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Dietary Risk Assessment for Sodium in Instant Noodles with the Potential Impact of the WHO Global Sodium Benchmark Adoption in Nigeria

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Abstract

Introduction

Consumption of instant noodles has increased in the last five years, from an average annual consumption of 2 billion servings in 2019 to 3 billion servings in 2023 [1]. Concerns have been raised about the sodium content, potential impact of the consumption of instant noodles on the risk of hypertension and adopting the WHO global sodium benchmark for instant noodles on dietary sodium intake in Nigeria.

Aim

To assess the potential impact of adopting the WHO global sodium benchmark on dietary risk of excess intake of sodium from instant noodles in Nigeria.

Methodology

The level of sodium in instant noodles 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 instant noodles consumption data from the GEMS/Food Cluster Diets. The assessment was done to evaluate dietary sodium intake and calculate the risk from instant noodles consumption using the recommended methods in the Codex Food Safety Risk Analysis Manual and FAO Dietary Risk – Pesticide Registration Toolkit [2]. Comparison of the estimated dietary intake was made with the Nutrient Reference Value – Noncommunicable Disease for Sodium from Codex Guidelines on Nutrition Labelling. Also, the estimated sodium content in instant noodles was compared with the WHO global sodium benchmark.

Results

The estimated dietary sodium intake was 4.8 g per day which exceeds the NRV-NCD for sodium. This suggests high risks of excess dietary sodium intake and diet-related hypertension. The estimated dietary sodium intake if the WHO global sodium benchmark was adopted was 2.6 g per day which is significantly lower compared with no benchmark. The estimated relative risk was 1.9, suggesting that the risk of excess dietary intake of sodium from instant noodles is higher in the absence of the sodium benchmark. The estimated relative risk reduction was 46%, suggesting a 46% reduction in the risk of excess intake of sodium upon the adoption of the WHO global sodium benchmark for instant noodles in Nigeria.

Conclusion

This study suggests that consumers of instant noodles in Nigeria may not be adequately protected against excess dietary sodium intake and diet-related hypertension. The dietary risk to health imposed by intake of sodium in instant noodles is high. The adoption of the WHO global sodium benchmark would contribute significantly to reducing dietary sodium intake and risk from instant noodles in Nigeria.

Keywords: Dietary intake; Risk assessments; Instant noodles; WHO global sodium benchmark

Introduction

The World Health Organization (WHO) has developed global benchmarks for sodium levels in foods across different food categories and subcategories including the subcategory description of instant noodles [3]. Nigeria is yet to establish sodium benchmarks across food categories. High dietary sodium intake (intake of more than 2,000 mg sodium per day), which increases blood pressure and the risk of cardiovascular diseases, is

responsible for 3 million of the estimated yearly 11 million deaths globally associated with poor diet. Cardiovascular diseases are the leading cause of noncommunicable diseases globally, responsible for 32% of all deaths [4-6]. Hypertension poses a major public health concern in Nigeria, with a prevalence among adults of approximately 31%. In 2019, 19.1 million adults aged 30-79 years were with hypertension in Nigeria and the average sodium consumption among Nigerian adults has been estimated to be 2.8 g per day, exceeding the WHO's daily recommendation of not more than 2 g per day [7-10]. This significant deviation underscores the potential for elevated health risks (atherosclerosis, stroke and heart attack) related to hypertension and cardiovascular diseases within the population. An effective way of reducing dietary sodium intake (thus, reducing blood pressure and diet-related non-communicable diseases) is by lowering sodium content in foods that contribute significantly to total dietary sodium intake [11-13]. The Global Nutrition Report shows that Nigeria is off course with regards to meeting established targets in the area of reducing the prevalence of hypertension among its population [14]. With increasing prices of other staple foods like rice, Nigerians have alternated with instant noodles. In its recent data for 2023, the World Instant Noodles Association revealed that Nigeria is among top 10 countries in the world that consume the most noodles with an annual average consumption of 3 billion servings of noodles. Consumption of instant noodles has increased in the last five years, from an average annual consumption of 2 billion servings in 2019 to 3 billion servings in 2023 [1]. Concerns have been raised about the sodium content, potential impact of the consumption of instant noodles on the risk of hypertension and adopting the WHO global sodium benchmark for instant noodles on dietary sodium intake in Nigeria. The importance of addressing these concerns is stressed in the recently published national policy on food safety and quality and its implementation plan [15].

This study assessed the potential impact of adopting the WHO global sodium benchmark on dietary risk of excess intake of sodium from instant noodles in Nigeria.

Methodology

Sodium content of instant noodles in Nigeria

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

Table 1: Sodium content of instant noodles in Nigeria.

S/N	Brand name	Sodium content (g per 100 g)
1	Golden penny chicken flavor	1.214
2	Minimie slurry chicken flavor	1.6
3	Mimee chicken flavor	1.686
4	Chikki chicken flavor	1.16
5	Indomie chicken flavor	1.68
6	Sedaap supreme tasty chicken noodles	1.543
7	Indomie onion chicken flavor	1.7
8	Indomie oriental fried noodles	1.414
9	Indomie crayfish flavor	0.941
10	Golden penny jollof chicken flavor	1.214
	Mean	1.4376
	Standard Deviation	0.2553
	Standard Error	0.0914

Consumption of instant noodles in Nigeria

Data on instant noodles consumption was estimated from the Global Environment Monitoring System (GEMS)/Food Cluster Diets (Table 2) which are developed by WHO, based on FAO Supply Utilization Account data and represent average per capita food consumption for 17 groups of countries in the world [16].

Table 2: Consumption of instant noodles in G13 Cluster that includes Nigeria.

Food category	Cluster	Consumption (g/day)
Grains and grain-based products	G13	333.34

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Estimation of Mean Dietary Sodium Intake (EDI) for the general population

Using the information on sodium content and consumption level, dietary sodium intake was estimated according to a methodology developed by Joint Expert Committee on Food Additives (JECFA) as stated below [17].

Calculation:

(Mean sodium content in g per 100 g of instant noodles x consumption of instant noodles in g per day) / 100).

Acceptable daily intake (ADI)

(WHO global sodium benchmark for instant noodles in g per 100 g x acceptable serving size, not more than 300 g, per day) / 1000. This methodology is derived from the Codex Committee on Contaminants in Foods' (CCFC's) criteria for selecting food groups that contribute to exposure [17].

Nutrient Reference Value – Noncommunicable Disease for Sodium

Table 3: Nutrient Reference Value – Noncommunicable Disease for Sodium.

Nutrient	Levels not to exceed	Levels to achieve
Saturated fatty acids	20 g	
Sodium	2 g	
Potassium		3.5 g

The value was obtained from the Codex Guidelines on Nutrition Labelling (Table 3): nutrient intake levels not to exceed and nutrient intake levels to achieve [18].

Global Sodium Benchmark

Table 4: WHO Global Sodium Benchmark.

Main food category	Subcategory	Subcategory description	Global benchmark (mg per 100 g)	Lowest maximum target on which the benchmark is based
Ready-made and convenience foods and composite dishes	Pasta, noodles, and rice or grains with sauce or seasoned (dry-mix, concentrated)	Dry-mixes for shelf-stable pasta, noodles, and rice or grain mixes with sauce or seasonings sold in concentrated form (e.g. macaroni with cheese sauce, noodles in tomato sauce and teriyaki noodles). Includes instant noodle with soup or seasonings.	770	United States: Grain-based meals/entrees, dry-mix, 770 mg

Value of the global sodium benchmark was obtained from the WHO Global Sodium Benchmarks for Different Food Categories (Table 4).

Risk characterization

The risk was characterized by comparing the estimated dietary sodium intake with the Nutrient Reference Value – Noncommunicable Disease (NRV-NCD) for sodium or expressing the estimated dietary sodium intake as a percentage of the NRV-NCD for sodium.

Dietary risk

Dietary risk is expressed as a percentage of the NRV-NCD for sodium. If the expressed percentage is more than 100%, the risk is generally considered to be high.

Relative risk

Dietary intake when there is benchmark / Dietary intake when there is no benchmark.

Relative risk reduction

(Dietary Intake when there is no benchmark – Dietary Intake when there is benchmark / Chronic Dietary Intake when there is no benchmark) x 100 [19].

Results and Interpretations

Table 1 shows the sodium content of instant noodles in Nigeria. All the noodles have a sodium content that exceeds the WHO global sodium benchmark. The sodium content ranged from 0.941 g to 1.700 g per 100 g. The mean content was 1.4376 g per 100 g which far exceeds the WHO global sodium benchmark of 0.770 g per 100 g for instant noodles (The mean content is 86.7% higher than the WHO global sodium benchmark). Adoption of the WHO global sodium benchmark would significantly reduce the sodium content of instant noodles in Nigeria [20].

The estimated dietary intake of sodium from instant noodles is approximately 4.8 g per day, which far exceeds the WHO recommended not more than 2 g of sodium per day or the NRV-

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NCD for sodium. This indicates that instant noodles contribute significantly to total dietary intake of sodium, a strong association between the consumption of instant noodles and excessive intake of sodium. The estimated dietary intake using the WHO global sodium benchmark is approximately 2.6 g per day, indicating significant impact of WHO global sodium benchmark adoption on dietary intake. Although there is significant impact on risk, there is need within the Nigeria context to adapt the WHO benchmark to a lower value.

The dietary risk is estimated to be 140% more of the NRV-NCD for sodium. This indicates very high risk. If the WHO global sodium benchmark is adopted, the dietary risk is estimated to be 30% more of the NRV-NCD. This indicates a significant impact of WHO global sodium benchmark adoption on dietary risk.

The relative risk is approximately 1.9. This indicates that the risk of excess dietary sodium intake when there is no WHO global sodium benchmark is higher than when the WHO global sodium benchmark is adopted.

The relative risk reduction is estimated to be approximately 46%. This implies that the adoption of WHO global sodium benchmark could reduce the risk of excess dietary sodium intake from instant noodles consumed in Nigeria by 46% and would have positive impact on the dietary sodium intake with its associated NCD risk. The estimated 46% reduction if the WHO global sodium target is adopted would contribute significantly to national efforts to reduce population sodium intake and achieve the WHO global target of a 30% reduction in mean population sodium intake by 2030 [21].

Conclusion

The consumption of instant noodles might play a key role in influencing the prevalence of hypertension in Nigeria. Adopting the WHO global sodium benchmark might reduce the dietary risk of excess sodium intake from instant noodles in Nigeria and contribute to risk reduction of diet-related hypertension. The likelihood of consumer protection and reduced risks of excessive sodium intake with hypertension if the WHO global sodium benchmark is adopted and implemented through a mandatory approach is high.

Limitations and assumptions

1. A more accurate dietary intake estimate would have been made if available national instant noodles consumption data were used.

2. It is assumed that the on-pack sodium content data reflect correct analytical data.

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