

# Dietary Intake Assessment of Sugar in Carbonated Soft Drinks in Lagos, Nigeria

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## Abstract

**Introduction:** Obesity is estimated to affect over 16% of adult women and 6% of adult men in Nigeria, which is 'off course' to prevent these numbers from increasing and has showed limited progress towards achieving the target of reducing obesity among these population groups. There is increasing concern that intake of added sugars-particularly in the form of sugar-sweetened beverages-increases overall energy intake and may reduce the intake of foods containing more nutritionally adequate calories, leading to an unhealthy diet, weight gain (obesity) and increased risk of NCDs. This study estimates dietary sugar intake from carbonated soft drinks and its associated risk to health in Nigeria.

**Methodology:** The level of sugar in carbonated soft drinks was estimated by this study from on-pack nutrition labels of brands most commonly available in the open markets and supermarkets in Lagos, Nigeria and daily soft drink consumption data from research studies. The assessment was done to evaluate dietary sugar intake and calculate its associated risk to health from soft drink consumption using the recommended methods in the Codex Food Safety Risk Analysis Manual and FAO Dietary Risk-Pesticide Registration Toolkit. Comparison of the estimated dietary intake was made with the recommended maximum level of sugar intake from the WHO Population Nutrient Intake Goals and the WHO Sugar Guidelines.

**Result:** The result shows that the estimated dietary intake of sugar from the soft drinks is 29.2g per day, contributes 58.4% of the WHO recommended maximum daily sugar intake. According to CCCF's criteria for selecting food groups that contribute to exposure, soft drinks contribute significantly to total dietary intake of sugar. According to the WHO African Region Nutrient Profile Model, soft drinks in Nigeria, 100ml of which contains an average of 8.12g added sugars, is classified as excessive in sugar. If maximum sugar level is set at 4g per 100ml carbonated soft drinks, the estimated dietary intake will reduce to 14g per day and the contribution of soft drinks will reduce to 28% of the recommended maximum intake. The relative intake is estimated to be 2, meaning consumer will take in 2 times less sugar if sugar benchmark is set at 4g. The relative risk reduction is estimated to be 52%, meaning the likelihood of exceeding the maximum daily intake/obesity is 52% less if the benchmark is set.

**Conclusion and recommendation:** This study concludes that consumption of carbonated soft drinks increases the risk of excessive sugar intake and unhealthy weight gain and is likely to be a major reason behind obesity rise in Nigeria. It recommends the establishment of sugar benchmark for soft drinks at 4g per 100ml of the product and restrictive marketing to children.

**Keywords:** Dietary intake assessment; Added sugars; Soft drinks; WHO sugar guidelines; WHO African region nutrient profile model; National policy on food safety and quality

## Introduction

Non-Communicable Diseases (NCDs) are the leading causes of death and were responsible for 38 million (68%) of the world's 56 million deaths in 2012 [1]. More than 40% of those deaths (16 million) were premature (i.e. under the age of 70 years). Almost three quarters of all NCD deaths (28 million) and the majority of premature deaths (82%), occurred in low and middle-income countries. Modifiable risk factors such as poor diet and physical inactivity are

some of the most common causes of NCDs; they are also risk factors for obesity-an independent risk factor for many NCDs-which is also rapidly increasing globally [2]. Obesity has become epidemic, with over 20% of adults classified as obese (obesity is estimated to affect 16% of adult women and 6% of adult men) in Nigeria, which is 'off course' to prevent these numbers from increasing and has showed limited progress towards achieving the target of reducing obesity among adult women and men. Although there is national nutrition policy to reduce sugar intake and content of packaged and processed foods, there is gap in implementation due to poor application of nutritional risk assessments of specific these foods, notably soft drinks in Nigeria [3].

There is increasing concern that intake of added sugars-particularly in the form of sugar-sweetened beverages-increases overall energy intake and may reduce the intake of foods containing more nutritionally adequate calories, leading to an unhealthy diet, weight gain (obesity) and increased risk of NCDs [4-5]. The intake of sugar-sweetened beverages, which has been identified as a behavioral risk factor, contributes to calorie overconsumption, especially among children and young adults. The National Bureau of Statistics indicates that 86.5% of Nigerian students consume carbonated soft drinks [NBS, 2010]. Nigeria is large market for soft drinks, contributing significantly to the global soft drink market with consumption reaching nearly U.S \$ 4.7 billion in 2018. Increased intake of soft drinks is particularly important in young children because consumption at an early age defines lifelong consumption patterns. Researchers have demonstrated that the worldwide popularity of carbonated soft drinks is due to their ready availability, heavy advertising and the fact that consumers find them highly palatable. Humans are born with a taste preference for sweets, so sugar is added to soft drinks to make them more palatable (improve their taste and appeal to consumers). In Nigeria, obesity is increasing and the excessive consumption of carbonated soft drinks is believed to be a major contributing factor to this problem [6]. These drinks provide little nutritional value. This means that people who consume a lot of them may be obese, yet suffer from malnutrition. Studies also show that excessive consumption of soft drinks leads to nutritional deficiencies such as poor intake of calcium [7]. This may be due to the substitution of soft drinks for milk. Increasing public awareness of the link between added sugars and health has led manufacturers to market soft drinks with claims such as, less sugar. If you take a second look at the nutritional information on the back of the bottle, you will see that the products are still high in added sugars. This study estimates dietary sugar intake from carbonated soft drinks and its associated risk to health in Nigeria.

## Methodology

### Sugar content of carbonated soft drinks in Nigeria

Data on sugar content was estimated from on-pack nutrition labels of several brands of soft drinks most commonly available in open markets and supermarkets in Lagos, Nigeria (Table 1).

**Table 1:** Sugar content of carbonated soft drinks in Nigeria.

S/N	Brand Name	Sugar Content (g per 100ml)
1	Coca-Cola (Coke)	7.5
2	Fanta	8.9
3	Bigi	5.8
4	Big	8.4
5	Royal crown (RC) Q orange	10
6	7 UP	6.9
7	Mirinda	7
8	Pepsi	7.1
9	Virgin Mojito Schweppes	8.4
10	Chapman Schweppes	9
11	Fayrouz	9.4
12	RC cola	9
13	Sprite	8.9
14	American cola	9.6
15	Planet orange	8.9
16	Pop orange	8.5
17	Mean content	8.33

### Consumption of carbonated soft drinks in Nigeria

Data on consumption was estimated to be 350ml from the study of VO Ansa [8].

### Estimation of Mean Dietary Sugar Intake for the general population

Using the information on sugar content and consumption level, dietary sugar intake from soft drinks was estimated according to a methodology developed by Joint Expert Committee on Food Additives (JECFA) as stated below [9-10].

### Calculation

(Mean sugar content in g per 100ml of the soft drinks x consumption of the soft drinks in ml per day)/ 100).

### Conversion factor

$$1\text{kcal}=4.18\text{kJ}$$

### Risk characterization

The risk was characterized by comparing the estimated dietary sugar intake with and expressed as a percentage of, the WHO Population Sugar Intake Goal.

### Relative intake (risk)

Dietary intake (risk) when soft drinks without proposed benchmark is consumed/Dietary intake (risk) when the soft drinks with proposed benchmark is consumed.

### Relative intake (risk) reduction

(Dietary intake [risk] when soft drinks without proposed benchmark is consumed–Dietary intake [risk] when the soft drinks

with proposed benchmark is consumed/Dietary intake [risk] when the soft drinks without proposed benchmark is consumed) x 100.

### Dietary risk

Dietary risk is the estimated dietary intake expressed as a percentage of the WHO Population Sugar Intake Goal.

### Result and Interpretation

Table 2 shows the sugar content of carbonated soft drinks in Nigeria. The content ranged from 5.8g to 10g, with an average of 8g, per 100ml of the product. This wide subjective range of contents reflects a lack of sugar content regulation. In 100ml of the product, the amount of energy (kcal) from added sugars (g from added sugars and 4kcal) is higher than 10% of the total energy. Thus, soft drinks in Nigeria are excessive in added sugars and exceed (on a per 100ml basis) the total sugar threshold provided in the WHO African region nutrient profile model for water-based flavored and unflavored drinks food category. Thus, soft drinks in Nigeria should be subject to restricted marketing to children. The estimated dietary intake of added sugars from soft drinks is 29.2g per day, which is 58.4% of the WHO recommended maximum daily sugar intake. This shows that soft drinks contribute over half of the added sugars in the diet, thus contributing significantly to the total dietary intake of sugars. Hence, the consumption of the product makes it more likely for the

diet to exceed the WHO recommended maximum daily sugar intake and consumers to develop obesity. This calls for policy/regulatory directive to drive the reformulation of soft drinks in Nigeria, which has the potential to limit/blunt our intake/appetite of/for more soft drinks. If the sugar content is benchmarked at 4g per 100ml of the product, the estimated dietary intake of added sugars would be 14g per day, which is less than 30% of the WHO recommended maximum daily sugar intake. The relative intake/risk is estimated to be 2. This suggests that consumers of soft drinks in Nigeria when sugar benchmark is established are 2 times less likely to exceed the WHO recommended maximum daily sugar intake and develop obesity. This could mean that when a sugar benchmark for soft drinks is present, the likelihood of developing obesity decreases relative to when it is absent. The relative intake/risk reduction is estimated to be approximately 52%. This indicates that reformulation to meet the proposed sugar benchmark would result in a significant (52%) reduction in the intake of added sugars and risk of obesity associated with the consumption of carbonated soft drinks in Nigeria. This could mean that when a sugar benchmark for soft drinks is present, the association between consumption of the drinks and obesity is weakened relative to when it is present. Front-of-pack warning label implementation for soft drinks would further facilitate the reformulation of the product in Nigeria.

**Table 2:** The nutrient profile model for the WHO African region [11].

Food Category	Examples of Food Items	Codex Food Category Code	Total Fat (g)	Saturated Fat (g)	Total Sugars (g)	Added Sugars (g)	Sodium (g)	Energy (kcal)
Water- based flavoured and unflavoured drink	Sport, energy drinks, electrolyte drinks, carbonated and non-carbonated water-based flavoured drinks (i.e. soft drinks), powdered juices, concentrates (liquid or solid) calculated as or in ready-to-drink form, flavoured waters (sparkling), reconstituted chocolate or malted powdered drinks, syrups, sugar cane juices	14.1.4	No threshold provided	No threshold provided	0	No threshold provided	0.1	No threshold provided

### Conclusion and Recommendation

This study concludes that consumption of carbonated soft drinks increases the risk of excessive sugar intake and obesity and is likely to be one of the major factors contributing to the obesity rise in Nigeria. It recommends the establishment of sugar benchmark for soft drinks at 4g per 100ml of the product and restrictive marketing to children. This will contribute significantly to national efforts in reducing population burden of obesity and related non-communicable diseases such as Type 2 diabetes, achieving WHO global diet-related non-communicable disease targets and Nigeria's vision of developing healthy, educated and productive Nigerians for a globally competitive Nation by 2030.

### Assumption

A. The on-pack sugar content data reflect correct analytical data.

B. Estimation of added sugars is based on the number of total sugars (carbohydrate) declared on product packaging. The product is a food with no or a minimal amount of naturally occurring sugars.

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