (9467, 14760)	28 (16, 44)	69 (57, 81)	6 (4, 8)	103 (81, 126)	0.8 (0.4, 1.2)	8.2 (6.8, 9.6)	0.5 (0.3, 0.7)	1.8 (1.4, 2.2)
Men															
Ages 20 to 44	46.3	1.8 (1.3, 2.2)	27 (27, 28)	378 (216, 558)	1116 (850, 1368)	33 (20, 48)	1527 (1170, 1853)	8 (5, 12)	24 (18, 30)	1 (0, 2)	33 (25, 40)	5.0 (2.9, 7.4)	33.1 (25.2, 40.5)	0.9 (0.5, 1.3)	12.3 (9.4, 14.9)

	Population characteristics			Number of deaths attributable to SSBs (95% UI)				Deaths per million adults attributable to SSBs (95% UI)				Proportion of deaths attributable to SSBs (95% UI)			
	Population (millions)	Mean SSB intake (servings/ day)	Mean BMI (kg/m^2)	CVD‡	Diabetes§	Cancersβ	Total†	CVD‡	Diabetes§	Cancersβ	Total†	CVD‡	Diabetes§	Cancersβ	Total†
Ages 45 to 64	44.2	0.9 (0.7, 1.1)	29 (29, 30)	1714 (1035, 2445)	4040 (2899, 5119)	277 (167, 399)	6031 (4617, 7501)	39 (23, 55)	91 (66, 116)	6 (4, 9)	136 (105, 170)	2.3 (1.4, 3.3)	16.9 (12.1, 21.4)	0.7 (0.4, 1.1)	4.9 (3.7, 6.1)
Ages 65 and older	19.4	0.6 (0.5, 0.8)	28 (27, 28)	2365 (1334, 3569)	4541 (3380, 5693)	433 (257, 618)	7339 (5521, 9245)	122 (69, 184)	235 (175, 294)	22 (13, 32)	379 (285, 478)	0.8 (0.5, 1.2)	7.1 (5.3, 8.9)	0.5 (0.3, 0.7)	1.7 (1.3, 2.2)
Overall	110	1.1 (0.8, 1.4)	28 (27, 29)	4457 (2613, 6373)	9697 (8072, 11325)	743 (447, 1041)	14897 (11858, 18080)	41 (24, 58)	88 (74, 103)	7 (4, 9)	136 (108, 165)	1.2 (0.7, 1.7)	10.6 (8.8, 12.4)	0.6 (0.3, 0.8)	2.7 (2.1, 3.2)
Both sexes overall	226	1.1 (0.8, 1.3)	28 (27, 28)	7767 (4667, 11383)	17736 (15540, 20035)	1443 (870, 2035)	26946 (21785, 32008)	34 (21, 50)	78 (69, 88)	6 (4, 9)	119 (96, 141)	1.0 (0.6, 1.4)	9.4 (8.2, 10.6)	0.5 (0.3, 0.8)	2.2 (1.8, 2.6)
East/Central Eurasia															
Women															
Ages 20 to 44	60.4	0.4 (0.2, 0.6)	24 (22, 26)	109 (68, 152)	212 (184, 240)	17 (11, 24)	338 (279, 405)	2 (1, 3)	4 (3, 4)	0 (0, 0)	6 (5, 7)	1.3 (0.8, 1.8)	11.0 (9.6, 12.4)	0.3 (0.2, 0.4)	2.0 (1.7, 2.4)
Ages 45 to 64	55.5	0.2 (0.1, 0.3)	28 (26, 30)	858 (524, 1204)	749 (639, 855)	136 (81, 193)	1743 (1304, 2192)	15 (9, 22)	14 (12, 15)	2 (1, 3)	31 (24, 40)	0.9 (0.5, 1.2)	6.3 (5.3, 7.2)	0.3 (0.2, 0.4)	1.0 (0.7, 1.3)
Ages 65 and older	32.5	0.1 (0.1, 0.2)	28 (24, 31)	4093 (2397, 5798)	1301 (1154, 1451)	252 (152, 358)	5647 (3802, 7521)	126 (74, 178)	40 (36, 45)	8 (5, 11)	174 (117, 231)	0.3 (0.2, 0.5)	3.4 (3.0, 3.7)	0.2 (0.1, 0.3)	0.4 (0.3, 0.5)
Overall	148	0.2 (0.1, 0.4)	26 (24, 29)	5061 (2994, 7115)	2262 (2066, 2472)	405 (244, 574)	7728 (5397, 10114)	34 (20, 48)	15 (14, 17)	3 (2, 4)	52 (36, 68)	0.4 (0.2, 0.5)	4.3 (3.9, 4.7)	0.2 (0.1, 0.3)	0.5 (0.3, 0.6)
Men															
Ages 20 to 44	59.7	0.4 (0.2, 0.6)	25 (24, 27)	496 (305, 697)	340 (299, 381)	15 (9, 20)	850 (642, 1081)	8 (5, 12)	6 (5, 6)	0 (0, 0)	14 (11, 18)	1.5 (0.9, 2.1)	11.5 (10.1, 12.9)	0.3 (0.2, 0.4)	2.0 (1.5, 2.6)
Ages 45 to 64	47.3	0.2 (0.1, 0.3)	27 (25, 29)	2410 (1459, 3389)	846 (752, 942)	161 (98, 228)	3417 (2352, 4535)	51 (31, 72)	18 (16, 20)	3 (2, 5)	72 (50, 96)	0.9 (0.5, 1.2)	6.4 (5.7, 7.1)	0.3 (0.2, 0.4)	1.0 (0.7, 1.3)
Ages 65 and older	17.6	0.1 (0.1, 0.2)	26 (24, 29)	3009 (1842, 4216)	759 (686, 834)	200 (122, 278)	3969 (2676, 5319)	171 (105, 240)	43 (39, 47)	11 (7, 16)	226 (152, 302)	0.4 (0.2, 0.6)	3.6 (3.3, 4.0)	0.2 (0.1, 0.2)	0.5 (0.3, 0.6)
Overall	125	0.3 (0.1, 0.4)	26 (24, 28)	5915 (3625, 8342)	1945 (1798, 2093)	376 (231, 527)	8236 (5675, 10849)	47 (29, 67)	16 (14, 17)	3 (2, 4)	66 (46, 87)	0.6 (0.3, 0.8)	5.2 (4.8, 5.6)	0.2 (0.1, 0.3)	0.6 (0.4, 0.9)
Both sexes overall	273	0.2 (0.1, 0.4)	26 (24, 29)	10976 (6591, 15346)	4206 (3913, 4508)	781 (475, 1098)	15964 (11097, 20903)	40 (24, 56)	15 (14, 17)	3 (2, 4)	58 (41, 77)	0.5 (0.3, 0.6)	4.7 (4.4, 5.0)	0.2 (0.1, 0.3)	0.5 (0.4, 0.7)
East and Southeast Asia															
Women															
Ages 20 to 44	341	0.9 (0.4, 1.3)	25 (23, 26)	162 (96, 234)	1849 (1549, 2151)	44 (27, 62)	2055 (1735, 2378)	0 (0, 0)	5 (4, 6)	0 (0, 0)	6 (5, 7)	0.8 (0.5, 1.1)	11.8 (9.8, 13.7)	0.2 (0.1, 0.2)	3.2 (2.7, 3.7)

	Population characteristics			Number of deaths attributable to SSBs (95% UI)				Deaths per million adults attributable to SSBs (95% UI)				Proportion of deaths attributable to SSBs (95% UI)			
	Population (millions)	Mean SSB intake (servings/ day)	Mean BMI (kg/m^2)	CVD‡	Diabetes§	Cancers$^{\beta}$	Total†	CVD‡	Diabetes§	Cancers$^{\beta}$	Total†	CVD‡	Diabetes§	Cancers$^{\beta}$	Total†
Ages 45 to 64	238	0.4 (0.2, 0.7)	27 (25, 28)	679 (436, 931)	7484 (6267, 8654)	194 (116, 278)	8356 (7044, 9610)	3 (2, 4)	31 (26, 36)	1 (0, 2)	35 (30, 40)	0.5 (0.3, 0.6)	6.7 (5.6, 7.8)	0.1 (0.1, 0.2)	2.3 (1.9, 2.6)
Ages 65 and older	101	0.3 (0.1, 0.5)	25 (22, 27)	1565 (833, 2348)	8651 (7223, 10117)	275 (143, 414)	10491 (8745, 12412)	16 (8, 23)	86 (72, 100)	3 (1, 4)	104 (87, 123)	0.1 (0.1, 0.2)	2.9 (2.4, 3.4)	0.1 (0.1, 0.2)	0.6 (0.5, 0.7)
Overall	680	0.5 (0.2, 0.9)	25 (23, 27)	2406 (1380, 3492)	17983 (16005, 19920)	513 (285, 752)	20902 (18392, 23602)	4 (2, 5)	26 (24, 29)	1 (0, 2)	31 (27, 35)	0.2 (0.1, 0.3)	4.2 (3.7, 4.7)	0.1 (0.1, 0.2)	1.0 (0.9, 1.1)
Men															
Ages 20 to 44	352	0.9 (0.4, 1.4)	24 (23, 25)	424 (244, 613)	2337 (1966, 2717)	38 (20, 56)	2799 (2344, 3253)	1 (0, 2)	7 (6, 8)	0 (0, 0)	8 (7, 9)	0.7 (0.4, 1.1)	11.1 (9.4, 13.0)	0.1 (0.1, 0.2)	2.9 (2.4, 3.4)
Ages 45 to 64	243	0.5 (0.2, 0.7)	25 (24, 27)	1448 (890, 2028)	7275 (6250, 8331)	296 (161, 449)	9019 (7723, 10305)	6 (4, 8)	30 (26, 34)	1 (0, 2)	37 (32, 42)	0.4 (0.3, 0.6)	6.8 (5.9, 7.8)	0.2 (0.1, 0.3)	1.6 (1.3, 1.8)
Ages 65 and older	84.6	0.3 (0.2, 0.5)	24 (22, 26)	1528 (793, 2315)	4982 (4132, 5857)	385 (194, 579)	6895 (5496, 8280)	18 (9, 27)	59 (49, 69)	5 (2, 7)	82 (65, 98)	0.1 (0.1, 0.2)	2.5 (2.0, 2.9)	0.1 (0.1, 0.2)	0.4 (0.4, 0.5)
Overall	680	0.6 (0.3, 0.9)	24 (23, 26)	3400 (1920, 4949)	14594 (13237, 15992)	719 (384, 1073)	18713 (16178, 21266)	5 (3, 7)	21 (19, 24)	1 (0, 2)	28 (24, 31)	0.2 (0.1, 0.3)	4.4 (4.0, 4.9)	0.1 (0.1, 0.2)	0.8 (0.7, 0.9)
Both sexes overall	1360	0.6 (0.3, 0.9)	25 (23, 27)	5807 (3314, 8421)	32577 (30041, 35102)	1232 (670, 1807)	39615 (35154, 44109)	4 (2, 6)	24 (22, 26)	1 (0, 2)	29 (26, 32)	0.2 (0.1, 0.3)	4.3 (4.0, 4.6)	0.1 (0.1, 0.2)	0.9 (0.8, 1.0)
Latin America and Caribbean															
Women															
Ages 20 to 44	88.1	1.7 (0.7, 2.7)	26 (25, 28)	290 (182, 402)	1760 (1513, 1958)	71 (43, 100)	2121 (1810, 2419)	3 (2, 5)	20 (17, 22)	1 (0, 2)	24 (21, 27)	3.9 (2.4, 5.4)	30.4 (26.2, 33.9)	1.0 (0.6, 1.4)	10.9 (9.3, 12.4)
Ages 45 to 64	54.2	0.8 (0.3, 1.4)	29 (27, 31)	947 (572, 1313)	7409 (6092, 8614)	249 (147, 354)	8605 (7111, 10031)	17 (11, 24)	137 (112, 159)	5 (3, 7)	159 (131, 185)	2.0 (1.2, 2.8)	17.1 (14.1, 19.9)	0.8 (0.5, 1.1)	7.7 (6.4, 9.0)
Ages 65 and older	22.7	0.6 (0.3, 1.0)	27 (24, 30)	2214 (1379, 3141)	9992 (8510, 11441)	336 (205, 468)	12541 (10455, 14628)	98 (61, 138)	440 (375, 504)	15 (9, 21)	552 (460, 644)	0.8 (0.5, 1.1)	7.3 (6.2, 8.4)	0.6 (0.4, 0.8)	2.7 (2.3, 3.2)
Overall	165	1.1 (0.4, 1.7)	27 (25, 30)	3452 (2120, 4845)	19161 (16982, 21159)	655 (403, 919)	23268 (19980, 26370)	21 (13, 29)	116 (103, 128)	4 (2, 6)	141 (121, 160)	1.0 (0.6, 1.4)	10.3 (9.2, 11.4)	0.7 (0.4, 1.0)	3.9 (3.4, 4.5)
Men															
Ages 20 to 44	85.6	1.8 (0.7, 2.9)	25 (24, 27)	648 (408, 905)	2650 (2255, 2957)	42 (25, 59)	3340 (2813, 3868)	8 (5, 11)	31 (26, 35)	0 (0, 2)	39 (33, 45)	4.4 (2.8, 6.1)	33.4 (28.4, 37.2)	0.7 (0.4, 1.0)	13.9 (11.7, 16.1)
Ages 45 to 64	50.3	0.9 (0.3, 1.5)	27 (25, 28)	1798 (1088, 2552)	8569 (6955, 9929)	181 (111, 254)	10549 (8476, 12410)	36 (22, 51)	170 (138, 197)	4 (2, 5)	210 (169, 247)	2.1 (1.3, 3.0)	18.5 (15.0, 21.4)	0.7 (0.4, 1.0)	7.5 (6.0, 8.8)
Ages 65 and older	17.9	0.7 (0.3, 1.1)	25 (23, 27)	2116 (1349, 2919)	8092 (6758, 9376)	221 (145, 305)	10429 (8687, 12186)	118 (75, 163)	452 (377, 524)	12 (8, 17)	582 (485, 681)	0.8 (0.5, 1.1)	8.5 (7.1, 9.9)	0.4 (0.3, 0.6)	2.7 (2.3, 3.2)

	Population characteristics			Number of deaths attributable to SSBs (95% UI)				Deaths per million adults attributable to SSBs (95% UI)				Proportion of deaths attributable to SSBs (95% UI)			
	Population (millions)	**Mean SSB intake (servings/ day)**	**Mean BMI (kg/m^2)**	**CVD‡**	**Diabetes§**	**Cancersβ**	**Total†**	**CVD‡**	**Diabetes§**	**Cancersβ**	**Total†**	**CVD‡**	**Diabetes§**	**Cancersβ**	**Total†**
Overall	154	1.2 (0.4, 1.9)	26 (24, 27)	4562 (2872, 6297)	19311 (17115, 21458)	445 (279, 613)	24318 (20736, 27976)	30 (19, 41)	126 (111, 140)	3 (2, 4)	158 (135, 182)	1.2 (0.8, 1.7)	12.9 (11.5, 14.4)	0.5 (0.3, 0.7)	4.4 (3.8, 5.1)
Both sexes overall	319	1.1 (0.4, 1.8)	26 (24, 29)	8013 (4992, 11191)	38472 (35106, 41892)	1100 (682, 1524)	47585 (41061, 53845)	25 (16, 35)	121 (110, 131)	3 (2, 5)	149 (129, 169)	1.1 (0.7, 1.6)	11.5 (10.5, 12.5)	0.6 (0.4, 0.9)	4.2 (3.6, 4.7)
North Africa and Middle East															
Women															
Ages 20 to 44	66.1	0.6 (0.2, 1.1)	27 (26, 28)	234 (142, 330)	515 (456, 570)	27 (16, 38)	776 (651, 926)	4 (2, 5)	8 (7, 9)	0 (0, 1)	12 (10, 14)	2.0 (1.2, 2.8)	14.4 (12.8, 16.0)	0.4 (0.3, 0.6)	3.5 (2.9, 4.1)
Ages 45 to 64	32.8	0.3 (0.1, 0.6)	30 (29, 32)	563 (341, 801)	1363 (1202, 1528)	52 (32, 74)	1979 (1627, 2321)	17 (10, 24)	42 (37, 47)	2 (1, 3)	60 (50, 71)	1.1 (0.7, 1.6)	7.9 (7.0, 8.9)	0.4 (0.2, 0.5)	2.4 (2.0, 2.8)
Ages 65 and older	11.2	0.3 (0.1, 0.4)	28 (26, 31)	995 (600, 1400)	2067 (1811, 2317)	43 (26, 61)	3106 (2518, 3694)	89 (54, 125)	185 (162, 208)	4 (2, 6)	278 (226, 331)	0.5 (0.3, 0.7)	4.0 (3.5, 4.5)	0.3 (0.2, 0.5)	1.2 (1.0, 1.4)
Overall	110	0.4 (0.1, 0.7)	28 (27, 30)	1793 (1087, 2564)	3945 (3585, 4285)	123 (75, 172)	5861 (4840, 6860)	16 (10, 23)	36 (33, 39)	1 (0, 2)	53 (44, 62)	0.7 (0.4, 1.0)	5.4 (4.9, 5.9)	0.4 (0.2, 0.5)	1.6 (1.3, 1.9)
Men															
Ages 20 to 44	71.6	0.7 (0.2, 1.1)	26 (25, 27)	496 (308, 693)	636 (567, 701)	14 (9, 19)	1146 (920, 1377)	7 (4, 10)	9 (8, 10)	0 (0, 0)	16 (13, 19)	1.9 (1.2, 2.7)	15.0 (13.4, 16.6)	0.3 (0.2, 0.4)	3.4 (2.8, 4.1)
Ages 45 to 64	33.5	0.3 (0.1, 0.6)	28 (26, 29)	1006 (606, 1409)	1485 (1292, 1672)	32 (19, 45)	2523 (1984, 3053)	30 (18, 42)	44 (39, 50)	1 (1, 1)	75 (59, 91)	1.1 (0.6, 1.5)	8.2 (7.1, 9.2)	0.3 (0.2, 0.4)	2.1 (1.6, 2.5)
Ages 65 and older	9.67	0.3 (0.1, 0.4)	26 (25, 28)	1005 (626, 1400)	1668 (1476, 1854)	34 (22, 46)	2707 (2204, 3249)	104 (65, 145)	172 (153, 192)	3 (2, 5)	280 (228, 336)	0.5 (0.3, 0.7)	4.2 (3.7, 4.7)	0.2 (0.1, 0.3)	1.0 (0.8, 1.2)
Overall	115	0.4 (0.2, 0.7)	27 (25, 28)	2507 (1551, 3490)	3789 (3482, 4110)	79 (50, 110)	6376 (5165, 7616)	22 (14, 30)	33 (30, 36)	1 (0, 2)	56 (45, 66)	0.8 (0.5, 1.0)	6.1 (5.6, 6.6)	0.2 (0.1, 0.3)	1.5 (1.2, 1.8)
Both sexes overall	225	0.4 (0.2, 0.7)	28 (26, 29)	4300 (2640, 5986)	7734 (7190, 8293)	202 (125, 283)	12236 (10059, 14421)	19 (12, 27)	34 (32, 37)	1 (0, 2)	54 (45, 64)	0.7 (0.4, 1.0)	5.7 (5.3, 6.2)	0.3 (0.2, 0.4)	1.6 (1.3, 1.8)
South Asia															
Women															
Ages 20 to 44	224	0.3 (0.1, 0.5)	22 (20, 23)	216 (112, 333)	1260 (942, 1574)	36 (18, 55)	1512 (1145, 1851)	1 (0, 2)	6 (4, 7)	0 (0, 0)	7 (5, 8)	0.6 (0.3, 0.9)	9.0 (6.7, 11.2)	0.2 (0.1, 0.3)	2.2 (1.7, 2.7)
Ages 45 to 64	122	0.2 (0.0, 0.3)	22 (20, 24)	621 (317, 945)	4639 (3378, 5965)	118 (61, 184)	5378 (4016, 6767)	5 (3, 8)	38 (28, 49)	1 (0, 2)	44 (33, 56)	0.4 (0.2, 0.6)	5.8 (4.2, 7.5)	0.2 (0.1, 0.3)	1.8 (1.3, 2.3)
Ages 65 and older	40.1	0.1 (0.0, 0.2)	21 (18, 23)	126 (64, 193)	887 (634, 1160)	12 (6, 19)	1026 (763, 1319)	3 (2, 5)	22 (16, 29)	0 (0, 0)	26 (19, 33)	0.0 (0.0, 0.0)	0.5 (0.4, 0.6)	0.0 (0.0, 0.0)	0.1 (0.1, 0.2)

	Population characteristics			Number of deaths attributable to SSBs (95% UI)				Deaths per million adults attributable to SSBs (95% UI)				Proportion of deaths attributable to SSBs (95% UI)			
	Population (millions)	Mean SSB intake (servings/ day)	Mean BMI (kg/m^2)	CVD‡	Diabetes§	Cancersβ	Total†	CVD‡	Diabetes§	Cancersβ	Total†	CVD‡	Diabetes§	Cancersβ	Total†
Overall	385	0.2 (0.1, 0.3)	21 (19, 23)	963 (498, 1467)	6787 (5461, 8192)	167 (85, 253)	7916 (6458, 9589)	2 (1, 4)	18 (14, 21)	0 (0, 1)	21 (17, 25)	0.1 (0.1, 0.2)	2.5 (2.0, 3.0)	0.1 (0.1, 0.2)	0.7 (0.6, 0.9)
Men															
Ages 20 to 44	238	0.4 (0.1, 0.6)	21 (20, 23)	355 (177, 554)	1570 (1033, 2111)	20 (10, 31)	1945 (1361, 2541)	1 (1, 3)	7 (4, 9)	0 (0, 0)	8 (6, 11)	0.5 (0.2, 0.7)	6.7 (4.4, 9.0)	0.2 (0.1, 0.3)	1.8 (1.3, 2.4)
Ages 45 to 64	126	0.2 (0.0, 0.3)	22 (20, 23)	608 (308, 921)	2858 (1791, 3897)	56 (28, 91)	3522 (2410, 4585)	5 (2, 7)	23 (14, 31)	0 (0, 1)	28 (19, 36)	0.2 (0.1, 0.3)	2.7 (1.7, 3.7)	0.1 (0.1, 0.2)	0.7 (0.5, 0.9)
Ages 65 and older	36.5	0.1 (0.0, 0.2)	21 (19, 23)	89 (47, 136)	590 (379, 806)	6 (3, 10)	685 (463, 914)	2 (1, 4)	16 (10, 22)	0 (0, 0)	19 (13, 25)	0.0 (0.0, 0.0)	0.3 (0.2, 0.5)	0.0 (0.0, 0.0)	0.1 (0.1, 0.1)
Overall	401	0.2 (0.1, 0.4)	21 (19, 23)	1053 (543, 1601)	5017 (3900, 6227)	83 (43, 128)	6152 (4806, 7478)	3 (1, 4)	13 (10, 16)	0 (0, 0)	15 (12, 19)	0.1 (0.1, 0.2)	1.7 (1.3, 2.1)	0.1 (0.0, 0.1)	0.4 (0.3, 0.5)
Both sexes overall	786	0.2 (0.1, 0.4)	21 (19, 23)	2015 (1042, 3051)	11803 (10025, 13663)	250 (130, 376)	14068 (11790, 16456)	3 (1, 4)	15 (13, 17)	0 (0, 0)	18 (15, 21)	0.1 (0.1, 0.2)	2.0 (1.7, 2.4)	0.1 (0.1, 0.2)	0.6 (0.5, 0.6)
Sub-Saharan Africa															
Women															
Ages 20 to 44	102	0.7 (0.2, 1.2)	23 (22, 25)	133 (89, 181)	1399 (1277, 1516)	17 (12, 23)	1549 (1399, 1700)	1 (1, 2)	14 (13, 15)	0 (0, 0)	15 (14, 17)	1.2 (0.8, 1.6)	13.2 (12.1, 14.3)	0.3 (0.2, 0.4)	6.1 (5.5, 6.6)
Ages 45 to 64	46	0.3 (0.1, 0.6)	25 (23, 26)	294 (200, 396)	2818 (2516, 3113)	51 (34, 68)	3163 (2814, 3509)	6 (4, 9)	61 (55, 68)	1 (0, 2)	69 (61, 76)	0.6 (0.4, 0.8)	7.3 (6.5, 8.1)	0.3 (0.2, 0.3)	3.3 (2.9, 3.6)
Ages 65 and older	15.1	0.2 (0.1, 0.4)	23 (20, 26)	420 (285, 565)	3060 (2697, 3398)	42 (29, 56)	3522 (3085, 3938)	28 (19, 37)	203 (179, 225)	3 (2, 4)	233 (204, 261)	0.3 (0.2, 0.4)	3.8 (3.3, 4.2)	0.2 (0.2, 0.3)	1.5 (1.3, 1.7)
Overall	163	0.4 (0.1, 0.8)	24 (21, 26)	847 (573, 1136)	7277 (6761, 7739)	110 (74, 148)	8234 (7514, 8915)	5 (4, 7)	45 (42, 48)	1 (0, 2)	51 (46, 55)	0.4 (0.3, 0.5)	5.6 (5.2, 5.9)	0.2 (0.2, 0.3)	2.3 (2.1, 2.5)
Men															
Ages 20 to 44	103	0.8 (0.2, 1.3)	22 (20, 24)	148 (90, 211)	1453 (1335, 1574)	13 (8, 18)	1613 (1463, 1777)	1 (0, 2)	14 (13, 15)	0 (0, 0)	16 (14, 17)	1.0 (0.6, 1.4)	12.6 (11.6, 13.7)	0.3 (0.2, 0.5)	6.1 (5.5, 6.7)
Ages 45 to 64	42.5	0.4 (0.1, 0.6)	23 (21, 25)	288 (187, 393)	2765 (2486, 3059)	48 (32, 65)	3101 (2767, 3452)	7 (4, 9)	65 (59, 72)	1 (1, 2)	73 (65, 81)	0.5 (0.3, 0.7)	7.1 (6.3, 7.8)	0.4 (0.2, 0.5)	3.2 (2.8, 3.5)
Ages 65 and older	12.3	0.3 (0.1, 0.5)	22 (20, 25)	266 (170, 366)	2215 (2001, 2433)	39 (26, 52)	2519 (2252, 2790)	22 (14, 30)	180 (163, 198)	3 (2, 4)	205 (183, 227)	0.2 (0.2, 0.3)	4.0 (3.6, 4.4)	0.3 (0.2, 0.4)	1.5 (1.4, 1.7)
Overall	158	0.5 (0.1, 0.8)	22 (20, 24)	702 (455, 970)	6432 (6035, 6837)	100 (67, 135)	7234 (6625, 7840)	4 (3, 6)	41 (38, 43)	1 (0, 1)	46 (42, 50)	0.4 (0.2, 0.5)	6.0 (5.7, 6.4)	0.3 (0.2, 0.4)	2.5 (2.3, 2.7)
Both sexes overall	320	0.5 (0.1, 0.8)	23 (21, 25)	1549 (1043, 2096)	13709 (12984, 14396)	210 (141, 281)	15468 (14295, 16610)	5 (3, 7)	43 (41, 45)	1 (0, 2)	48 (45, 52)	0.4 (0.3, 0.5)	5.8 (5.5, 6.1)	0.3 (0.2, 0.4)	2.4 (2.2, 2.6)

	Population characteristics			Number of deaths attributable to SSBs (95% UI)				Deaths per million adults attributable to SSBs (95% UI)				Proportion of deaths attributable to SSBs (95% UI)			
	Population (millions)	Mean SSB intake (servings/ day)	Mean BMI (kg/m^2)	CVD‡	Diabetes§	Cancersβ	Total†	CVD‡	Diabetes§	Cancersβ	Total†	CVD‡	Diabetes§	Cancersβ	Total†
Western Europe															
Women															
Ages 20 to 44	57.2	0.6 (0.4, 0.7)	24 (23, 26)	19 (13, 26)	71 (63, 78)	15 (9, 20)	104 (88, 120)	0 (0, 0)	1 (0, 2)	0 (0, 0)	2 (1, 3)	1.2 (0.8, 1.6)	12.2 (10.8, 13.5)	0.3 (0.2, 0.3)	1.2 (1.0, 1.4)
Ages 45 to 64	55.9	0.2 (0.2, 0.3)	28 (26, 30)	149 (90, 209)	363 (317, 408)	125 (76, 176)	638 (502, 778)	3 (2, 4)	6 (6, 7)	2 (1, 3)	11 (9, 14)	0.9 (0.5, 1.2)	6.6 (5.8, 7.4)	0.3 (0.2, 0.4)	0.9 (0.7, 1.1)
Ages 65 and older	42.9	0.2 (0.1, 0.2)	28 (25, 30)	1724 (1014, 2488)	2591 (2325, 2877)	438 (260, 623)	4752 (3769, 5788)	40 (24, 58)	60 (54, 67)	10 (6, 15)	111 (88, 135)	0.3 (0.2, 0.4)	2.5 (2.2, 2.8)	0.2 (0.1, 0.3)	0.5 (0.4, 0.7)
Overall	156	0.4 (0.3, 0.5)	26 (24, 28)	1892 (1115, 2722)	3025 (2753, 3317)	578 (348, 823)	5494 (4364, 6646)	12 (7, 17)	19 (18, 21)	4 (2, 5)	35 (28, 43)	0.3 (0.2, 0.5)	2.7 (2.5, 3.0)	0.2 (0.1, 0.3)	0.6 (0.5, 0.7)
Men															
Ages 20 to 44	58.4	0.7 (0.5, 0.9)	26 (25, 27)	96 (59, 134)	180 (156, 202)	14 (8, 19)	289 (232, 345)	2 (1, 2)	3 (3, 3)	0 (0, 0)	5 (4, 6)	1.6 (1.0, 2.2)	13.5 (11.8, 15.2)	0.3 (0.2, 0.5)	2.8 (2.3, 3.4)
Ages 45 to 64	54.8	0.3 (0.2, 0.3)	28 (27, 30)	547 (332, 768)	824 (721, 934)	161 (97, 226)	1532 (1191, 1881)	10 (6, 14)	15 (13, 17)	3 (2, 4)	28 (22, 34)	0.9 (0.5, 1.3)	6.9 (6.1, 7.8)	0.3 (0.2, 0.4)	1.3 (1.0, 1.6)
Ages 65 and older	31.9	0.2 (0.1, 0.3)	28 (26, 29)	1579 (941, 2204)	2187 (1939, 2429)	411 (249, 579)	4177 (3222, 5139)	49 (29, 69)	68 (61, 76)	13 (8, 18)	131 (101, 161)	0.4 (0.2, 0.5)	3.1 (2.7, 3.4)	0.2 (0.1, 0.3)	0.7 (0.5, 0.8)
Overall	145	0.4 (0.3, 0.5)	27 (26, 28)	2222 (1337, 3116)	3191 (2871, 3483)	586 (354, 823)	5998 (4645, 7365)	15 (9, 21)	22 (20, 24)	4 (2, 6)	41 (32, 51)	0.4 (0.3, 0.6)	3.8 (3.4, 4.1)	0.2 (0.1, 0.3)	0.8 (0.6, 1.0)
Both sexes overall	301	0.4 (0.3, 0.5)	27 (25, 28)	4114 (2460, 5750)	6215 (5768, 6701)	1163 (703, 1643)	11493 (9044, 13926)	14 (8, 19)	21 (19, 22)	4 (2, 5)	38 (30, 46)	0.4 (0.2, 0.5)	3.2 (3.0, 3.4)	0.2 (0.1, 0.3)	0.7 (0.5, 0.8)

‡CVD deaths include those from ischemic heart disease, ischemic stroke, and hypertensive heart disease.

§Diabetes deaths include deaths from the direct effects of SSBs on diabetes and the effects of SSBs on diabetes that are mediated through BMI.

βCancer deaths include those from breast cancer, uterine cancer, esophageal cancer, colon and rectum cancers, pancreatic cancers, kidney cancers, and gall bladder cancer.

†Total deaths include those from CVD, diabetes, and cancers as described above.

Countries are grouped into regions as follows:
Australia/New Zealand: Australia, New Zealand.
East/Central Eurasia: Albania, Armenia, Azerbaijan, Bulgaria, Bosnia and Herzegovina, Belarus, Czech Republic, Estonia, Georgia, Croatia, Hungary, Kazakhstan, Kyrgyzstan, Lithuania, Latvia, Moldova, Macedonia, Montenegro, Mongolia, Poland, Romania, Russian Federation, Serbia, Slovakia, Slovenia, Tajikistan, Turkmenistan, Ukraine, Uzbekistan
East/Southeast Asia: Brunei Darussalam, China, Fiji, Micronesia, Indonesia, Japan, Cambodia, Kiribati, Republic of Korea, Lao People's Democratic Republic, Sri Lanka, Maldives, Marshall Islands, Myanmar, Malaysia, Philippines, Papua New Guinea, Democratic People's Republic of Korea, Singapore, Solomon Islands, Thailand, Timor-Leste, Tonga, Taiwan, Viet Nam, Vanuatu, Samoa.

Latin America/Caribbean: Argentina, Antigua and Barbuda, Bahamas, Belize, Bolivia, Brazil, Barbados, Chile, Colombia, Costa Rica, Cuba, Dominica, Dominican Republic, Ecuador, Grenada, Guatemala, Guyana, Honduras, Haiti, Jamaica, Saint Lucia, Mexico, Nicaragua, Panama, Peru, Paraguay, El Salvador, Suriname, Trinidad and Tobago, Uruguay, Saint Vincent and the Grenadines, Venezuela.

North Africa/Middle East: United Arab Emirates, Bahrain, Algeria, Egypt, Iran, Iraq, Jordan, Kuwait, Lebanon, Libyan Arab Jamahiriya, Morocco, Oman, Occupied Palestinian Territory, Qatar, Saudi Arabia, Syrian Arab Republic, Tunisia, Turkey, Yemen.

South Asia: Afghanistan, Bangladesh, Bhutan, India, Nepal, Pakistan.

Sub-Saharan Africa: Angola, Burundi, Benin, Burkina Faso, Botswana, Central African Republic, Côte d'Ivoire, Cameroon, Democratic Republic of the Congo, Congo, Comoros, Cape Verde, Djibouti, Eritrea, Ethiopia, Gabon, Ghana, Guinea, Gambia, Guinea-Bissau, Equatorial Guinea, Kenya, Liberia, Lesotho, Madagascar, Mali, Mozambique, Mauritania, Mauritius, Malawi, Namibia, Niger, Nigeria, Rwanda, Sudan, Senegal, Sierra Leone, Somalia, São Tomé and Príncipe, Swaziland, Seychelles, Chad, Togo, United Republic of Tanzania, Uganda, South Africa, Zambia, Zimbabwe.

Western Europe: Andorra, Austria, Belgium, Switzerland, Cyprus, Germany, Denmark, Spain, Finland, France, United Kingdom, Greece, Ireland, Iceland, Israel, Italy, Luxembourg, Malta, Netherlands, Norway, Portugal, Sweden.

Table 4

Global and regional DALYs related to SSB consumption in 2010

	Population characteristics			Number of DALYs attributable to SSBs (95% UI)					DALYs per million adults attributable to SSBs (95% UI)					Percent of DALYs attributable to SSBs (95% UI)			
	Population	Mean SSB intake (servings/ day)	Mean BMI (kg/m^2)	CVD‡	Diabetes§	Cancersβ	Musculo-skeletal¶	Total†	CVD‡	Diabetes§	Cancersβ	Musculo-skeletal¶	Total†	CVD‡	Diabetes§	Cancersβ	Musculo-skeletal¶	Total†
Globe																		
Women																		
Ages 20 to 44	987	0.8 (0.3, 1.3)	24.7 (23.1, 26.3)	294808 (53872, 894390)	372240 (140880, 769120)	34343 (6024, 132271)	33489 (5007, 143503)	734880 (260247, 1760532)	230 (42, 698)	290 (110, 600)	27 (5, 103)	26 (4, 112)	573 (203, 1373)	2.5 (0.9, 6.6)	3.5 (1.3, 7.1)	0.2 (0.1, 0.7)	0.2 (0.0, 0.5)	0.4 (0.2, 0.9)
Ages 45 to 64	654	0.4 (0.2, 0.6)	27.2 (25.2, 29.1)	519525 (77623, 1416485)	712098 (280473, 1406840)	87985 (15112, 264554)	132295 (18392, 411280)	1451903 (472003, 3185858)	795 (119, 2167)	1089 (429, 2152)	135 (23, 405)	202 (28, 629)	2221 (722, 4874)	1.2 (0.4, 3.1)	4.7 (1.8, 9.1)	0.2 (0.1, 0.6)	0.4 (0.1, 1.4)	0.8 (0.3, 1.7)
Ages 65 and older	293	0.3 (0.1, 0.5)	25.8 (22.8, 28.7)	742527 (121255, 2136253)	595440 (239959, 1174648)	68755 (11181, 236558)	88073 (10524, 327831)	1494795 (461518, 3634885)	2537 (414, 7300)	2035 (820, 4014)	235 (38, 808)	301 (36, 1120)	5108 (1577, 12420)	0.9 (0.2, 3.0)	4.2 (1.6, 8.2)	0.3 (0.0, 1.0)	0.5 (0.1, 2.0)	0.8 (0.3, 2.1)
Women overall	1930	0.5 (0.2, 0.8)	25.7 (23.5, 27.9)	1556860 (252750, 4447127)	1679778 (661311, 3350608)	191083 (32317, 633384)	253857 (33923, 882614)	3681578 (1193768, 8581275)	699 (113, 1996)	754 (297, 1504)	86 (15, 284)	114 (15, 396)	1652 (536, 3851)	1.5 (0.5, 4.2)	4.1 (1.6, 8.1)	0.2 (0.1, 0.7)	0.4 (0.1, 1.3)	0.7 (0.3, 1.5)
Men																		
Ages 20 to 44	1020	0.9 (0.4, 1.4)	24.3 (22.9, 25.8)	619039 (118456, 1602534)	465992 (179272, 941049)	24712 (4043, 76731)	21364 (3397, 62462)	1131107 (387637, 2420754)	466 (89, 1207)	351 (135, 709)	19 (3, 58)	16 (3, 47)	852 (292, 1823)	2.9 (1.0, 6.9)	6.1 (2.3, 12.1)	0.2 (0.0, 0.6)	0.1 (0.0, 0.5)	0.5 (0.2, 0.9)
Ages 45 to 64	645	0.4 (0.2, 0.7)	25.8 (24.1, 27.5)	1230704 (180660, 2779689)	843033 (335415, 1635657)	103247 (14853, 250627)	94963 (12361, 267311)	2271946 (656182, 4517436)	1907 (280, 4308)	1307 (520, 2535)	160 (23, 388)	147 (19, 414)	3521 (1017, 7002)	1.4 (0.4, 4.1)	4.9 (1.9, 9.5)	0.2 (0.0, 0.8)	0.5 (0.1, 1.6)	0.8 (0.3, 1.7)
Ages 65 and older	231	0.3 (0.1, 0.5)	24.7 (22.7, 26.8)	812458 (226030, 2424935)	517800 (209314, 994182)	67653 (15239, 304601)	43914 (7232, 176926)	1441825 (532366, 3725193)	3510 (977, 10477)	2237 (904, 4295)	292 (66, 1316)	190 (31, 764)	6230 (2300, 16095)	1.1 (0.2, 3.2)	3.7 (1.4, 7.2)	0.2 (0.0, 0.8)	0.5 (0.1, 1.8)	0.8 (0.3, 1.8)
Men overall	1890	0.6 (0.2, 0.9)	24.8 (23.1, 26.6)	2662201 (525146, 6807159)	1826824 (724002, 3570888)	195612 (34136, 631960)	160241 (22989, 506700)	4844878 (1576185, 10663382)	1208 (238 3088)	829 (328, 1620)	89 (15, 287)	73 (10, 230)	2198 (715, 4837)	1.8 (0.6, 4.7)	4.9 (1.9, 9.6)	0.2 (0.0, 0.7)	0.4 (0.1, 1.3)	0.7 (0.3, 1.5)
Both sexes overall	3830	0.5 (0.2, 0.9)	25.3 (23.3, 27.3)	4219061 (777896, 11254286)	3506602 (1385313, 6921496)	386695 (66453, 1265343)	414097 (56912, 1389314)	8526456 (2769953, 19244657)	952 (175, 2539)	791 (313, 1561)	87 (15, 285)	93 (13, 313)	1924 (625, 4342)	1.6 (0.5, 4.5)	4.5 (1.7, 8.9)	0.2 (0.1, 0.7)	0.4 (0.1, 1.3)	0.7 (0.3, 1.5)
Country Income Level																		
High income	763	0.5 (0.3, 0.6)	26.7 (25.0, 28.5)	280243 (167025, 583031)	881425 (394880, 1562988)	50087 (25564, 133452)	44740 (15407, 155255)	1256495 (699247, 2292130)	336 (200, 699)	1057 (473, 1874)	60 (31, 160)	54 (18, 186)	1507 (838, 2748)	1.0 (0.6, 2.4)	4.4 (1.8, 8.2)	0.1 (0.1, 0.3)	0.1 (0.0, 0.4)	0.5 (0.3, 1.1)

	Population characteristics			Number of DALYs attributable to SSBs (95% UI)					DALYs per million adults attributable to SSBs (95% UI)					Percent of DALYs attributable to SSBs (95% UI)			
	Population	Mean SSB intake (servings/ day)	Mean BMI (kg/m^2)	CVD‡	Diabetes§	Cancersβ	Musculo-skeletal¶	Total†	CVD‡	Diabetes§	Cancersβ	Musculo-skeletal¶	Total†	CVD‡	Diabetes§	Cancersβ	Musculo-skeletal¶	Total†
Upper middle income	1530	0.7 (0.3, 1.1)	26.3 (24.4, 28.2)	619316 (203775, 2447285)	1376986 (568380, 2649568)	69435 (17044, 365715)	79980 (19886, 345074)	2145716 (948946, 5564122)	353 (116, 1397)	786 (324, 1512)	40 (10, 209)	46 (11, 197)	1225 (542, 3175)	1.5 (0.7, 3.4)	6.1 (2.5, 11.7)	0.2 (0.1, 0.5)	0.3 (0.1, 0.9)	0.8 (0.4, 1.6)
Lower middle income	1210	0.6 (0.2, 1.0)	25.2 (23.2, 27.2)	2753266 (375163, 6534363)	1074097 (370326, 2298304)	211883 (21492, 572887)	204356 (18242, 608452)	4243602 (998925, 9058923)	1902 (259, 4514)	742 (256, 1588)	146 (15, 396)	141 (13, 420)	2931 (690, 6258)	1.6 (0.5, 4.8)	4.6 (1.6, 9.6)	0.2 (0.0, 0.8)	0.4 (0.1, 1.4)	0.8 (0.3, 1.8)
Low income	323	0.3 (0.1, 0.5)	22.1 (19.8, 24.4)	566236 (31933, 1689606)	174095 (51727, 410636)	55290 (2353, 193290)	85021 (3377, 280533)	880643 (122835, 2329483)	1420 (80, 4238)	437 (130, 1030)	139 (6, 485)	213 (8, 704)	2209 (308, 5843)	2.6 (0.3, 8.4)	2.1 (0.7, 4.6)	0.4 (0.0, 1.5)	0.7 (0.0, 2.9)	0.5 (0.1, 1.5)
Australia and New Zealand																		
Women																		
Ages 20 to 44	3.6	0.4 (0.2, 0.6)	26.0 (25.2, 26.9)	173 (106, 259)	554 (206, 1191)	53 (33, 80)	39 (18, 74)	818 (456, 1479)	39 (24, 58)	124 (46, 267)	12 (7, 18)	9 (4, 17)	183 (102, 331)	1.1 (0.7, 1.5)	1.2 (0.4, 2.6)	0.1 (0.1, 0.2)	0.0 (0.0, 0.1)	0.1 (0.1, 0.2)
Ages 45 to 64	3.35	0.2 (0.1, 0.3)	28.8 (27.7, 29.9)	319 (219, 457)	1148 (432, 2503)	180 (122, 256)	182 (83, 344)	1829 (1060, 3196)	95 (65, 136)	343 (129, 747)	54 (36, 76)	54 (25, 103)	546 (316, 954)	0.4 (0.3, 0.6)	1.9 (0.7, 3.7)	0.1 (0.1, 0.1)	0.1 (0.0, 0.2)	0.2 (0.1, 0.3)
Ages 65 and older	1.94	0.1 (0.1, 0.2)	27.8 (26.9, 28.8)	644 (474, 853)	1396 (544, 2927)	150 (100, 213)	96 (46, 177)	2286 (1383, 3792)	331 (244, 439)	718 (280, 1505)	77 (51, 109)	50 (24, 91)	1176 (711, 1950)	0.2 (0.2, 0.3)	1.6 (0.6, 3.2)	0.1 (0.0, 0.1)	0.1 (0.0, 0.1)	0.2 (0.1, 0.3)
Women overall	8.89	0.2 (0.1, 0.4)	27.4 (26.4, 28.4)	1136 (800, 1569)	3097 (1183, 6621)	383 (254, 548)	317 (147, 595)	4933 (2898, 8467)	116 (82, 161)	317 (121, 678)	39 (26, 56)	32 (15, 61)	505 (297, 868)	0.6 (0.4, 0.8)	1.6 (0.6, 3.2)	0.1 (0.1, 0.1)	0.1 (0.0, 0.1)	0.2 (0.1, 0.3)
Men																		
Ages 20 to 44	3.57	0.4 (0.2, 0.6)	26.9 (26.2, 27.6)	410 (267, 601)	713 (257, 1529)	36 (20, 59)	25 (12, 48)	1184 (682, 2025)	92 (60, 134)	159 (57, 342)	8 (4, 13)	6 (3, 11)	264 (152, 452)	1.3 (0.9, 1.7)	2.7 (1.0, 5.6)	0.1 (0.0, 0.1)	0.0 (0.0, 0.0)	0.2 (0.1, 0.3)
Ages 45 to 64	3.28	0.2 (0.1, 0.3)	28.9 (28.2, 29.7)	872 (626, 1176)	1628 (611, 3414)	194 (123, 281)	117 (55, 224)	2811 (1711, 4663)	266 (191, 359)	496 (186, 1041)	59 (37, 86)	36 (17, 68)	857 (522, 1422)	0.5 (0.4, 0.7)	1.8 (0.7, 3.6)	0.1 (0.0, 0.1)	0.1 (0.0, 0.1)	0.2 (0.2, 0.4)
Ages 65 and older	1.64	0.1 (0.1, 0.2)	27.9 (27.1, 28.6)	830 (615, 1091)	1672 (633, 3439)	177 (114, 255)	53 (25, 102)	2732 (1670, 4525)	507 (376, 667)	1022 (387, 2103)	108 (70, 156)	33 (15, 63)	1670 (1021, 2766)	0.2 (0.2, 0.3)	1.3 (0.5, 2.6)	0.1 (0.0, 0.1)	0.0 (0.0, 0.1)	0.2 (0.1, 0.3)
Men overall	8.48	0.2 (0.1, 0.4)	27.8 (27.0, 28.5)	2112 (1509, 2868)	4012 (1501, 8382)	407 (256, 595)	196 (92, 374)	6727 (4063, 11213)	225 (161, 305)	427 (160, 893)	43 (27, 63)	21 (10, 40)	716 (433, 1194)	0.7 (0.5, 0.9)	1.9 (0.7, 3.9)	0.1 (0.0, 0.1)	0.0 (0.0, 0.1)	0.2 (0.1, 0.3)

	Population characteristics			Number of DALYs attributable to SSBs (95% UI)					DALYs per million adults attributable to SSBs (95% UI)					Percent of DALYs attributable to SSBs (95% UI)			
	Population	Mean SSB intake (servings/ day)	Mean BMI (kg/m^2)	CVD‡	Diabetes§	Cancersβ	Musculo-skeletal¶	Total†	CVD‡	Diabetes§	Cancersβ	Musculo-skeletal¶	Total†	CVD‡	Diabetes§	Cancersβ	Musculo-skeletal¶	Total†
Both sexes overall	17.4	0.2 (0.1, 0.4)	27.6 (26.7, 28.4)	3248 (2308, 4437)	7109 (2683, 15003)	790 (511, 1144)	513 (239, 969)	11660 (6962, 19680)	170 (121, 232)	371 (140, 783)	41 (27, 60)	27 (12, 51)	609 (364, 1028)	0.6 (0.4, 0.8)	1.7 (0.7, 3.5)	0.1 (0.0, 0.1)	0.0 (0.0, 0.1)	0.2 (0.1, 0.3)
Canada and U.S.																		
Women																		
Ages 20 to 44	45	1.6 (1.2, 2.0)	26.4 (25.7, 27.0)	10059 (6559, 13985)	46638 (22427, 79711)	1608 (1022, 2448)	1297 (632, 2466)	59603 (34939, 93195)	178 (116, 248)	827 (398, 1413)	29 (18, 43)	23 (11, 44)	1057 (619, 1652)	2.5 (1.8, 3.4)	6.5 (2.9, 11.5)	0.2 (0.1, 0.4)	0.1 (0.0, 0.1)	0.6 (0.3, 1.0)
Ages 45 to 64	46.1	0.8 (0.6, 1.0)	29.2 (28.4, 30.1)	21516 (15138, 28549)	117050 (55317, 198511)	5942 (4009, 8354)	6632 (3309, 12439)	151139 (88769, 236152)	467 (329, 620)	2541 (1201, 4309)	129 (87, 181)	144 (72, 270)	3281 (1927, 5126)	1.1 (0.8, 1.3)	9.0 (4.2, 15.0)	0.2 (0.1, 0.2)	0.2 (0.1, 0.4)	0.9 (0.5, 1.4)
Ages 65 and older	25.6	0.6 (0.4, 0.7)	28.0 (27.2, 28.8)	24760 (18351, 32226)	114732 (53922, 194331)	4240 (2850, 6161)	3283 (1648, 6002)	147015 (86073, 227384)	966 (716, 1257)	4475 (2103, 7579)	165 (111, 240)	128 (64, 234)	5734 (3357, 8868)	0.5 (0.4, 0.6)	7.4 (3.4, 12.2)	0.1 (0.1, 0.2)	0.1 (0.1, 0.3)	0.8 (0.4, 1.3)
Women overall	117	1.0 (0.8, 1.2)	27.7 (26.9, 28.5)	56335 (40048, 74759)	278420 (131666, 472553)	11790 (7881, 16963)	11211 (5589, 20906)	357756 (209781, 556731)	440 (313, 584)	2173 (1028, 3689)	92 (62, 132)	88 (44, 163)	2793 (1638, 4346)	1.4 (1.0, 1.8)	7.6 (3.5, 12.9)	0.2 (0.1, 0.3)	0.1 (0.1, 0.3)	0.7 (0.4, 1.2)
Men																		
Ages 20 to 44	46.3	1.8 (1.3, 2.2)	27.2 (26.6, 27.7)	21980 (14596, 31212)	64555 (30299, 108124)	1283 (733, 2170)	948 (450, 1731)	88767 (52997, 134444)	377 (250, 535)	1107 (520, 1855)	22 (13, 37)	16 (8, 30)	1523 (909, 2306)	3.1 (2.2, 4.2)	12.9 (5.8, 21.8)	0.2 (0.1, 0.4)	0.1 (0.0, 0.1)	0.8 (0.4, 1.3)
Ages 45 to 64	44.2	0.9 (0.7, 1.1)	29.1 (28.5, 29.8)	50846 (36756, 66835)	160750 (74845, 268450)	6624 (4074, 10105)	4690 (2251, 8367)	222910 (135121, 330714)	1151 (832, 1513)	3638 (1694, 6076)	150 (92, 229)	106 (51, 189)	5045 (3058, 7485)	1.3 (1.0, 1.7)	9.1 (4.0, 15.0)	0.2 (0.1, 0.3)	0.2 (0.1, 0.4)	1.1 (0.6, 1.7)
Ages 65 and older	19.4	0.6 (0.5, 0.8)	27.9 (27.3, 28.5)	28821 (21554, 36844)	111961 (50940, 188457)	4076 (2550, 6098)	1766 (862, 3175)	146625 (85561, 223353)	1489 (1114, 1904)	5785 (2632, 9737)	211 (132, 315)	91 (45, 164)	7576 (4421, 11540)	0.6 (0.4, 0.7)	6.2 (2.8, 10.5)	0.1 (0.1, 0.1)	0.1 (0.1, 0.3)	0.8 (0.5, 1.3)
Men overall	110	1.1 (0.8, 1.4)	27.9 (27.3, 28.5)	101648 (72907, 134891)	337267 (156083, 565031)	11983 (7357, 18373)	7404 (3563, 13273)	458302 (273679, 688510)	834 (598, 1107)	2768 (1281, 4638)	98 (60, 151)	61 (29, 109)	3762 (2246, 5651)	1.7 (1.2, 2.2)	9.4 (4.2, 15.8)	0.2 (0.1, 0.3)	0.1 (0.1, 0.3)	0.9 (0.5, 1.4)
Both sexes overall	226	1.1 (0.8, 1.3)	27.8 (27.1, 28.5)	157983 (112955, 209650)	615686 (287750, 1037584)	23773 (15238, 35336)	18616 (9151, 34179)	816058 (483460, 1245241)	632 (452, 839)	2463 (1151, 4151)	95 (61, 141)	74 (37, 137)	3265 (1934, 4982)	1.5 (1.1, 2.0)	8.5 (3.9, 14.3)	0.2 (0.1, 0.3)	0.1 (0.1, 0.3)	0.8 (0.5, 1.3)
East and Southeast Asia																		
Women																		
Ages 20 to 44	341	0.9 (0.4, 1.3)	24.9 (23.4, 26.4)	43502 (5336, 261258)	66098 (24272, 144241)	7540 (706, 50420)	8651 (679, 74288)	125791 (37694, 501434)	100 (12, 603)	153 (56, 333)	17 (2, 116)	20 (2, 172)	290 (87, 1158)	2.5 (0.6, 7.2)	4.4 (1.6, 8.8)	0.2 (0.0, 0.7)	0.2 (0.0, 0.7)	0.6 (0.2, 1.5)

	Population characteristics			Number of DALYs attributable to SSBs (95% UI)					DALYs per million adults attributable to SSBs (95% UI)					Percent of DALYs attributable to SSBs (95% UI)			
	Population	**Mean SSB intake (servings/ day)**	**Mean BMI (kg/m^2)**	**CVD‡**	**Diabetes§**	**Cancersβ**	**Musculo-skeletal¶**	**Total†**	**CVD‡**	**Diabetes§**	**Cancersβ**	**Musculo-skeletal¶**	**Total†**	**CVD‡**	**Diabetes§**	**Cancersβ**	**Musculo-skeletal¶**	**Total†**
Ages 45 to 64	238	0.4 (0.2, 0.7)	26.6 (24.7, 28.5)	52701 (7184, 220062)	135713 (50776, 273544)	11095 (1499, 48858)	23984 (2383, 100452)	223492 (73317, 596369)	221 (30, 923)	569 (213, 1148)	47 (6, 205)	101 (10, 421)	938 (308, 2502)	1.1 (0.2, 3.7)	5.4 (2.1, 10.6)	0.2 (0.0, 0.7)	0.5 (0.1, 1.9)	1.1 (0.4, 2.7)
Ages 65 and older	101	0.3 (0.1, 0.5)	24.5 (21.6, 27.5)	241385 (11010, 970152)	110547 (38953, 245152)	25084 (1042, 129905)	36381 (1480, 187636)	413397 (67327, 1465240)	2398 (109, 9638)	1098 (387, 2435)	249 (10, 1291)	361 (15, 1864)	4107 (669, 14556)	1.0 (0.1, 3.7)	4.5 (1.7, 9.0)	0.3 (0.0, 1.1)	0.7 (0.1, 2.7)	1.1 (0.3, 2.7)
Women overall	680	0.5 (0.2, 0.9)	25.2 (23.1, 27.3)	337588 (23529, 1451472)	312357 (114002, 662937)	43719 (3248, 229183)	69015 (4542, 362376)	762680 (178337, 2563042)	437 (30, 1880)	405 (148, 859)	57 (4, 297)	89 (6, 469)	988 (231, 3320)	1.5 (0.3, 4.9)	4.8 (1.8, 9.5)	0.2 (0.0, 0.8)	0.4 (0.1, 1.8)	1.0 (0.3, 2.3)
Men																		
Ages 20 to 44	352	0.9 (0.4, 1.4)	24.1 (22.8, 25.5)	88199 (12895, 393677)	76211 (29010, 154587)	4449 (494, 19905)	3536 (432, 13127)	172396 (53231, 528216)	196 (29, 875)	169 (64, 343)	10 (1, 44)	8 (1, 29)	383 (118, 1173)	2.4 (0.6, 6.7)	5.8 (2.0, 11.8)	0.1 (0.0, 0.4)	0.1 (0.0, 0.5)	0.6 (0.2, 1.4)
Ages 45 to 64	243	0.5 (0.2, 0.7)	25.2 (23.7, 26.7)	153823 (16420, 557260)	145043 (54636, 293663)	13398 (1697, 40947)	16893 (1570, 60715)	329156 (89301, 871090)	632 (67, 2290)	596 (225, 1207)	55 (7, 168)	69 (6, 250)	1353 (367, 3580)	1.4 (0.3, 4.3)	5.6 (2.0, 11.0)	0.2 (0.0, 0.6)	0.5 (0.1, 1.7)	1.1 (0.4, 2.5)
Ages 65 and older	84.6	0.3 (0.2, 0.5)	23.9 (22.0, 25.8)	236311 (16201, 1229854)	85066 (32508, 176977)	27019 (1619, 215283)	16121 (942, 102011)	364516 (61902, 1706625)	2795 (192, 14544)	1006 (384, 2093)	320 (19, 2546)	191 (11, 1206)	4311 (732, 20182)	1.2 (0.1, 3.6)	4.1 (1.5, 8.2)	0.2 (0.0, 0.8)	0.6 (0.0, 2.1)	1.0 (0.3, 2.3)
Men overall	680	0.6 (0.3, 0.9)	24.3 (22.7, 25.9)	478333 (45516, 2180791)	306319 (116153, 625226)	44866 (3810, 276135)	36550 (2944, 175853)	866068 (204434, 3105931)	615 (59, 2803)	394 (149, 804)	58 (5, 355)	47 (4, 226)	1113 (263, 3992)	1.7 (0.3, 4.9)	5.2 (1.8, 10.3)	0.2 (0.0, 0.6)	0.4 (0.0, 1.4)	0.9 (0.3, 2.1)
Both sexes overall	1360	0.6 (0.3, 0.9)	24.8 (22.9, 26.6)	815921 (69045, 3632262)	618677 (230155, 1288163)	88585 (7058, 505318)	105565 (7486, 538229)	1628748 (382771, 5668974)	526 (45, 2343)	399 (148, 831)	57 (5, 326)	68 (5, 347)	1051 (247, 3657)	1.6 (0.3, 4.9)	5.0 (1.8, 9.9)	0.2 (0.0, 0.7)	0.4 (0.0, 1.6)	0.9 (0.3, 2.2)
East/Central Eurasia																		
Women																		
Ages 20 to 44	60.4	0.4 (0.2, 0.6)	24.3 (22.3, 26.3)	6687 (2880, 17236)	17253 (5092, 43821)	751 (302, 2019)	757 (263, 1784)	25448 (11085, 57788)	86 (37, 222)	223 (66, 566)	10 (4, 26)	10 (3, 23)	328 (143, 746)	1.1 (0.4, 5.0)	1.9 (0.6, 4.3)	0.1 (0.0, 0.4)	0.1 (0.0, 0.1)	0.2 (0.1, 0.5)
Ages 45 to 64	55.5	0.2 (0.1, 0.3)	28.0 (25.6, 30.4)	16929 (8580, 29657)	33426 (10337, 85735)	2790 (1355, 5077)	3815 (1350, 8390)	56960 (28529, 112668)	305 (155, 535)	603 (186, 1546)	50 (24, 92)	69 (24, 151)	1027 (514, 2032)	0.3 (0.2, 0.6)	2.5 (0.9, 5.1)	0.1 (0.0, 0.1)	0.1 (0.0, 0.3)	0.3 (0.1, 0.5)
Ages 65 and older	32.5	0.1 (0.1, 0.2)	27.6 (24.0, 31.1)	39042 (14017, 166425)	29247 (9463, 70097)	2253 (856, 7102)	2656 (679, 11622)	73197 (32657, 237016)	1201 (431, 5119)	900 (291, 2156)	69 (26, 218)	82 (21, 358)	2252 (1005, 7291)	0.3 (0.1, 1.6)	2.3 (0.9, 4.6)	0.1 (0.0, 0.7)	0.2 (0.0, 1.1)	0.3 (0.1, 1.2)

	Population characteristics			Number of DALYs attributable to SSBs (95% UI)					DALYs per million adults attributable to SSBs (95% UI)					Percent of DALYs attributable to SSBs (95% UI)			
	Population	**Mean SSB intake (servings/ day)**	**Mean BMI (kg/m^2)**	**CVD‡**	**Diabetes§**	**Cancersβ**	**Musculo-skeletal¶**	**Total†**	**CVD‡**	**Diabetes§**	**Cancersβ**	**Musculo-skeletal¶**	**Total†**	**CVD‡**	**Diabetes§**	**Cancersβ**	**Musculo -skeletal¶**	**Total†**
Women overall	148	0.2 (0.1, 0.4)	26.5 (23.8, 29.2)	62658 (25477, 213318)	79926 (24893, 199653)	5793 (2513, 14197)	7228 (2292, 21797)	155605 (72271, 407471)	379 (154, 1289)	483 (150, 1207)	35 (15, 86)	44 (14, 132)	941 (437, 2463)	0.6 (0.2, 2.4)	2.2 (0.8, 4.7)	0.1 (0.0, 0.4)	0.1 (0.0, 0.5)	0.3 (0.1, 0.8)
Men																		
Ages 20 to 44	59.7	0.4 (0.2, 0.6)	25.3 (23.5, 27.0)	25573 (12021, 50703)	20702 (6121, 51122)	566 (213, 1371)	490 (169, 1192)	47331 (24300, 87712)	331 (156, 656)	268 (79, 662)	7 (3, 18)	6 (2, 15)	613 (315, 1136)	1.0 (0.5, 2.6)	4.3 (1.5, 8.8)	0.1 (0.0, 0.2)	0.0 (0.0, 0.1)	0.2 (0.1, 0.5)
Ages 45 to 64	47.3	0.2 (0.1, 0.3)	27.2 (25.3, 29.2)	51698 (25795, 102375)	32181 (9826, 78698)	3025 (1308, 6353)	2208 (756, 5400)	89113 (48274, 164867)	1093 (545, 2164)	680 (208, 1663)	64 (28, 134)	47 (16, 114)	1884 (1020, 3485)	0.4 (0.2, 1.2)	2.7 (1.0, 5.6)	0.1 (0.0, 0.2)	0.1 (0.0, 0.4)	0.3 (0.1, 0.6)
Ages 65 and older	17.6	0.1 (0.1, 0.2)	26.4 (24.0, 28.8)	30889 (12279, 110774)	16525 (5222, 38531)	1701 (673, 4952)	847 (232, 3141)	49962 (23995, 144178)	1755 (698, 6295)	939 (297, 2189)	97 (38, 281)	48 (13, 178)	2839 (1363, 8193)	0.3 (0.1, 1.3)	1.8 (0.7, 3.7)	0.1 (0.0, 0.4)	0.1 (0.0, 0.6)	0.2 (0.1, 1.0)
Men overall	125	0.3 (0.1, 0.4)	26.2 (24.2, 28.2)	108161 (50095, 263852)	69409 (21169, 168352)	5293 (2194, 12675)	3545 (1158, 9734)	186407 (96568, 396757)	761 (352, 1856)	488 (149, 1184)	37 (15, 89)	25 (8, 68)	1311 (679, 2791)	0.6 (0.3, 1.7)	2.9 (1.1, 6.0)	0.1 (0.0, 0.3)	0.1 (0.0, 0.4)	0.2 (0.1, 0.7)
Both sexes overall	273	0.2 (0.1, 0.4)	26.3 (24.0, 28.7)	170819 (75572, 477170)	149335 (46062, 368005)	11086 (4708, 26872)	10773 (3449, 31530)	342012 (168839, 804228)	555 (246, 1551)	485 (150, 1196)	36 (15, 87)	35 (11, 103)	1112 (549, 2615)	0.6 (0.2, 2.0)	2.6 (0.9, 5.4)	0.1 (0.0, 0.3)	0.1 (0.0, 0.4)	0.2 (0.1, 0.7)
Latin America and Caribbean																		
Women																		
Ages 20 to 44	88.1	1.7 (0.7, 2.7)	26.4 (24.5, 28.3)	20231 (11217, 34984)	98436 (41292, 182108)	2985 (1449, 6155)	3673 (1510, 7479)	125324 (65460, 212885)	177 (98, 307)	864 (362, 1598)	26 (13, 54)	32 (13, 66)	1099 (574, 1868)	4.5 (2.4, 8.1)	7.3 (2.9, 14.2)	0.5 (0.2, 1.1)	0.3 (0.1, 0.6)	0.9 (0.4, 1.6)
Ages 45 to 64	54.2	0.8 (0.3, 1.4)	28.9 (26.7, 31.1)	30068 (17678, 51607)	206008 (87896, 382255)	6269 (3230, 11478)	12640 (5174, 26028)	254985 (132029, 440829)	554 (326, 952)	3799 (1621, 7049)	116 (60, 212)	233 (95, 480)	4702 (2435, 8129)	2.0 (1.1, 3.4)	10.3 (4.3, 19.2)	0.4 (0.2, 0.7)	0.7 (0.3, 1.6)	1.8 (0.9, 3.2)
Ages 65 and older	22.7	0.6 (0.3, 1.0)	26.8 (23.8, 29.9)	29093 (15669, 59087)	164436 (69037, 306255)	3771 (1731, 8177)	4931 (1875, 11862)	202232 (100088, 362843)	1281 (690, 2602)	7243 (3041, 13489)	166 (76, 360)	217 (83, 522)	8907 (4408, 15981)	1.1 (0.5, 2.7)	9.5 (3.9, 17.7)	0.3 (0.1, 0.9)	0.6 (0.2, 1.9)	1.8 (0.9, 3.5)
Women overall	165	1.1 (0.4, 1.7)	27.2 (24.8, 29.6)	79392 (44564, 145678)	468879 (198225, 870618)	13025 (6411, 25810)	21244 (8559, 45369)	582542 (297578, 1016557)	416 (233, 763)	2456 (1038, 4560)	68 (34, 135)	111 (45, 238)	3051 (1559, 5324)	2.5 (1.3, 4.7)	9.0 (3.7, 17.0)	0.4 (0.2, 0.9)	0.6 (0.2, 1.4)	1.5 (0.7, 2.8)
Men																		
Ages 20 to 44	85.6	1.8 (0.7, 2.9)	25.2 (23.6, 26.8)	35314 (20390, 58766)	121160 (51509, 224711)	1606 (755, 3095)	2294 (926, 4807)	160374 (86326, 268070)	316 (183, 527)	1086 (462, 2013)	14 (7, 28)	21 (8, 43)	1437 (773, 2402)	5.2 (2.7, 9.7)	12.4 (5.0, 23.2)	0.3 (0.1, 0.7)	0.2 (0.1, 0.6)	0.8 (0.4, 1.5)

	Population characteristics			Number of DALYs attributable to SSBs (95% UI)					DALYs per million adults attributable to SSBs (95% UI)					Percent of DALYs attributable to SSBs (95% UI)			
	Population	**Mean SSB intake (servings/ day)**	**Mean BMI (kg/m^2)**	**CVD‡**	**Diabetes§**	**Cancersβ**	**Musculo-skeletal¶**	**Total†**	**CVD‡**	**Diabetes§**	**Cancersβ**	**Musculo-skeletal¶**	**Total†**	**CVD‡**	**Diabetes§**	**Cancersβ**	**Musculo-skeletal¶**	**Total†**
Ages 45 to 64	50.3	0.9 (0.3, 1.5)	26.6 (24.8, 28.4)	53094 (32118, 89724)	233094 (98549, 432220)	4061 (2139, 7159)	7829 (3174, 16611)	298078 (157064, 507815)	1056 (639, 1784)	4634 (1959, 8593)	81 (43, 142)	156 (63, 330)	5926 (3123, 10096)	2.2 (1.2, 4.0)	10.6 (4.5, 19.8)	0.2 (0.1, 0.5)	0.7 (0.2, 1.6)	1.6 (0.8, 2.8)
Ages 65 and older	17.9	0.7 (0.3, 1.1)	25.2 (23.1, 27.4)	33828 (19127, 69167)	142331 (58743, 264426)	2597 (1333, 5295)	2691 (1008, 6728)	181446 (91832, 323350)	1889 (1068, 3863)	7950 (3281, 14770)	145 (74, 296)	150 (56, 376)	10135 (5129, 18061)	1.2 (0.6, 3.3)	8.2 (3.4, 15.6)	0.2 (0.1, 0.5)	0.6 (0.2, 2.0)	1.5 (0.7, 3.0)
Men overall	154	1.2 (0.4, 1.9)	25.6 (23.7, 27.4)	122237 (71635, 217657)	496584 (208800, 921357)	8264 (4227, 15549)	12814 (5108, 28146)	639899 (335222, 1099235)	680 (398, 1210)	2762 (1161, 5124)	46 (24, 86)	71 (28, 157)	3559 (1864, 6113)	2.9 (1.5, 5.7)	10.4 (4.3, 19.5)	0.2 (0.1, 0.6)	0.5 (0.2, 1.4)	1.3 (0.7, 2.4)
Both sexes overall	319	1.1 (0.4, 1.8)	26.4 (24.2, 28.5)	201629 (116199, 363336)	965464 (407026, 1791975)	21289 (10638, 41358)	34058 (13667, 73516)	1222440 (632800, 2115792)	544 (313, 980)	2604 (1098, 4834)	57 (29, 112)	92 (37, 198)	3297 (1707, 5707)	2.7 (1.4, 5.2)	9.7 (4.0, 18.3)	0.3 (0.1, 0.7)	0.5 (0.2, 1.4)	1.4 (0.7, 2.6)
North Africa and Middle East																		
Women																		
Ages 20 to 44	66.1	0.6 (0.2, 1.1)	27.0 (25.7, 28.3)	12731 (6052, 25713)	37908 (13277, 83700)	982 (461, 1989)	1246 (498, 2593)	52867 (25377, 102851)	145 (69, 292)	431 (151, 951)	11 (5, 23)	14 (6, 29)	601 (288, 1169)	1.4 (0.7, 2.7)	4.2 (1.6, 8.4)	0.2 (0.1, 0.3)	0.1 (0.0, 0.2)	0.5 (0.2, 1.0)
Ages 45 to 64	32.8	0.3 (0.1, 0.6)	30.5 (28.8, 32.1)	12492 (6428, 21695)	50952 (18414, 110019)	1110 (566, 1990)	3770 (1480, 7759)	68325 (33214, 129147)	381 (196, 661)	1553 (561, 3353)	34 (17, 61)	115 (45, 236)	2082 (1012, 3936)	0.6 (0.3, 1.0)	5.3 (2.0, 10.5)	0.1 (0.1, 0.2)	0.2 (0.1, 0.5)	0.9 (0.4, 1.6)
Ages 65 and older	11.2	0.3 (0.1, 0.4)	28.3 (25.8, 30.8)	9885 (4252, 26282)	34536 (12924, 72621)	416 (182, 1059)	1249 (407, 3710)	46086 (21681, 96060)	886 (381, 2356)	3096 (1158, 6509)	37 (16, 95)	112 (36, 333)	4131 (1943, 8610)	0.3 (0.2, 0.9)	4.3 (1.7, 8.7)	0.1 (0.0, 0.3)	0.2 (0.1, 0.7)	0.8 (0.3, 1.6)
Women overall	110	0.4 (0.1, 0.7)	28.4 (26.5, 30.2)	35108 (16732, 73690)	123397 (44615, 266339)	2508 (1210, 5039)	6265 (2385, 14062)	167278 (80272, 328058)	266 (127, 558)	935 (338, 2018)	19 (9, 38)	47 (18, 107)	1268 (608, 2486)	0.8 (0.4, 1.6)	4.6 (1.7, 9.2)	0.1 (0.1, 0.3)	0.2 (0.1, 0.5)	0.7 (0.3, 1.4)
Men																		
Ages 20 to 44	71.6	0.7 (0.2, 1.1)	26.1 (24.9, 27.2)	22944 (11640, 43242)	49709 (17626, 106374)	504 (214, 1049)	891 (349, 1901)	74048 (36978, 137613)	243 (123, 457)	525 (186, 1125)	5 (2, 11)	9 (4, 20)	783 (391, 1455)	1.5 (0.8, 2.8)	7.3 (2.8, 14.6)	0.1 (0.0, 0.2)	0.1 (0.0, 0.2)	0.6 (0.3, 1.2)
Ages 45 to 64	33.5	0.3 (0.1, 0.6)	27.8 (26.5, 29.1)	21313 (11343, 35722)	53721 (19533, 112453)	594 (276, 1075)	2525 (978, 5327)	78153 (39911, 140341)	635 (338, 1065)	1602 (582, 3353)	18 (8, 32)	75 (29, 159)	2330 (1190, 4184)	0.7 (0.4, 1.1)	5.0 (1.9, 10.0)	0.1 (0.0, 0.1)	0.2 (0.1, 0.4)	0.8 (0.4, 1.5)
Ages 65 and older	9.67	0.3 (0.1, 0.4)	26.4 (24.7, 28.1)	10576 (5113, 28404)	29478 (10930, 60885)	297 (133, 788)	671 (228, 2155)	41022 (20093, 84738)	1094 (529, 2937)	3048 (1130, 6296)	31 (14, 82)	69 (24, 223)	4242 (2078, 8762)	0.4 (0.2, 1.0)	3.8 (1.5, 7.6)	0.0 (0.0, 0.1)	0.2 (0.0, 0.6)	0.7 (0.3, 1.5)

	Population characteristics			Number of DALYs attributable to SSBs (95% UI)					DALYs per million adults attributable to SSBs (95% UI)					Percent of DALYs attributable to SSBs (95% UI)			
	Population	**Mean SSB intake (servings/ day)**	**Mean BMI (kg/m^2)**	**CVD‡**	**Diabetes§**	**Cancersβ**	**Musculo-skeletal¶**	**Total†**	**CVD‡**	**Diabetes§**	**Cancersβ**	**Musculo-skeletal¶**	**Total†**	**CVD‡**	**Diabetes§**	**Cancersβ**	**Musculo-skeletal¶**	**Total†**
Men overall	115	0.4 (0.2, 0.7)	26.6 (25.2, 28.0)	54833 (28096, 107367)	132907 (48089, 279713)	1395 (623, 2912)	4088 (1555, 9383)	193223 (96982, 362692)	398 (204, 779)	964 (349, 2030)	10 (5, 21)	30 (11, 68)	1402 (704, 2632)	0.8 (0.4, 1.6)	5.4 (2.1, 10.7)	0.1 (0.0, 0.1)	0.1 (0.0, 0.4)	0.7 (0.3, 1.4)
Both sexes overall	225	0.4 (0.2, 0.7)	27.5 (25.9, 29.1)	89942 (44828, 181058)	256304 (92704, 546052)	3903 (1833, 7951)	10352 (3940, 23445)	360500 (177254, 690750)	333 (166, 671)	950 (344, 2024)	14 (7, 29)	38 (15, 87)	1336 (657, 2561)	0.8 (0.4, 1.6)	5.0 (1.9, 10.0)	0.1 (0.0, 0.2)	0.2 (0.1, 0.4)	0.7 (0.3, 1.4)
South Asia																		
Women																		
Ages 20 to 44	224	0.3 (0.1, 0.5)	21.6 (20.1, 23.2)	161612 (13397, 421698)	63895 (19728, 142776)	16834 (1267, 57540)	13509 (702, 40691)	255850 (53752, 579714)	543 (45, 1418)	215 (66, 480)	57 (4, 193)	45 (2, 137)	860 (181, 1949)	4.5 (0.4, 11.8)	1.7 (0.5, 3.9)	0.5 (0.0, 1.6)	0.3 (0.0, 0.9)	0.4 (0.1, 1.1)
Ages 45 to 64	122	0.2 (0.0, 0.3)	22.1 (20.3, 24.0)	331469 (14304, 891167)	106165 (34086, 226102)	50720 (2242, 156917)	63622 (2267, 191320)	551976 (69830, 1304908)	2727 (118, 7333)	874 (280, 1860)	417 (18, 1291)	523 (19, 1574)	4542 (575, 10737)	3.4 (0.2, 9.6)	2.4 (0.8, 5.1)	0.6 (0.0, 2.2)	1.1 (0.0, 3.7)	0.9 (0.1, 2.5)
Ages 65 and older	40.1	0.1 (0.0, 0.2)	20.6 (18.0, 23.2)	332328 (46536, 653573)	74360 (28880, 152361)	25555 (2584, 58894)	29896 (3312, 68673)	462139 (102995, 849463)	8292 (1161, 16307)	1855 (721, 3801)	638 (64, 1469)	746 (83, 1713)	11531 (2570, 21194)	2.3 (0.2, 6.3)	2.2 (0.8, 4.5)	0.8 (0.1, 2.6)	1.1 (0.1, 3.6)	0.9 (0.2, 2.4)
Women overall	385	0.2 (0.1, 0.3)	21.4 (19.3, 23.4)	825409 (74237, 1966438)	244420 (82694, 521238)	93109 (6093, 273351)	107028 (6282, 300684)	1269965 (226577, 2734084)	1798 (162, 4284)	532 (180, 1135)	203 (13, 595)	233 (14, 655)	2766 (494, 5956)	3.4 (0.2, 9.2)	2.1 (0.7, 4.5)	0.6 (0.0, 2.1)	0.8 (0.0, 2.8)	0.8 (0.1, 2.0)
Men																		
Ages 20 to 44	238	0.4 (0.1, 0.6)	21.2 (19.6, 22.7)	361696 (33983, 832009)	82398 (26816, 183165)	12771 (1034, 35964)	9673 (552, 26553)	466539 (92219, 972543)	1141 (107, 2624)	260 (85, 578)	40 (3, 113)	31 (2, 84)	1471 (291, 3067)	4.9 (0.5, 12.9)	2.9 (0.9, 6.3)	0.4 (0.0, 1.2)	0.2 (0.0, 0.7)	0.5 (0.1, 1.1)
Ages 45 to 64	126	0.2 (0.0, 0.3)	21.6 (19.8, 23.5)	807618 (41130, 1640736)	140143 (48397, 292875)	63770 (2954, 145853)	47102 (1996, 118867)	1058632 (123445, 2015267)	6409 (326, 13021)	1112 (384, 2324)	506 (23, 1157)	374 (16, 943)	8401 (980, 15993)	3.5 (0.2, 10.0)	2.7 (0.9, 5.5)	0.5 (0.0, 1.7)	0.8 (0.0, 2.8)	1.0 (0.1, 2.5)
Ages 65 and older	36.5	0.1 (0.0, 0.2)	20.7 (18.7, 22.8)	402157 (138747, 752272)	74420 (28191, 152815)	23845 (7007, 48948)	15579 (3361, 36232)	516000 (201633, 914121)	11026 (3804, 20624)	2040 (773, 4190)	654 (192, 1342)	427 (92, 993)	14147 (5528, 25062)	2.6 (0.3, 6.3)	2.0 (0.7, 4.2)	0.5 (0.1, 1.5)	0.8 (0.1, 2.7)	0.9 (0.2, 2.1)
Men overall	401	0.2 (0.1, 0.4)	21.1 (19.3, 22.9)	1571471 (213861, 3225017)	296960 (103403, 628856)	100386 (10995, 230765)	72354 (5909, 181652)	2041171 (417298, 3901931)	3277 (446, 6725)	619 (216, 1311)	209 (23, 481)	151 (12, 379)	4257 (870, 8137)	3.7 (0.3, 9.7)	2.5 (0.9, 5.3)	0.5 (0.0, 1.5)	0.6 (0.0, 2.1)	0.8 (0.1, 1.9)
Both sexes overall	786	0.2 (0.1, 0.4)	21.2 (19.3, 23.2)	2396880 (288098, 5191455)	541380 (186097, 1150094)	193494 (17088, 504117)	179382 (12191, 482335)	3311136 (643875, 6636016)	2554 (307, 5531)	577 (198, 1225)	206 (18, 537)	191 (13, 514)	3528 (686, 7070)	3.5 (0.3, 9.5)	2.3 (0.8, 4.9)	0.6 (0.0, 1.8)	0.7 (0.0, 2.4)	0.8 (0.1, 2.0)
Sub-Saharan Africa																		
Women																		

	Population characteristics			Number of DALYs attributable to SSBs (95% UI)					DALYs per million adults attributable to SSBs (95% UI)					Percent of DALYs attributable to SSBs (95% UI)			
	Population	**Mean SSB intake (servings/ day)**	**Mean BMI (kg/m^2)**	**CVD‡**	**Diabetes§**	**Cancersβ**	**Musculo-skeletal¶**	**Total†**	**CVD‡**	**Diabetes§**	**Cancersβ**	**Musculo-skeletal¶**	**Total†**	**CVD‡**	**Diabetes§**	**Cancersβ**	**Musculo-skeletal¶**	**Total†**
Ages 20 to 44	102	0.7 (0.2, 1.2)	23.4 (22.0, 24.8)	37029 (6917, 111725)	30816 (10209, 70855)	2912 (412, 10073)	3804 (485, 13033)	74561 (23857, 182806)	261 (49, 789)	218 (72, 500)	21 (3, 71)	27 (3, 92)	526 (168, 1291)	2.5 (0.6, 8.2)	1.9 (0.6, 4.2)	0.2 (0.0, 0.7)	0.2 (0.0, 0.7)	0.2 (0.1, 0.5)
Ages 45 to 64	46	0.3 (0.1, 0.6)	24.7 (22.9, 26.5)	49411 (5112, 166467)	42357 (15102, 91405)	7557 (614, 28181)	15404 (1348, 60247)	114729 (28738, 315748)	1075 (111, 3622)	922 (329, 1989)	164 (13, 613)	335 (29, 1311)	2496 (625, 6871)	1.4 (0.2, 5.4)	2.7 (0.9, 5.7)	0.2 (0.0, 0.9)	0.6 (0.1, 2.5)	0.5 (0.1, 1.4)
Ages 65 and older	15.1	0.2 (0.1, 0.4)	23.2 (20.0, 26.4)	52327 (3299, 190299)	31662 (10880, 68345)	4481 (259, 18357)	7791 (365, 33591)	96260 (18857, 288885)	3466 (219, 12603)	2097 (721, 4526)	297 (17, 1216)	516 (24, 2225)	6375 (1249, 19133)	1.4 (0.1, 5.4)	2.6 (0.9, 5.6)	0.4 (0.0, 1.5)	0.8 (0.0, 3.6)	0.7 (0.1, 2.1)
Women overall	163	0.4 (0.1, 0.8)	23.6 (21.5, 25.8)	138767 (15328, 468492)	104835 (36190, 230604)	14950 (1285, 56611)	26999 (2198, 106871)	285550 (71452, 787440)	685 (76, 2312)	517 (179, 1138)	74 (6, 279)	133 (11, 527)	1409 (353, 3885)	1.8 (0.3, 6.3)	2.4 (0.8, 5.2)	0.3 (0.0, 1.1)	0.5 (0.0, 2.3)	0.5 (0.1, 1.3)
Men																		
Ages 20 to 44	103	0.8 (0.2, 1.3)	22.1 (20.4, 23.7)	57263 (9026, 184052)	35051 (11296, 81630)	3024 (329, 12305)	3166 (357, 12434)	98504 (28433, 253567)	400 (63, 1286)	245 (79, 570)	21 (2, 86)	22 (2, 87)	688 (199, 1772)	3.7 (0.6, 11.1)	3.3 (1.1, 7.2)	0.3 (0.0, 1.2)	0.2 (0.0, 0.9)	0.3 (0.1, 0.7)
Ages 45 to 64	42.5	0.4 (0.1, 0.6)	23.0 (21.1, 24.8)	78552 (7711, 267908)	46511 (16286, 98467)	8853 (711, 34537)	12168 (937, 49004)	146083 (32801, 409279)	1849 (182, 6307)	1095 (383, 2318)	208 (17, 813)	286 (22, 1154)	3439 (772, 9635)	2.1 (0.3, 8.1)	3.1 (1.1, 6.5)	0.4 (0.0, 1.9)	0.8 (0.1, 3.4)	0.6 (0.1, 1.7)
Ages 65 and older	12.3	0.3 (0.1, 0.5)	22.2 (19.9, 24.6)	55345 (3270, 177770)	24201 (8211, 51487)	5327 (287, 19051)	5388 (223, 21842)	90261 (15464, 248934)	4495 (266, 14438)	1966 (667, 4182)	433 (23, 1547)	438 (18, 1774)	7331 (1256, 20218)	1.8 (0.1, 5.9)	2.3 (0.8, 4.9)	0.5 (0.0, 1.7)	0.9 (0.0, 3.6)	0.7 (0.1, 2.0)
Men overall	158	0.5 (0.1, 0.8)	22.4 (20.4, 24.3)	191160 (20007, 629731)	105762 (35794, 231584)	17203 (1327, 65893)	20722 (1518, 83280)	334848 (76698, 911779)	966 (101, 3182)	534 (181, 1170)	87 (7, 333)	105 (8, 421)	1692 (388, 4607)	2.6 (0.3, 8.4)	2.9 (1.0, 6.2)	0.4 (0.0, 1.6)	0.6 (0.0, 2.6)	0.5 (0.1, 1.4)
Both sexes overall	320	0.5 (0.1, 0.8)	23.0 (20.9, 25.1)	329927 (35336, 1098222)	210597 (71984, 462188)	32153 (2612, 122505)	47721 (3715, 190151)	620398 (148150, 1699219)	824 (88, 2742)	526 (180, 1154)	80 (7, 306)	119 (9, 475)	1549 (370, 4242)	2.2 (0.3, 7.3)	2.6 (0.9, 5.7)	0.3 (0.0, 1.3)	0.6 (0.0, 2.5)	0.5 (0.1, 1.4)
Western Europe																		
Women																		
Ages 20 to 44	57.2	0.6 (0.4, 0.7)	24.2 (22.6, 25.7)	2785 (1408, 7532)	10643 (4376, 20716)	678 (372, 1547)	512 (221, 1096)	14618 (7626, 28381)	40 (20, 108)	153 (63, 298)	10 (5, 22)	7 (3, 16)	210 (110, 408)	1.7 (0.8, 5.0)	2.1 (0.8, 4.2)	0.1 (0.1, 0.4)	0.0 (0.0, 0.1)	0.2 (0.1, 0.4)
Ages 45 to 64	55.9	0.2 (0.2, 0.3)	27.6 (25.7, 29.5)	4620 (2981, 6824)	19279 (8111, 36767)	2322 (1474, 3444)	2246 (998, 4301)	28468 (16517, 46842)	83 (53, 122)	345 (145, 658)	42 (26, 62)	40 (18, 77)	509 (295, 838)	0.5 (0.3, 0.7)	2.8 (1.2, 5.2)	0.1 (0.1, 0.1)	0.1 (0.0, 0.1)	0.2 (0.1, 0.4)

	Population characteristics			Number of DALYs attributable to SSBs (95% UI)					DALYs per million adults attributable to SSBs (95% UI)					Percent of DALYs attributable to SSBs (95% UI)			
	Population	**Mean SSB intake (servings/ day)**	**Mean BMI (kg/m^2)**	**CVD‡**	**Diabetes§**	**Cancersβ**	**Musculo-skeletal¶**	**Total†**	**CVD‡**	**Diabetes§**	**Cancersβ**	**Musculo-skeletal¶**	**Total†**	**CVD‡**	**Diabetes§**	**Cancersβ**	**Musculo-skeletal¶**	**Total†**
Ages 65 and older	42.9	0.2 (0.1, 0.2)	27.7 (25.4, 30.1)	13062 (7646, 37354)	34525 (15355, 62560)	2805 (1576, 6691)	1791 (712, 4558)	52183 (30457, 104202)	305 (178, 872)	806 (358, 1460)	65 (37, 156)	42 (17, 106)	1218 (711, 2431)	0.3 (0.1, 0.7)	2.8 (1.2, 4.9)	0.1 (0.0, 0.2)	0.1 (0.0, 0.2)	0.3 (0.2, 0.6)
Women overall	156	0.4 (0.3, 0.5)	26.4 (24.4, 28.3)	20467 (12035, 51710)	64447 (27843, 120044)	5806 (3422, 11682)	4550 (1931, 9955)	95269 (54601, 179425)	122 (72, 307)	383 (165, 713)	34 (20, 69)	27 (11, 59)	566 (324, 1066)	0.8 (0.4, 2.1)	2.6 (1.1, 4.8)	0.1 (0.1, 0.3)	0.1 (0.0, 0.1)	0.2 (0.1, 0.5)
Men																		
Ages 20 to 44	58.4	0.7 (0.5, 0.9)	25.9 (24.7, 27.0)	5658 (3637, 8272)	15493 (6339, 29806)	474 (251, 814)	340 (150, 668)	21966 (12471, 36564)	80 (51, 116)	218 (89, 419)	7 (4, 11)	5 (2, 9)	309 (175, 514)	1.4 (0.9, 2.1)	5.4 (2.1, 10.1)	0.1 (0.0, 0.2)	0.0 (0.0, 0.0)	0.3 (0.1, 0.5)
Ages 45 to 64	54.8	0.3 (0.2, 0.3)	28.2 (26.9, 29.6)	12886 (8760, 17955)	29963 (12733, 55416)	2728 (1571, 4317)	1431 (643, 2797)	47008 (28553, 73400)	235 (160, 328)	547 (232, 1011)	50 (29, 79)	26 (12, 51)	858 (521, 1340)	0.5 (0.3, 0.7)	3.0 (1.2, 5.5)	0.1 (0.0, 0.1)	0.1 (0.0, 0.1)	0.3 (0.2, 0.6)
Ages 65 and older	31.9	0.2 (0.1, 0.3)	27.5 (25.9, 29.1)	13700 (9123, 18760)	32147 (13937, 57165)	2614 (1523, 3930)	797 (350, 1540)	49259 (30216, 75369)	429 (286, 587)	1007 (436, 1790)	82 (48, 123)	25 (11, 48)	1543 (946, 2360)	0.2 (0.2, 0.3)	2.1 (0.9, 3.8)	0.0 (0.0, 0.1)	0.0 (0.0, 0.1)	0.3 (0.2, 0.4)
Men overall	145	0.4 (0.3, 0.5)	27.1 (25.7, 28.5)	32245 (21520, 44986)	77603 (33010, 142387)	5817 (3345, 9061)	2569 (1143, 5005)	118233 (71241, 185333)	204 (136, 285)	491 (209, 902)	37 (21, 57)	16 (7, 32)	749 (451, 1174)	0.7 (0.5, 1.1)	3.5 (1.4, 6.4)	0.1 (0.0, 0.1)	0.0 (0.0, 0.1)	0.3 (0.2, 0.5)
Both sexes overall	301	0.4 (0.3, 0.5)	26.7 (25.1, 28.4)	52712 (33555, 96696)	142050 (60853, 262431)	11622 (6767, 20743)	7118 (3074, 14960)	213503 (125841, 364758)	162 (103, 296)	435 (187, 805)	36 (21, 64)	22 (9, 46)	655 (386, 1118)	0.8 (0.4, 1.6)	3.0 (1.2, 5.6)	0.1 (0.0, 0.2)	0.0 (0.0, 0.1)	0.3 (0.1, 0.5)

‡CVD DALYs include those from ischemic heart disease, ischemic stroke, and hypertensive heart disease.

§Diabetes DALYs include those from the direct effects of SSBs on diabetes and the effects of SSBs on diabetes that are mediated through BMI.

βCancer DALYs include those from breast cancer, uterine cancer, esophageal cancer, colon and rectum cancers, pancreatic cancers, kidney cancers, and gall bladder cancer.

¶Musculoskeletal DALYS include those from lower back pain and osteoarthritis.

†Total DALYs include those from CVD, diabetes, and cancers as described above.

Countries are grouped into regions as follows:
Australia/New Zealand: Australia, New Zealand.
East/Central Eurasia: Albania, Armenia, Azerbaijan, Bulgaria, Bosnia and Herzegovina, Belarus, Czech Republic, Estonia, Georgia, Croatia, Hungary, Kazakhstan, Kyrgyzstan, Lithuania, Latvia, Moldova, Macedonia, Montenegro, Mongolia, Poland, Romania, Russian Federation, Serbia, Slovakia, Slovenia, Tajikistan, Turkmenistan, Ukraine, Uzbekistan
East/Southeast Asia: Brunei Darussalam, China, Fiji, Micronesia, Indonesia, Japan, Cambodia, Kiribati, Republic of Korea, Lao People's Democratic Republic, Sri Lanka, Maldives, Marshall Islands, Myanmar, Malaysia, Philippines, Papua New Guinea, Democratic People's Republic of Korea, Singapore, Solomon Islands, Thailand, Timor-Leste, Tonga, Taiwan, Viet Nam, Vanuatu, Samoa.

Latin America/Caribbean: Argentina, Antigua and Barbuda, Bahamas, Belize, Bolivia, Brazil, Barbados, Chile, Colombia, Costa Rica, Cuba, Dominica, Dominican Republic, Ecuador, Grenada, Guatemala, Guyana, Honduras, Haiti, Jamaica, Saint Lucia, Mexico, Nicaragua, Panama, Peru, Paraguay, El Salvador, Suriname, Trinidad and Tobago, Uruguay, Saint Vincent and the Grenadines, Venezuela.

North Africa/Middle East: United Arab Emirates, Bahrain, Algeria, Egypt, Iran, Iraq, Jordan, Kuwait, Lebanon, Libyan Arab Jamahiriya, Morocco, Oman, Occupied Palestinian Territory, Qatar, Saudi Arabia, Syrian Arab Republic, Tunisia, Turkey, Yemen.

South Asia: Afghanistan, Bangladesh, Bhutan, India, Nepal, Pakistan.

Sub-Saharan Africa: Angola, Burundi, Benin, Burkina Faso, Botswana, Central African Republic, Côte d'Ivoire, Cameroon, Democratic Republic of the Congo, Congo, Comoros, Cape Verde, Djibouti, Eritrea, Ethiopia, Gabon, Ghana, Guinea, Gambia, Guinea-Bissau, Equatorial Guinea, Kenya, Liberia, Lesotho, Madagascar, Mali, Mozambique, Mauritania, Mauritius, Malawi, Namibia, Niger, Nigeria, Rwanda, Sudan, Senegal, Sierra Leone, Somalia, São Tomé and Príncipe, Swaziland, Seychelles, Chad, Togo, United Republic of Tanzania, Uganda, South Africa, Zambia, Zimbabwe.

Western Europe: Andorra, Austria, Belgium, Switzerland, Cyprus, Germany, Denmark, Spain, Finland, France, United Kingdom, Greece, Ireland, Iceland, Israel, Italy, Luxembourg, Malta, Netherlands, Norway, Portugal, Sweden.