



## **Replacing sugar-based soft drinks with sugar-free alternatives could slow the progress of the obesity epidemic: have your Coke® and drink it too**

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The average New Zealand adult is now officially overweight. Mean body mass index for both men and women is more than  $26 \text{ kg/m}^2$ ;<sup>1</sup> one unit above the normal weight cut-off of  $25 \text{ kg/m}^2$ . Obesity, usually defined as a body mass index greater than 30 units, increased by over 50% between 1989 and 1997 and now afflicts nearly one in five adult New Zealanders.<sup>1,2</sup> Average adult body weight increased by 3.2 kg between 1989 and 1997,<sup>1,2</sup> paralleling an increase in energy intake;<sup>1</sup> among men daily energy intakes are estimated to have increased from 11.2 MJ in 1989 to 12 MJ in 1997, and in women from 7.2 MJ to 8 MJ.<sup>1,2</sup> Local information on children is limited but international data suggest similar trends to those for adults. Excessive body weight is now considered one of the most important paediatric medical problems in the United States.<sup>3</sup>

Sources of energy intake have changed in recent years, with total fat contributing just under 35% of total energy in 1997, down from about 38% in 1989.<sup>1,2</sup> In contrast, carbohydrate intake has increased from almost 44% to over 46% over the same period.<sup>1,2</sup> Increasing consumption of sugar-sweetened beverages has contributed to the increased consumption of carbohydrate and to the increased total energy intake. While the replacement of energy-dense fat with less-energy-dense carbohydrate has been encouraged as one way to reduce total energy intake, New Zealanders appear to have overcompensated. The causes of obesity are multifactorial; however, the increased availability and consumption of highly palatable, sugar-based soft drinks may be an important contributing factor. Despite being fat free, many of these drinks are surprisingly energy dense (up to 10 teaspoons of sugar in a standard 330 ml can) and relatively less satiating than solid foods with the same energy content, leading to excessive consumption.

Carbonated-beverage (ie, soft-drink) consumption in New Zealand has increased by about 45% in the last five years<sup>4</sup> and we are now the 11th highest consumers per capita worldwide. An unsubstantiated local report suggested that up to 20% of some children's energy intake is derived from soft drinks<sup>5</sup> but there are no published national data on consumption levels in children. The recently completed National Nutrition Survey in Children will provide us with better information later in the year. However, it is known that males aged 15 to 24 years are the highest adult consumers of soft drinks in New Zealand.<sup>1</sup> Non-alcoholic beverages (including fruit juice, coffee, tea) provide this subgroup of the population with about 260 kcal a day, about 10% of their daily energy intake and about 20% of their daily carbohydrate intake.<sup>1</sup> Well over half these calories are believed to come from soft drinks alone.

Prospective studies have demonstrated an association between soft-drink consumption and weight gain.<sup>3,6</sup> In a study by Ludwig et al each additional regular serving of soft drink was associated with an increase in body mass index of  $0.24 \text{ kg/m}^2$  (95% CI

0.10–0.39;  $p = 0.03$ ).<sup>3</sup> In contrast, drinking diet soft drink was negatively associated with obesity. Other adverse effects of regular soft-drink consumption include the well-known cariogenic effect of sugar on tooth enamel.

Replacing sugar-sweetened soft drinks with artificially sweetened equivalents nationwide could have modest but measurable effects. Many people drink these beverages out of thirst or social conditioning, rather than for energy. Diet drinks using artificial sweeteners would provide the same amount of fluid replenishment and possibly palatability but virtually no energy (about 3 kcal per can). As a first step we suggest that schools and hospitals substitute current ‘sugar-saturated’ soft drinks with sugar-free alternatives in cafeterias and vending machines. There are few New Zealand data on vending machine use but American reports suggest that seven out of ten people use them daily,<sup>7</sup> so the impact of substitution on consumption could be substantial. There has been some debate recently suggesting that schools ban soft drinks from vending machines; however, substitution would allow schools to continue to gain revenue from vending machine sales without adding more sugar to young New Zealanders’ diets.

There is considerable public misconception about the possible hazards of artificial sweeteners used in diet drinks. The most prevalent sweeteners in diet drinks are aspartame and acesulfame potassium. Both have undergone rigorous toxicological study and have been shown to be safe for consumption in humans including pregnant women, children and the ill.<sup>8</sup> Regulatory groups in over 100 countries, including the Joint Food and Agricultural Organization/World Health Organization Expert Committee on Food Additives (JECFA), have approved the use of these sweeteners and the use of low-calorie artificially sweetened products worldwide tripled in the last two decades of the twentieth century.<sup>8</sup> In the United States alone, there are 150 million regular consumers of such products and the use of artificial sweeteners pervades all types of foods, beverages and pharmaceutical products.<sup>8</sup>

Many soft drinks contain caffeine and there is some concern about the potential effects of caffeine consumption particularly with regards to the increase in urinary excretion of calcium.<sup>9</sup> However, human studies suggest that moderate intakes have little or no deleterious effect in young women because of compensatory mechanisms to increase calcium absorption.<sup>9</sup> Older women do not appear to compensate adequately, especially in circumstances of inadequate intake of calcium.<sup>9</sup> Nevertheless, diet soft drinks contain less caffeine than tea and less than one third of the caffeine of equivalent amounts of brewed coffee, both of which beverages are consumed much more frequently than soft drinks in older adults.<sup>10</sup>

Data from the 1997 National Nutrition Survey suggest that young New Zealand men, aged 15–24 years, consume on average almost 300 ml of regular soft drinks daily.<sup>1</sup> By extrapolating from the Ludwig study<sup>3</sup> the effect of soft-drink consumption on body mass index we estimated that an increase in body mass of approximately  $0.2 \text{ kg/m}^2$  (equivalent to a weight gain of 0.6 kg) could potentially be attributed to consumption of soft drinks in young New Zealand men. The potential impact of this increased body mass on blood pressure has been estimated indirectly from the international INTERSALT study,<sup>11</sup> as has been done in other modelling studies.<sup>12</sup> This degree of weight gain was associated with an increase in mean systolic blood pressure of about 0.2 mmHg,<sup>11</sup> and in the long term could potentially be associated with an increase in

stroke of about 0.5% per annum, and an increase in coronary events of about 0.3% per annum.<sup>11</sup>

If this soft-drink associated increase in body mass and blood pressure affected the total adult population, based on national morbidity and mortality data from 1999,<sup>13</sup> there would be an annual excess of about 50 hospitalisations and 15 deaths from stroke and about 90 hospitalisations and almost 25 deaths from coronary disease; an annual total of about 140 preventable hospitalisations and about 40 preventable deaths. The morbidity and mortality attributable to the consumption of all non-alcoholic beverages would be approximately twice that of soft drinks alone and these calculations only consider the effects of increasing weight on blood pressure and not on other weight-related disease, particularly diabetes. Moreover, it is recognised that the data from nutrition surveys generally under-report consumption making our projections conservative.

The obesity-related harms of sugar-sweetened soft drinks described above are likely to far outweigh any theoretical harm of the artificial sweeteners found in diet soft drinks, providing sufficient evidence to justify policies limiting their consumption. The substitution of sugar-based soft drinks with diet soft drinks in vending machines in schools and hospitals would be one small but achievable step in the right direction. Schools and hospitals were the first smoke-free zones in New Zealand and could now take a leadership role in tackling the obesity epidemic.

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