Republic of Mauritius

Ministry of Health and Wellness

NaCl

Mauritius Salt Intake Study 2023

Report

NaCl

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The Mauritius Salt Intake Study 2023

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Executive Summary

Elevated sodium (salt) intake is a causal factor of hypertension, and contributes to increased risks of health conditions such as cardio-vascular diseases, renal complications and stomach cancer.

The overall aim of the Mauritius Salt Intake Study 2023 3 was to provide a measurement of the current average daily salt intake in the Mauritian population using 24-hour urinary sodium excretion.

This is the second study following the first Mauritius Salt Intake Study conducted in 2012 as part of the Mauritius Nutrition Survey carried out in the same year. This report documents the findings of the 2nd Mauritius Salt Intake Study 2023.

The present study has revealed that the daily salt consumption by adult Mauritian population aged 30 -59 years is higher than the recommended level (the World Health Organization recommends adults to consume less than 5.0 grams of salt /day).

The overall age and sex standardized mean salt intake was estimated at 7.1 grams (7.6 grams for men and 6.5 grams for women) in this study. This represents a 10% decrease from 7.9 grams in 2012.

Interventions to reduce population wide salt intake have been shown to be highly cost effective to diminish the burden of cardio-vascular diseases. The findings and recommendations documented in this report will be used to develop a national strategy and action plan to decrease salt intake in the Mauritian population.

Recommendations

Policy and cost-effective interventions must be accelerated for further reducing population wide salt consumption to benefit health and minimize the health care burden for individuals, families and society and may focus on:

- Implementation of food standards set by regulatory bodies and mechanisms such as the Food Standards Agency and the Food Act to enforce maximum sodium content limits in foods and to encourage food product reformulation.
- Strengthening supportive environments for consumer choices by policy aimed at food industry, healthy public food procurement and service, and setting nutrition criteria for prepared foods sold to public.
- Mandatory marketing restrictions to control market supply based on consumer demand for unhealthy foods high in salt (sodium and fats and sugars)
- Fiscal policies such as taxes on unhealthy foods and beverages, subsidies on healthy foods such as vegetables, fruits, and low salt products.
- Nutrition labelling to empower consumer choice such as interpretative front-of-pack labelling, and nutrient declaration for controlling sodium/salt in foods (as well as fat and sugar),
- Innovative strategies to reinforce and raise consumer awareness and empowerment through intensive nutrition education and skilling programs that will reduce population salt intake/ consumption.
- Mass media campaigns to encourage further behavior change concerning eating habits and diet to reduce consumption of highly processed foods and improve the overall nutritional quality of diets.

1. Introduction

Mauritius is a country with a population of 1.2 million which has shifted from an agriculture based low-income economy to a more diversified high-income economy based mainly on trade, manufacturing, tourism and financial services.

Along with rapid economic growth, Mauritius is experiencing an increase in public healthcare expenditure. The National Health Accounts 2017 (NHA), indicates that the country spent an estimated amount of Rs 16.5 billion on non-communicable diseases, representing 66.52% of the total health expenditure. Approximately 22% of the NCD budget (around Rs 3.6 billion), was spent on the treatment of cardiovascular diseases. In addition, Mauritius spent Rs 1.2 billion (around 7.3%) and Rs 955 million (around5.8%) on diabetes and cancer, respectively in 2016.

Globally, cardiovascular diseases remain the leading cause of deaths among people at their most economically productive age that is between 30 and 70 years. Hypertension is one of the main risk factors for death and disability globally. It can lead to cardiovascular diseases such as stroke, heart attack, heart failure and kidney damage amongst other health problems. It increases mortality from cardiovascular and kidney diseases. The age-standardized prevalence of hypertension in adults aged 30-74 years was 33% (32% in women and 34% in men) worldwide in 2019. In the same year, more than 50% of all cardiovascular deaths (hypertensive heart disease deaths, ischaemic heart disease deaths and stroke deaths) and 62% of deaths from chronic kidney disease worldwide were attributed to high systolic blood pressure.

NCDs are currently the leading cause of mortality and morbidity in Mauritius, which closely reflects the global situation. According to the Health Statistics Report 2022, of all deaths recorded in Mauritius for the year 2022, diseases of the circulatory system (mainly heart diseases and strokes) were responsible for 34.8% followed by endocrine, nutritional and metabolic diseases (mainly diabetes) for 22.2%.

In Mauritius, according to the NCD Survey 2021, the standardized prevalence of hypertension is 27.2% (26.9% for men and 27.5% for women). Moreover, the survey states that the age and sex adjusted prevalence of having any three risk factors to develop hypertension (the risk factors include: glucose intolerance, abdominal obesity, smoking, total cholesterol and albuminuria) was 76.9% (77.5% in men and 76.4% in women).

In the recent Mauritius Nutrition Survey 2022, the average daily consumption per capita of dietary sodium was found to be 2954.4mg (7.3g salt) in participants aged 12 to 74 years. In the same study, energy-dense and nutrient-poor foods in the daily diet such as fast foods, sweetened beverages, fried foods and pastries contributed to 409.3 g of sodium (around 1.0g salt) per day. The average monthly household consumption of salt used in cooking was 500g as reported by this participant group.

The Salt Intake Study carried out in 2012 in Mauritius revealed that the salt intake in the population was higher than generally recommended, as seen worldwide. The overall age-sex standardized mean salt intake was estimated at 7.9 g daily. It was also found that 83.2% of adults aged 30-59 years consumed 5 or more grams of salt daily and that salt intake level was higher among men.

Sodium deficiency is highly improbable in healthy individuals. Over the course of human evolution, sodium found naturally in foods was physiologically enough because the body developed mechanisms to retain and conserve it. The human body requires small amounts of sodium to regulate body fluids and electrolyte as well as maintain critical body functions. However, most people consume much more sodium than they need for good health and a high intake of sodium can lead to adverse health consequences. The kidneys regulate the fluid and electrolyte balance in the body. Disturbance in this balance leads to various health complications such as hypertension and chronic kidney disease.

Salt consumption has increased in almost all populations globally, and most of the sodium we eat comes from salt added in daily cooking, as well as from packaged, processed, store bought, ready-to-eat and restaurants foods. Various studies have shown that there are health risks associated with high salt intake, including high blood pressure in sensitive individuals. In 2019, almost 2 million cardiovascular deaths were attributed to sodium consumption above the reference level of 1 to 5 grams daily. This makes excessive sodium intake the biggest cause of death than any other dietary factor.

The WHO 2023 Global report on hypertension states that many of these deaths can be prevented through policies that aim to reduce the risk of hypertension. The main causes of hypertension are more likely to be social and environmental exposures such as poor-quality diet high in sodium and low in potassium, overweight and obesity, consumption of alcohol, use of tobacco and physical

inactivity. Thus, it is important to address these NCD risk factors in both the treatment and the prevention of hypertension.

Therefore, health authorities around the world have recommended limitations of dietary sodium. In the WHO World Health Report 2002 (WHO, 2002) it is estimated that globally 62% of cerebrovascular disease and 49% of ischemic heart disease were attributable to elevated blood pressure (systolic > 115 mmHg). A technical report produced by WHO and the Food and Agriculture Organization of the United Nations (FAO) recommends the consumption of 5 g of sodium chloride or less (or 2 g sodium) per day as a population nutrient intake goal, while ensuring that the salt is iodized (WHO, 2010).

Excessive sodium intake is defined as more or equal to 2000 mg per day (more or equal to 5 g of salt per day). Increased sodium intake has been associated with hypertension, a major risk factor for death and disability globally. It can lead to cardiovascular diseases such as stroke, heart attack, heart failure, kidney damage, and many other health problems.

Given the direct and dose-response relationship between the amount of dietary salt (sodium chloride) consumed and hypertension risk, salt reduction strategies at national level could be useful in reducing the blood pressure burden. Reducing sodium intake is known to be one of the most cost-effective way to improve health as it can avert many cardiovascular events and deaths at very low total programme costs. Elevated blood pressure can be avoided, hypertension can be better controlled, thousands of deaths from cardiovascular diseases such as stroke, heart and renal disease can be prevented and this will in turn reduce the financial burden of treatment and health-related costs put on health care systems.

Several strategies have been implemented by the Ministry of Health and Wellness to reduce sodium intake in the Mauritian population. Awareness campaigns on salt intake reduction are being continuously carried out within different levels of the community and through mass media. Pamphlets on salt intake reduction have been created and distributed. The level of sodium in commonly consumed bread is controlled through the draft Food Regulations 2023, which states that the sodium content in a bread of 100g should not exceed 400mg.

Knowledge of sodium consumption levels and main sources of sodium in the diet are important to inform and develop a realistic country-specific salt reduction policy. The present study will thus

help to update data on salt intake trends in the Mauritian population. Study findings may be used to assess impacts and outcomes of salt reduction strategies on the population that have been developed and used to address the situation, since the last study.

The WHO also encourages countries to estimate a baseline of population-level dietary salt intake and from there to monitor trends in intake and the effectiveness of any interventions within and between populations. Measuring population salt intake is crucial to obtain current data for the development of population salt reduction strategy. It helps to define the scale of the issue and build a case for a nationwide public health program. Over time, monitoring trends in population salt intake is a necessary step in evaluating the effectiveness of the intervention.

More than 90% of salt eaten is passed in urine and therefore the most accurate measurement to estimate dietary salt intake is to collect 24-hour urine samples from a representative sample of the population. The recognized gold-standard method of measuring population salt intake is by measuring 24-hour urinary sodium excretion through 24-hour urine measurements, ideally over several days to account for the daily change in salt intake but one 24-hour urine measurement is considered sufficient for population surveys.

4. Aim and Objective of the Mauritius Salt Intake Survey 2023

AIM

The aim of this study was to measure the average daily salt (sodium) intake in the adult Mauritian population.

OBJECTIVE

The objectives of the survey were:

- To obtain updated data on current salt intake of Mauritian adults.
- To study trends in the salt intake from the baseline study.
- To formulate evidence-based recommendations in view to reduce morbidity and mortality associated with cardiovascular disease.

5. Survey Design and Methodology

A cross sectional and community-based survey has been conducted.

5.1 Study Sample

The sampling frame were all adults aged 30 to 59 years that had participated in the Mauritius National Nutrition Survey 2022, and were randomly selected from 10 clusters representing well-demarcated geographical regions defined by the Cartography Division of Statistics Mauritius (Ex CSO) for the National Nutrition Survey 2022.

In order to meet the study requirements with respect to reliability, validity and for logistical considerations, the final sample size comprised a total of 300 respondents (150 men and 150 women).

5.2 Inclusion criteria

The criteria for inclusion in the study were

- Mauritian adults aged 30 to 59 years,
- and who provided written consent for participation in the study.

5.3 Exclusion criteria

The criteria for **exclusion** were:

(i) Pregnant women
(ii) Hypertensive patients on medication
(iii) Cardiac patients on medication (diuretics)
(iv) Patients undergoing dialysis.

Ethical Considerations

Ethical clearance was obtained from the Ethics Committee of the Ministry of Health and Wellness. Written consent ***(Annex 1)*** for all participants was obtained prior to survey administration. Confidentiality and anonymity were maintained during all survey procedures. Only aggregated data will be published. Participation in the study was completely voluntary.

Interviewer Training

Survey interview officers attended a one-day comprehensive training program on 29 August 2023 on interview techniques and guidelines to standardize data collection through questionnaires. Interview supervisors ensured quality control of questionnaires/data collection on survey sites.

Data Collection

The Mauritius Salt Intake Study 2023 was conducted from 31 August to 05 September 2023 at 10 sites. Two teams worked in parallel at two different survey sites daily.

6. Survey Activities

6.1 Registration

The name of the participant was registered and a survey serial number allocated. Personal data were collected and entered on the questionnaire form.

6.2 Blood Pressure

Blood pressure (BP) was measured in all subjects using an automated blood pressure monitor (Omron blood pressure machine SEM-1) that was regularly calibrated.

6.3 Blood sample

All participants had their blood taken for HbA1c.

6.4 Anthropometry

Anthropometric measurements were taken on the survey site. Height, weight, waist circumference were measured by trained staff. All anthropometric measurements were taken with subjects wearing light clothing and without shoes.

- Weight - Good quality heavy duty weighing scales were used to weigh participants who were barefoot and wearing light clothing, to the nearest 0.1 kilogram. The weighing scales were calibrated daily using standard weight.
- Height - Height was recorded to the nearest 0.5 centimeter, using a stadiometer.

- Waist Circumference: Waist girth was measured to the nearest 0.5cm at the mid-point between the iliac crest and the lower margin of the ribs, using a measuring tape, taking care to apply it horizontally.

6.5 Questionnaire

A questionnaire was used to gather information on the participants' socio-demographic background, lifestyle practices and dietary knowledge/attitudes and behavior/practices. Questions were asked in a standard manner using the appropriate language (usually Creole), and numbers recorded legibly in pencil in appropriate boxes. Each box on the survey form was filled/completed.

6.6 Urine Collection

A 24-hour urine sample was collected from all participants to carry out sodium intake test. Prior to the start of the urine collection, participants were given clear instructions and counseled by trained staff on the 24-hour urinary collection method.

To improve on rates of complete collection, the latter was carried out at participants' home during the 24 hours when urine was collected. The participants were instructed by the survey team on the method of urine collection, they were also counseled on the importance of collecting a complete sample, and were provided with a sufficient number of standard 1-litre collection jars (and a funnel for women) for the 24-hour period: equivalent to a capacity of 4–5 litres. To prevent deterioration of the samples, the collection jars were pretreated with boric acid as preservative.

- Immediately before starting the collection, the participant was asked to void his or her bladder, the time of start was to be recorded at this point.
- All urine voided from that moment onwards was collected until the same time the following day when the end of the collection was supervised in the home.
- At about the same time the next day, the participant was asked to empty his or her bladder completely, and the final urine specimen was collected. At this point the collection time was recorded.
- Samples collected were placed in a cool box and sent to the laboratory within 2 hours of collection.

Calculation of an individual's sodium excretion over 24-hour are based on:

- sodium concentration (mmol per litre),
- total volume of urine collected (ml),
- collection time (hours and minutes)

6.7 Response Rate

253 participants out of 300 eligible individuals that were selected to participate in the study, attended the survey sites, i.e. a response rate of 84% was obtained.

7. Findings

The results of the Mauritius Salt Intake Study 2023 are presented in this report.

7.1 Urine sodium excretion and estimated 24-hour salt consumption

The following method was used to estimate an individual's urinary sodium excretion and estimated 24-hour salt intake.

24-hour urinary sodium has been calculated as:

Urinary sodium (mmol/24-hour) = sodium (mmol/litre) x urinary volume (litre per 24-hour)

As 1g of salt = 17.1 mmol of sodium,
Salt intake has been calculated as:

Salt (g/day) = 24-hour urinary sodium (mmol/24-hour) / 17.1

In line with international practice, the volume of urine samples collected for which the laboratory results have been considered for data analysis is between 700 ml and 3000 ml.

Table 1: Urine sodium excretion and estimated 24-hour salt consumption

	Sodium in 24-hour urine (mmol/L)	Estimated 24-hour consumption of salt (grams)
Mean	**123.8**	**7.2**

Table 1 shows the urine sodium excretion and estimated 24-hour salt consumption by the survey participants. The mean sodium in the 24-hour urine was found to be 123.8mmol/L with a Standard Deviation of 58.8mmol/L. The unadjusted mean salt in the 24-hour urine excretion was found to be 7.2 grams.

Table 2: 24-hour salt consumption by Gender

Gender	Estimated 24-hour consumption of salt (grams)
Male	8.1
Female	6.5

Table 2 shows the average 24-hour salt consumption by male participants was 8.1g compared 6.5g consumed by female participants.

In order to provide national estimates of the parameters studied, results have been standardized by age and gender. The overall age-gender standardized mean salt in urine for adults aged 30-59 years was 7.1g.

It is therefore estimated that the overall age-sex standardized mean consumption of salt per day in the Mauritian population was 7.1grams (7.6 grams for men and 6.5 grams for women).

Table 3: 24-hour salt consumption by Age Group and Gender

Age Group	Estimated 24-hour consumption of salt (grams) Overall	Estimated 24-hour consumption of salt (grams) MALE	Estimated 24-hour consumption of salt (grams) FEMALE
30 – 34	6.0	4.9	6.3
35 – 39	7.3	8.4	6.7
40 – 44	7.6	8.2	7.1
45 – 49	7.1	9.0	5.8
50 – 54	7.2	7.9	6.1
55 – 59	7.3	7.6	6.9

Table 3 shows 24 -hour salt consumption by age group and gender. Highest level of 24-hour salt consumption was noted in the age group 40–44 years at 7.6g: 8.2g daily salt intake by men and 7.1g by women. Amongst participants aged 35-39 years, the mean 24-hour consumption of salt was 7.3g, similar to those aged 55-59 years. Overall, 24-hour salt consumption was higher amongst men aged 45-49 years at 9.0g. Lowest salt intake is noted amongst participants aged 30 – 34years at 6.0g, with men consuming 4.9g salt and women consuming 6.3grams salt daily.

7.2. Characteristics of survey participants and mean salt intake

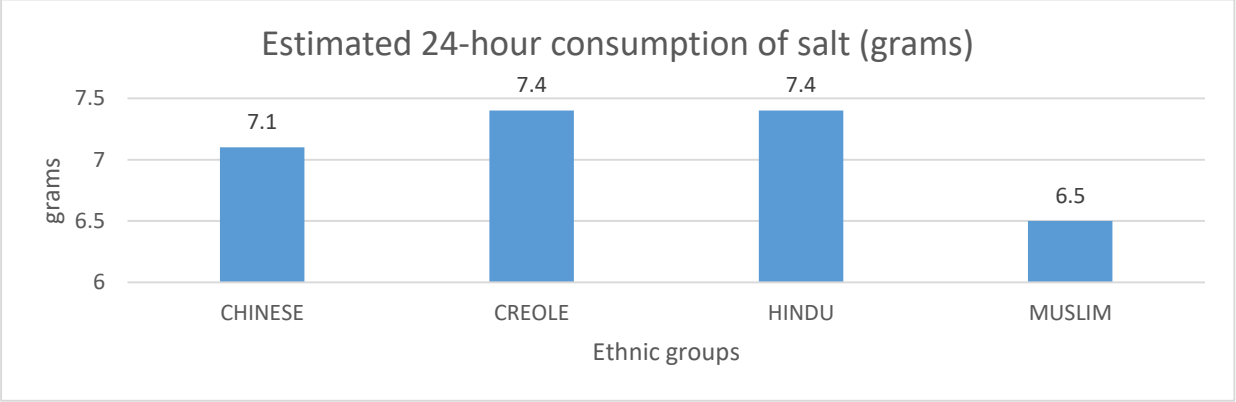
7.2.1 Estimated mean 24-hour salt consumption by ethnicity

Table 4: Estimated 24-hour salt consumption by ethnic group

Ethnic Group	Estimated 24-hour consumption of salt (grams)
Chinese	7.1
Creole	7.4
Hindu	7.4
Muslim	6.5

Overall, mean 24-hour salt consumption was higher than recommended amongst all ethnic groups in the survey. Lowest was noted amongst Muslim population at 6.5g and highest daily salt intake was found to be 7.4g amongst both Creole and Hindu participants.

Fig 1 Estimated 24-hour salt consumption by ethnicity



7.2.2 Estimated mean 24-hour salt consumption by education

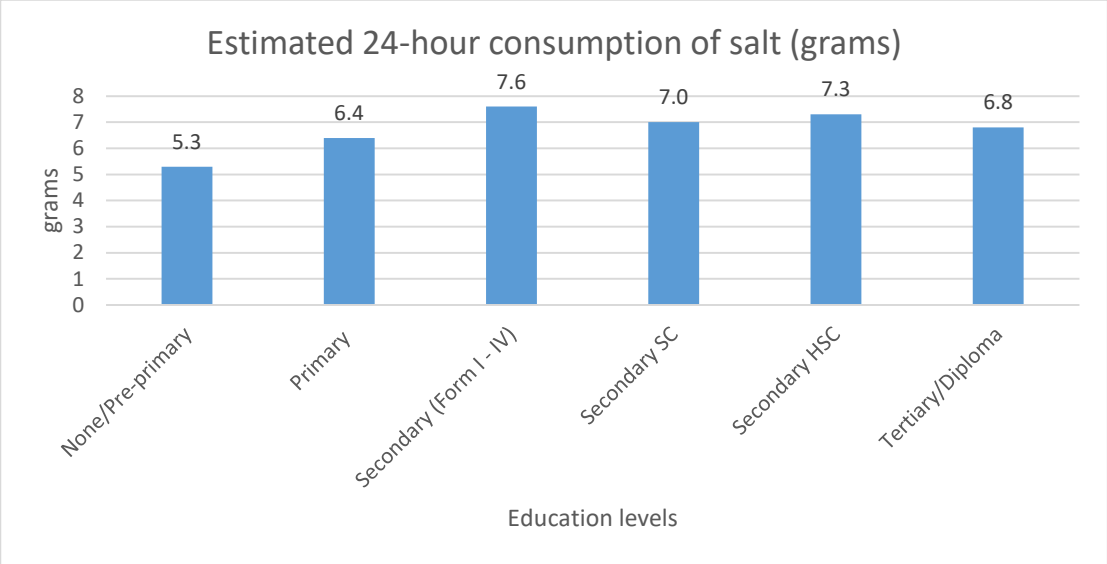
Table 5: Estimated 24-hour salt consumption by education

	Estimated 24-hour consumption of salt (grams)
None/Pre-primary	5.3
Primary	6.4
Secondary (Form I - IV)	7.6
Secondary SC	7.0
Secondary HSC	7.3
Tertiary/Diploma	6.8

Overall, mean 24-hour salt consumption was higher than recommended amongst all education levels in the survey. Lowest mean was noted amongst those with no education or who have

achieved pre-primary level at 5.3g, whereas those listed as having achieved secondary level of education up to grade 10 consumed more at 7.6g daily.

Fig 2 Estimated 24-hour salt consumption by education level



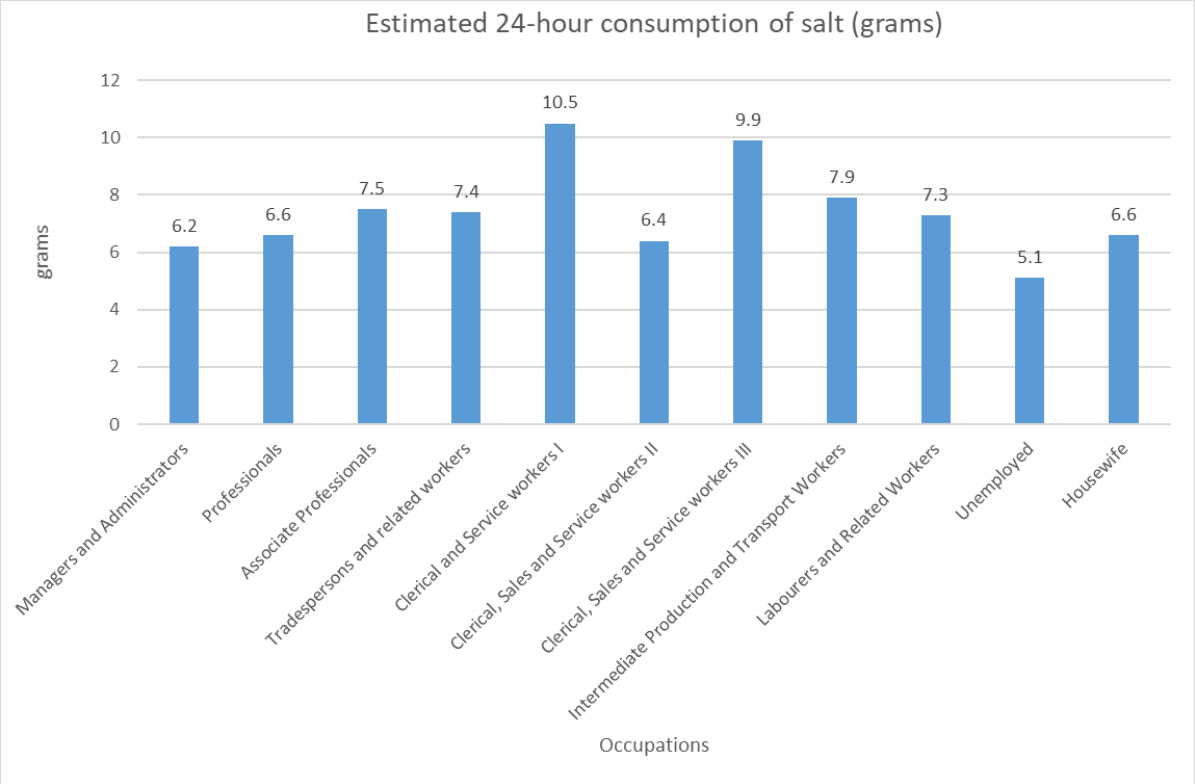
7.2.3 Estimated mean 24-hour salt consumption by occupation

Table 6: Estimated 24-hour salt consumption by occupation

	Estimated 24-hour consumption of salt (grams)
Managers and Administrators	6.2
Professionals	6.6
Associate Professionals	7.5
Tradespersons and related workers	7.4
Clerical and Service workers I	10.5
Clerical, Sales and Service workers II	6.4
Clerical, Sales and Service workers III	9.9
Intermediate Production and Transport Workers	7.9
Labourers and Related Workers	7.3
Unemployed	5.1
Housewife	6.6

Overall, mean 24-hour salt consumption was higher than recommended amongst all occupation categories in the survey. Lowest mean was noted amongst those in the unemployed category at 5.1g and highest consumption in the clerical and service workers at 10.5g.

Fig 3 Estimated 24-hour salt consumption by occupation



7.2.4 Estimated mean 24-hour salt consumption by household income

Table 7: Estimated 24-hour salt consumption by household income level

	Estimated 24-hour consumption of salt (grams)
Up to Rs 10,000	7.3
Rs 10,001 -Rs 20,000	7.7
Rs 20,001 - Rs 35,000	7.0
Rs 35,001 - Rs 50,000	7.0
Above Rs 50,000	7.1

Overall, mean 24-hour salt consumption was higher than recommended amongst all income levels in the survey. Lowest mean consumption was noted amongst those in household with income levels of Rs 20001-35,000 and Rs 35,001-50,000 category at 7.0g and highest consumption at 7.7g daily by those in household income in Rs 10.001-20,000 range.

Fig 4 Estimated 24-hour salt consumption by household income

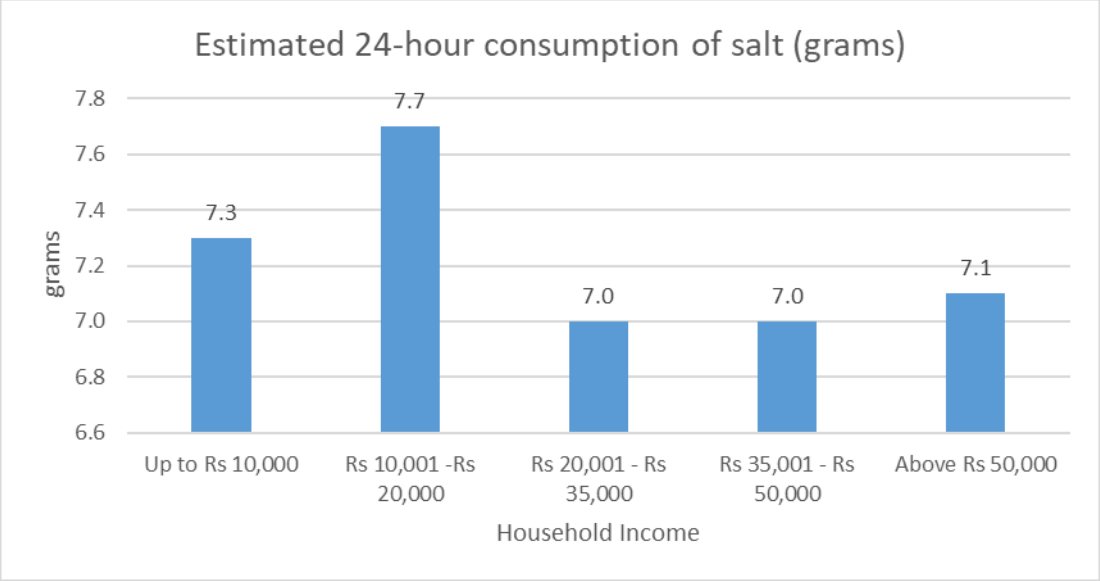


Table 8: Mean salt consumption as per BMI

	Both Sexes (%)	Estimated 24-hour consumption of salt (grams)	Male (%)	Estimated 24-hour consumption of salt (grams)	Female (%)	Estimated 24-hour consumption of salt (grams)
Underweight	**3.2**	**5.9**	6	**6**	1	**5.6**
Normal Weight	**20.3**	**7.1**	21.4	**8.5**	19.4	**5.7**
Overweight	**47.1**	**7.2**	50	**8**	44.7	**6.5**
Obese	**29.4**	**7.5**	22.6	**8.5**	35	**7.0**

Table 8 shows salt consumption by body weight classification (BMI). Irrespective of body weight all survey participants showed higher 24-hour salt consumption than recommended. Participants that were obese showed a highest 24-hour salt intake at 7.5g (8.5g by men and 7.0g by women) and the lowest intake was among underweight participants who consumed 5.9g salt daily (6.0g by men and 5.6g in women).

Table 9: Mean salt consumption for participants with elevated HbA1c

	Male			Female			Both sexes		
	Number	%	Estimated 24-hour consumption of salt (grams)	Number	%	Estimated 24-hour consumption of salt (grams)	Number	%	Estimated 24-hour consumption of salt (grams)
Pre-diabetes	48	57.8	8.2	61	59.2	6.4	109	58.6	7.2
Diabetes	18	21.7	7.9	23	22.3	6.9	41	22.0	7.3

Table 9 shows that survey participants who had elevated blood glucose level, consumed more salt than recommended at 7.2g and 7.3g, that is, similar to those with normal blood glucose levels.

Findings concerning dietary knowledge and habits are found at ***Annex 2***.

8. Discussion and Conclusion

Despite its many uses, it is now well established that a long-term excess intake of salt is a major cause of hypertension and thus a risk factor for stroke and coronary heart disease. An excess of dietary salt may also affect three other conditions/diseases: gastric cancer, osteoporosis, and bronchial hyper-reactivity.

Today, the increasing production of processed foods, rapid urbanization and changing lifestyles are transforming population dietary patterns. Highly processed foods that are high in salt, fat and sugar, are becoming increasingly available and affordable, and so are having a growing impact on health. High salt intake is a major cause of raised blood pressure (BP), which increases the risk of cardiovascular diseases (CVDs) such as stroke, heart disease and heart attack, the leading cause of death worldwide. A moderate reduction in salt consumption causes a significant reduction in BP and is associated with reduced cardiovascular events.

Good nutrition is a key component in reducing the global burden of NCDs worldwide. A healthy diet, low in sodium, saturated fat and trans-fat and rich in fibre (such as wholegrain rice, bread and pasta), fruits and vegetables high in potassium and nitrates can help to control and prevent hypertension.

In most of the world's populations, sodium intake greatly exceeds the minimal physiological need. The global average sodium intake is estimated to be 4310 mg/day (10.78 g of salt per day), which is above the recommended intake. In the WHO African Region, the estimated sodium intake is slightly above the recommended intake (2687 mg/day (6.7g/day salt)). Other than salt, one of the main sources of sodium is processed foods such as bread, cereal and grains, processed meats and dairy products in many high-income countries and increasingly in low-middle income countries (LMICs).

The survey findings provide clear evidence that Mauritians consume more salt than recommended. The results show the mean 24-hour consumption of salt by adult Mauritian is 7.2g. The World Health Organization (WHO) recommendations for dietary salt intake by adults is < 5 g/d (<2000 mg/d of sodium) on a daily basis.

The Mauritius Salt Intake Study 2012 reported a baseline standardized salt intake mean salt intake of 7.9g by adults on a daily basis. Comparing the findings of the Mauritius Salt Intake Survey

2012 and the present Study in 2023, salt intake has decreased by 10%. It is evident that national and global targets may be achieved over time. Therefore, much emphasis must be laid on accelerating the salt reduction program in Mauritius.

WHO set a global target stated in Sustainable Development Goals, of reducing dietary salt intake by 30% by 2025 and many countries worldwide have implemented salt reduction programmes. Highest salt consumption has been noted for China (17.7 g/d). Higher salt intake than recommended by WHO are also noted for India (9.8 g/d), Pakistan (8.9 g/d), Ghana (8.2 g/d) and Seychelles (7.5 g/d) (refer to ***Annex 3***).

Reducing sodium intake is known to be one of the most cost-effective way to improve health as it can avert many cardiovascular events and deaths at very low total programme costs. Elevated blood pressure can be avoided, hypertension can be better controlled, thousands of deaths from cardiovascular diseases such as stroke, heart and renal disease can be prevented and this will in turn reduce the financial burden of treatment and health-related costs put on health care systems.

The WHO recommends several sodium reduction-related best buys policies as practical actions that should be undertaken immediately, to prevent cardiovascular disease and its associated costs.

9. Recommendations

Excessive consumption of salt (more than 5 g per day) raises blood pressure, a major risk factor for cardiovascular diseases such as heart disease and stroke, that are the leading causes of death in Mauritius. Following the 1st baseline Salt Intake Study in 2012, salt reduction strategies have been initiated and included a national policy commitment, public awareness campaigns and voluntary salt reduction in foods (reformulation) by industry. However, despite ongoing efforts, data from successive surveys indicate that salt intake by the Mauritian population continue to exceed the limits recommended by WHO (<5g salt / d) to protect health. More concerted efforts are needed to strengthen national salt reduction programmes, conduct high-quality surveillance, and implement policies and interventions that are known to be effective in reducing population-level salt intake.

One of the recommendations is to strengthen the implementation of salt reduction policies by prioritizing targeted interventions and regulatory measures for **healthy public food procurement and service policy** that mandates food standards for salt content.

F**iscal policies** to reduce population wide salt intake through increasing tax on unhealthy foods and beverages with high salt (sodium) content that may be useful to obtain revenue for government subsidies on healthy foods such as vegetables and fruit and for other salt reduction interventions.

Mandatory **Nutrition labelling** policies may be introduced to inform the public of the salt content of food and influence consumers to make healthier choice as well as influence manufacturers to develop healthier food products. Clear and simple interpretative **front-of-pack labelling** (FOPL) appropriate to local context and **'Nutrient declaration'** on the back of processed foods, are methods that may aid consumer choices to easily identify products that do not meet basic nutritional criteria.

Food Standards agency and the Food Act /Regulations serve as regulatory bodies whose role and impact contribute greatly to enforcing compliance with mandated food standards. Specific **nutrition criteria** can be set for food served and sold in public settings. These criteria can include: to limit use of processed/prepared food high in salt (sodium) and prohibition of placing salt shakers on diner's tables in public food facilities.

Marketing and advertisement is a major influencer for people, thus it is suggested to implement mandatory **marketing restrictions** to limit exposure to unhealthy food and beverages, to decrease the consumption of these products and to encourage industries to reformulate and market healthier products.

In order to control the effect of negative marketing and advertisement promoting unhealthy foods/beverages/snacks: implementation of the School Canteen Regulations must be strengthened.

The Ministry of Health and Wellness can engage in **partnership** with a wide range of stakeholders in developing and implementing policies. Civil societies/NGOs can mobilise resources, drive communication activities and build public and policy-maker support for sodium reduction policies. Moreover, civil societies/NGOs can support monitoring of industry actions and oppose and challenge commercially driven practices. Local Health Committees can be involved in mass media

campaign on sodium reduction to influence behaviour change and to educate consumers and stakeholders.

Effective **Salt Reduction Strategy** can be devised as a support package to help in establishing or scaling up population-based salt reduction initiatives in Mauritius.

It is essential to conduct the **Salt Intake Survey** regularly (5 yearly basis) through 24-hr urinary sodium excretion to measure progression in further reducing salt consumption until country specific and global targets are achieved. Further research and in-depth **analysis** on associated parameters like cardiovascular diseases will also provide deeper insights and understanding of such health conditions as stroke and cerebrovascular events.

Bakery products are one of the major contributors to sodium consumption all over the island, salt reduction initiatives must involve this food category. Thus, a workshop for bakers can be carried out to sensitise them to reduce the amount of salt used in bakery products.

Ongoing monitoring of the salt content of bread, as per the standards specified by the Food Regulation 2023 is also recommended for consumers that use this as a staple food island wide.

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Annex

Annex 1: Consent Form

Ministry of Health and Wellness

Mauritius Salt Intake Study 2023

Consent Form

Reg. No. | | | | | |

1. I, Mr./Mrs./Miss ……. consent to take part in the Mauritius Salt Intake Study 2023, which is being undertaken by the Ministry of Health and Wellness in collaboration with Monash University, Australia; University of Helsinki, Finland; Umea University Hospital, Sweden; and Imperial College, London, UK.

2. I understand that the purpose of the survey is to provide a measurement of average salt intake in the Mauritian population.

3. I understand that I will be asked to provide 24-hour Urine Collection, blood samples and that I will undergo physical examinations to measure my height, weight, waist and hip and blood pressure. I have been told that I will be asked some general questions about my health status particularly related to my lifestyle factors and medical history.

4. I understand that I will be informed of my results and my consent is given voluntarily. I agree that if the results of my investigations are abnormal, I will be referred for further investigations, treatment and follow up.

5. I have also been informed that all the data reporting will be done anonymously so that my name will be kept strictly confidential.

Name of Participant	Signature	Date
…….	…….	……/……/**2023**

Name of Witness	Signature of Witness	Date
……	..……..	……/……/**2023**

Annex 2: Additional Figures and Tables

Figure A1

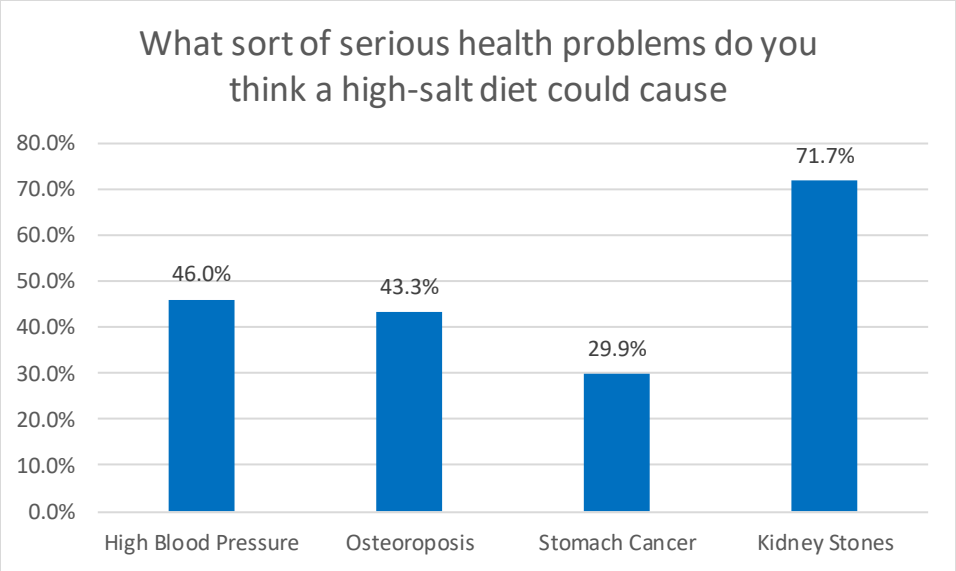

Figure A2

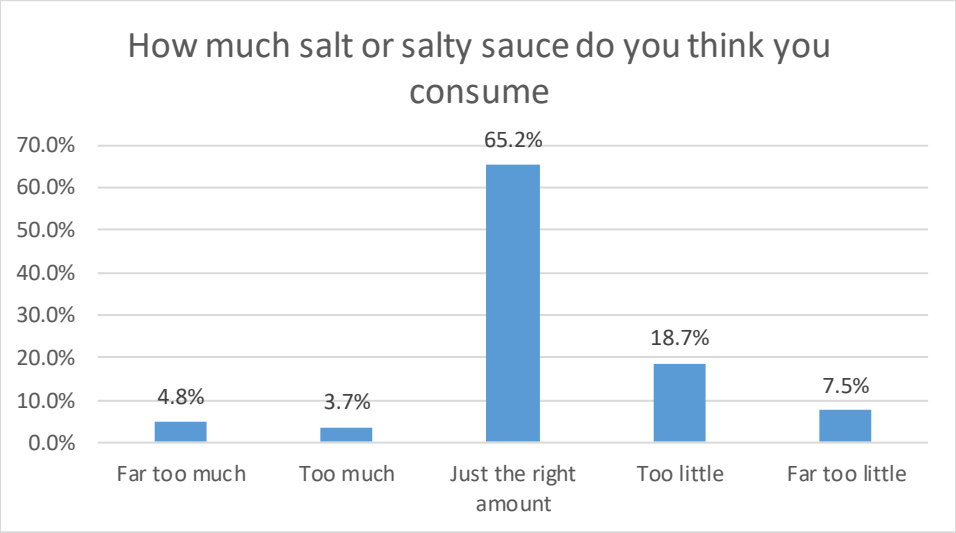

Table A1. Knowledge in means of controlling salt

Measures to control salt intake	%
Limit consumption of processed foods	87.7
Look at the salt or sodium content on food labels	36.4
Buy low-salt/sodium alternatives	34.8
Use spices other than salt when cooking	51.3
Does not add salt when cooking	12.3
Does not add salt at the table	50.3
Avoid eating foods prepared outside home	82.4

Table A2. Importance of lowering the salt/sodium in your diet

	%
Very important	66.8
Somewhat important	32.6
Not at all important	0.5

Table A3. Knowledge on Salt consumption

	%
Yes	96.8
No	3.2

Table A4. Frequency of consuming processed food high in salt

	%
Always	9.1
Often	27.3
Sometimes	42.8
Rarely	19.3
Never	1.6

Table A6. Frequency of adding salt or salty sauce to food before consumption

	%
Always	4.3
Often	9.6
Sometimes	35.8
Rarely	30.5
Never	19.8

Annex 3: Salt consumption per person, by country

Country	Salt Consumption Daily Per Capita (Grams)
China	17.7
Singapore	11.5
India	9.8
Pakistan	8.9
Finland	8.4
Ghana	8.2
Seychelles	7.5
Madagascar	7.2
Eswatini	7.1
South Africa	6.5

Source: WHO Global Salt Report on Sodium intake reduction, 2023

Annex 4: List of Survey Staff

Chief Investigator	**Survey Site Coordinators**
Dr B. Ori, Director General Health Services	Miss P. Chekori
Team Leader	Mr I. S. Neetye
Mr D. Dassaye, Permanent Secretary	Mr G. Gaoneadry
Principal Investigator	Mrs R. Rumjaune
Dr S. Kowlessur, Director Health Promotion and Research	**Data Editing Officer**
Senior Investigator	Mrs D. Dyal
Mrs A. Doomun, Chief Nutritionist	Mrs P. Lallmahomed
General Administrator	**Data Coordinator**
Mrs S. Kalasopatan-Chellen, Deputy Permanent Secretary (NCD)	Mr R. Lutchmadoo
Investigator	**Data Entry Officer**
Mrs L. Moothoosamy, Ag. Principal Nutritionist	Mr K. Boodhoo
Laboratory Manager	Mrs V. Doorgah
Dr S. Hunmah, Head Biochemistry Services	Mrs S. Gurbhoo
Data Manager	Mrs L. Pydegadu
Mr N. Jeeanody, Chief Health Statistician	Mrs Hosany
Principal Survey Coordinator	**Interviewer**
Mr J. Heecharan	Mrs L. Boyroo
Survey Coordinator	Mrs A. Jaulim-Foolessur
Ms L. Babajee	Mrs S. Hossenbaccus
Medical Officer	Mrs S. Boodhoo
Dr S. Boodoo	Mrs I. Goolaub
Dr N. Suffee	Mrs S. Cowlessur
Senior Survey Officer	**Registration Officer**
Mr J. L. Bhujoharry	Mrs A. Chellapen
Mrs A. Rampersad	Mrs D. Poonuth
Survey Officer	Mrs L. Pydeegadu
Mrs J. Tapsee	Mrs G. Benidin

Miss K. Beegun	
Urine Collection Officer	**Officers for distribution of Urine Container**
Mrs K. Raumoo	Mrs B. Baurhoo
Mrs B. Sonoo	Mrs Lotun
Officer for measuring height, weight, Waist Hip	Mr S. Moongah
Mr K. Ragoonath	Mrs U. Jowaheer
Mrs N. Meetooah	Mrs S. Seeboruth
Mr P. Neamuth	Mrs Chellapen
Mrs P. D. Nundlall	Mrs P. Jhungeer
Officer for measuring blood pressure	Mrs G. Benidin
Mr S. Boodhoo	Mrs B. D. Purmessur
Mrs S. Permale	Mr V. Mungroo
Mrs A. Luximon	Mrs S. Sreekeessoon
Mrs K. D. Govinda	Mrs D. Persand
Officers for taking blood specimen	Mrs D. Prayag
Mrs Z. Choychoo	Mrs D. Boodhoo
Mrs T. Appalasawmy	Mrs S. Sobrun
Mrs R. Soobroyen	Mr S. Koonjooah
Mrs M. Ghaboss	Mr Z. M. Joomun
Labourer/attendant (survey site)	Mr K. Boodhoo
Mr Heerah	Miss M. Mourat
Mrs Noorbux	Mrs Ramashire

Acknowledgement

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