



Commission for Health & Others  
Rodrigues Regional Assembly



Ministry of Health and Wellness  
Republic of Mauritius

# RODRIGUES NUTRITION SURVEY 2023

## Report



April 2024



# **The Rodrigues Nutrition Survey 2023**

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## Abbreviations

BIA	Bioelectrical Impedance Analysis
BMI	Body Mass Index
FAO	Food And Agriculture Organization
FIES	Food Insecurity Experience Scale
HDL-C	High-Density Lipoprotein Cholesterol
ICN2	International Conference On Nutrition
MDD-W	Minimum Dietary Diversity For Women
MNS 2022	Mauritius Nutrition Survey 2022
MUFA	Monounsaturated Fatty Acids
NCDs	Non-Communicable Diseases
NPAN	National Plan Of Action On Nutrition
OTC	Over The Counter
PUFA	Polyunsaturated Fatty Acids
SFA	Saturated Fatty Acids
SDGs	Sustainable Development Goals
UNDP	United Nations Development Programme
WHO	World Health Organization
WIFS	Weekly Iron and Folic Acid Supplementation
WRA	Women of Reproductive Age





## EXECUTIVE SUMMARY

The overall objective of the Rodrigues Nutrition Survey 2023 (RNS2023) was to study food consumption patterns and assess the nutritional status of the population with a view to address diet and nutrition related health problems, and non-communicable diseases in the country.

## MAIN FINDINGS

### Dietary behaviours

#### *Findings for participants aged 5-74 years*

- Overall, at least 97.4% of survey participants aged 5-74 years were non-vegetarian (that is, they consumed a variety of animal foods); 1.1% were semi-vegetarian (that is, they consumed either fish /sea-foods or poultry or meat), whilst 1.0% reported being strictly vegan (they ate only plant products).
- 82.1% children aged 5-11 years, 57.1% adolescents aged 12-19 years, 70.4% younger adults aged 20 to 49 years, and 86.5% of older adults aged 50 to 74 years ate breakfast daily (on all 7 days of the week); 8.1% adolescents and 4.3% younger adults skipped breakfast daily.
- 2.1% children aged 5-11 years and 7.5% of participants aged 12-74 years consumed soft drinks on a daily basis, whilst majority of participants reported consumption of soft drinks and sweetened drinks on a weekly basis.
- 88.7% children 5-11 years and 84.2% participants aged 12-74 years consumed milk daily.
- 92.8% children aged 5-11 years reported eating at least one vegetable daily and 49.2% reported that they ate at least 2 vegetables daily.
- 80.5% children reported eating at least one fruit daily.

## **Dietary knowledge and practices**

### Findings for participants aged 5-74 years

- 46.1% survey participants reported receiving dietary advice from ‘other’ sources (such as teacher/coach), 24.0% of participants reported that they received such advice from health professionals; and 17.3% participants noted nutritionists as their source of information.
- At least 87.4% participants aged 12-74 years reported regular use of cooking methods such as ‘sauté/ fricassée/ étouffée’, and at least 86.1% reported frying food and steaming/pressure cooking/boiling their food regularly.
- 66.0% reported using blended oil for cooking (composition of soyabean /palm oil blends are controlled by the Food Act 1999).
- Plain boiled rice, white bread, pulses, vegetables, fruits, milk and dairy products formed part of the staple diet across all age groups, and it is notable that children preferred pasta to rice/bread. Amongst animal foods consumed chicken was most popular, followed by fish consumption.
- Salty biscuits, snacks and fried foods, ‘roti/farata’, pastry and peanuts were items that were regularly consumed on a weekly basis by the population.
- At least 30.0% adults (20-74 years), 52.5% adolescents (12-19 years), 40.0% children (5-11 years) do not achieve recommended daily water intake.
- Participant knowledge of healthy nutrition and lifestyle practices was good overall.

## **Estimated average daily food consumption**

### Findings for participants aged 12-74 years

- Rice (plain, cooked) was the food item that was consumed in the highest quantity with a daily mean per capita of 742.2 grams by 97.1% of respondents.
- White bread was consumed by 91.0% of participants with a daily mean per capita of 76.1 grams.

- Brown bread was consumed by 20.0% of participants aged 12-74 years with a daily mean per capita of 80.5 grams.
- Potatoes were popular with 94.4% of the population aged 12-74 years with a daily mean per capita of 30.6 grams.
- Daily mean per capita of vegetables was found to be 86.4 grams for participants aged 12-74 years.
- Daily mean per capita of fruits was found to be 170.5 grams for participants aged 12-74 years.
- Together, mean per capita of vegetables and fruits was 254.5 grams and represents 63.6% of the WHO recommendation of 400 grams daily intake, for adults and adolescents.
- Mean per capita of fats such as margarine and oils used in cooking for all participants aged 12-74 years was found to be 28.1 grams.
- Average daily per capita for following nutrients/dietary constituents supplied by total dietary intake were found to be:
  - Energy: 3980.3 kilocalories
  - Carbohydrates: 547.7 grams (55.0% of total energy)
  - Proteins: 144.9 grams (14.56% of total energy)
  - Fats: 127.4 grams (28.8% of total energy)
  - Dietary fibre: 26.0 grams
  - Dietary cholesterol: 438.2 milligrams
  - Dietary sodium: 3075.2 milligrams
  - Added sugar: 50.8 grams

## **Anaemia**

### Findings for participants aged 5-74 years

- Overall, the prevalence of iron deficiency anaemia was found to be higher amongst females than in males amongst participants aged 12-74 years and more in boys than girls amongst children 5-11 years.
- The highest prevalence of anaemia was found amongst girls aged 12-19 years at 44.9% and in women aged 20-49 years at 35.8%.
- The prevalence of mild anaemia in these 2 groups were found to be: 24.3% amongst girls and 20.6% amongst women, whereas the prevalence of moderate anaemia was noted as 15.2% and 20.6%, respectively.
- Prevalence of severe anaemia was nil amongst all age groups.

## **Status of serum micro-nutrients**

### Findings for participants aged 5-74 years

#### Serum Ferritin status:

- Overall, 9.1% of participants aged 5-74 years had low level of serum ferritin.
- 22.2% adolescents aged 12-19 years showed low levels of serum ferritin: 37.4% in boys and 9.3% in girls of this age.
- 32.5% older adults aged 50-74 years had above normal level of serum ferritin, and was noted more amongst women of this age group at 55.6%.

#### Serum Folate status:

- Overall, 11.4% participants aged 5-74 years had low level of serum folate.
- Prevalence of low levels of serum folate was found to be 18.5% in children aged 5-11 years, 12.6% in adolescents, 13.2% in adults aged 20-49 years, and 2.5% in adults aged 50-74 years.

#### Serum Vitamin B12 status:

- Overall, 2.6 % of survey participants had low level of serum vitamin B12
- 7.3 % participants had above normal level of serum vitamin B12.

### Serum Vitamin D status:

- Overall, 54.8% participants aged 5-74 years had low level of serum vitamin D.
- Below normal levels of vitamin D were noted amongst 39.0% of children aged 5-11 years, 80.8% of adolescents aged 12-19 years, 48.6% younger adults aged 20-49 years, 53.4.% of older adults aged 50-74 years.

### **Minimum Dietary Diversity for Women of Reproductive Age (WRA) aged 15 - 49 years (MDD -W).**

- Findings show that 75.7% of women of reproductive age 15-49 years were consuming foods from at least 5 or more food groups, as recommended in order to achieve dietary adequacy, compared with 24.3% of women in this age group reported consuming foods from less than 5 food groups.
- Foods from the following 5 food groups were most consumed by the women: 98.9% had eaten a food from the group ‘grains, white roots and tubers and plantains’, 93.7% had consumed ‘meat, poultry and fish’, 76.2% had consumed ‘milk and milk products’, 71.4% had eaten ‘other vegetables’, and 54.0% had consumed ‘other fruits’.
- More specifically, the most common foods consumed in the preceding 24 hours by the women were reported as follows: 86.8% had eaten rice/pasta /noodles, 69.8% had foods made from any wheat flour such as bread/roti/crepes/pancakes, 66.1% had milk (dairy), 60.8% consumed other vegetables (such as beetroot/ cabbage/ tomato/ cucumbers/ onion/ radish), 59.8% had chicken, and 54.0% had other fruits (such as apples/banana/orange/ pineapple/guava/grapes/star fruit and so on).

### **INFLUENCE OF COVID 19 ON DIET AND EATING HABITS**

#### Findings for participants aged 12-74 years

- Overall, 28.6% reported that their eating habits changed due to the COVID -19 compared to their earlier diet (pre-pandemic).
- **During** the pandemic lockdown, dietary changes reported were as follows:

- At least 33.8% of participants reported consuming *less* ‘roti’ and at least 40.4% consumed less ‘dhollpuri’.
- 42.9% adolescents, 52.5% younger adults aged 20-49 years and 48.1% older adults 50-74 years reported consuming *less* fast foods/take-away.
- 22.7% adolescents, 36.1% younger adults aged 20-49 years and 31.6% older adults 50 -74 years reported consuming *less* sweetened/soft drinks.
- 30.3% adolescents, 35.4% younger adults aged 20-49 years and 35.0% older adults aged 50-74 years also reported consuming *less* desserts and sweets,
- At least 26.3% adolescents, 31.8% younger adults, and 35.4% reported less salty snacks /baked products consumed by both these age groups.
- 23.2% adolescents aged 12-19 years, 35.7% younger adults aged 20-49 years, and 30.0% older adults aged 50-74 years reported *increased* water consumption.

## Body Mass Index (BMI)

### Findings for participants aged 5-74 years

- In the age group 5 to 11 years: 2.6% of the children were underweight, 11.8% were overweight, 8.2% were obese and 77.4% were of normal weight.
- In the age group 12 to 19 years: 2.5% of the adolescents were underweight, 13.1% were overweight, 14.6% were obese and 69.7% were of normal weight.
- In the age group 20 to 49 years: 1.8% of adults were underweight, 34.2% were overweight, 39.9% were obese and 24.1% were of normal weight.
- In the age group 50 to 74 years: nil underweight, 32.6% were overweight, 41.1% were obese and 26.1% were of normal weight.
- In women aged 15-49 years, it was found that 2.2% were underweight, 24.1% were overweight, 40.4% were obese; and 33.3% were of normal weight.

## Waist circumference

### Findings for participants aged 18-74 years

- In the age group 18-49 years: 63.5% had elevated waist circumference (42.5 % amongst men and 78.8% amongst women).

- In the age group 50-74 years: 76.3% were found to have elevated waist circumference (57.1% amongst men and 93.5% amongst women)

## **Body Fat Mass**

### Findings for participants aged 5-74 years

- Overall, body fat mass above normal was noted in at least 67.3% amongst adults aged 20-74 years
- At least 16.2% of children and adolescents aged 5-19 years had body fat mass above normal
- Body fat mass above normal was found to be higher amongst women aged 50-74 years at 75.8% and amongst adolescent girls at 57.0%

## **Physical and leisure activity**

### Findings for participants aged 5-74 years

- Regarding physical activity for health, results showed that: 52.8% of respondents aged 5-11 years, 38.4% aged 12-19 years, 42.5% of respondents aged 20 to 49 years and 33.8% aged 50-74 years met the recommended standards for age.
- 23.3 % of all participants aged 18-74 years described their occupational physical activity as lightly active, 20.5% reported being moderately active at work, and 16.5% reported 'vigorous activity at work'.
- All respondents (5-74 years) spent an average of 2.0 hours daily watching TV/video/VCD/DVD, on the computer, playing electronic games, sending SMS, reading /other sedentary activities, with adolescents reporting higher amount of 'screen' time at 2.9 hours.

## Conclusion and Recommendations

The Rodrigues Nutrition Survey 2023 has provided timely and much needed data regarding the eating habits and nutritional status of the population aged 5-74 years. Overall, dietary intake appears to be higher than recommended in terms of energy intake that may impact on weight status. It is notable that underweight amongst all age groups has decreased significantly, whilst overweight and obesity continue on a positive trend. Similarly, amongst women of reproductive age (15-49 years), underweight is low compared with higher level of overweight and obesity in this vulnerable population. Body fat mass is also found to be high amongst adolescent girls, and amongst all adults aged 20-74 years (irrespective of gender). The nutritional quality of dietary intake may be associated with the trends noted for iron deficiency anaemia, especially amongst adolescent girls and women aged 20-49 years. Dietary quality may also be implicated to some extent in micronutrient imbalances that were noted concerning vitamin B12, folate and vitamin D. There is an urgent need to promote healthy eating habits with emphasis on balanced diets and dietary quality of foods consumed, compatible with age specific requirements. Nutritionally appropriate diets and physical activity practices aid in achieving healthy weight, control diet related conditions such as anaemia, reduce micronutrient deficiencies, and prevent/treat NCD's such as pre-diabetes and diabetes, hypertension, hyperlipidemia and cardio-vascular conditions.

The findings of the Rodrigues Nutrition Survey 2023, as well as those of other surveys that have been recently conducted, such as the Rodrigues NCD Survey 2022, will be used to:

- Update and formulate the National Plan of Action for Nutrition (NPAN) 2023-2028,
- Propose strategies targeting eating habits and diet related behaviours of the Rodriguan population to promote healthy nutritional status and well-being of the population overall, and more so of vulnerable sub-groups,
- Develop and/or strengthen policy and programs to address trends noted in anaemia, other micro-nutrient imbalances, overweight and obesity, and NCD's,
- Scale up/re-engineer effective on-going interventions/programs in order to prevent/manage the problem of non-communicable diseases, their risk factors, and other diet related health conditions such as weight management, hyperlipidaemias and anaemia amongst others,



- Implement tailored health promotion activities and sensitisation campaigns using mass media strategies and education materials in the local context to address gaps in nutrition knowledge and lifestyle practices,
- Conduct studies and surveys such as the Salt Intake Study urgently to facilitate nutrition focused program planning and implementation,
- Undertake further research targeting specific micro-nutrients and the factors influencing physiological status, including dietary behaviour, to aid appropriate policy action and public health interventions,
- Enhance capacity building and training to achieve effective and efficient program delivery meeting global targets on diet, nutrition and health.

## 1. INTRODUCTION

The World Health Organization (WHO) considers good nutrition, that is, an adequate and well-balanced diet, combined with regular physical activity to be a cornerstone of good health. A healthy diet helps protect against malnutrition in all its forms, as well as non-communicable diseases (NCDs), including diabetes, heart disease, stroke and cancer. Poor nutrition can lead to reduced immunity, increased susceptibility to disease, impaired physical and mental development, and reduced productivity.

Nutrition transitions from a traditional diet (rich in grains, fruit and vegetables) providing numerous macro- and micro-nutrients essential for healthy weight and wellbeing, to modern diets that are energy dense and nutrient-poor, combined with a reduction in physical activity are reflected in the increasing numbers of overweight children and adults. According to a press release of the WHO marking World Obesity Day 2022, 650 million adults, 340 million adolescents and 39 million children are obese. The WHO European Report on Obesity 2022 states that overweight and obesity affects 60% adults, and one in 3 children (29% boys and 27% girls).

Foods, diets and nutritional status are important determinants of NCDs. Populations around the world are increasingly exposed to foods and diets that influence the risk of developing NCDs. NCDs are currently the leading cause of mortality in Rodrigues, which closely reflects the global situation. Overweight acquired during childhood or adolescence may persist into adulthood. It is associated with a raft of medical co-morbidities, such as: coronary heart disease, diabetes, gallbladder disease, cancer, and osteoarthritis of the weight-bearing joints later in life as well as adverse psychological and social consequences and a poor quality of life. These chronic conditions place a heavy burden on families, on societies and on governments.

Rodrigues Nutrition Surveys have provided much valuable information concerning nutritional status of population sub-groups, eating habits, dietary trends and consumption patterns of Rodriguans. Successive surveys noted several trends such as increased consumption of animal fats and unhealthy hydrogenated fats (trans-fatty acids); widespread displacement of nutrient-rich foods (such as fruits, vegetables and legumes) by energy-dense nutrient poor foods in the daily diet that result in health problems associated with poor diet and consumption patterns and that may grow steadily worse. Such trends are influenced by

local and global marketing strategies promoting consumption of salty, sugary and fatty snacks and fast foods, as well as with major changes in the food supply.

The last Rodrigues Nutrition Survey was conducted in 2012. The intervening years have seen significant changes in eating habits, an increasing use of technologies that facilitate sedentary behaviour such as video games, mobile phones and the internet, along with a changing family life and structure. The COVID-19 pandemic situation has further impacted on eating habits and dietary consumption patterns as well as physical activity practices that influence individual health behaviour and weight.

## **2. BACKGROUND**

The WHO forward that today nearly one in three persons globally, suffers from at least one form of malnutrition: wasting, stunting, vitamin and mineral deficiency, overweight or obesity and diet-related NCDs. Thus, in 2015, the United Nations along with the WHO launched the Decade of Action on Nutrition 2016-2025 with the view to trigger intensified action to end hunger and eradicate all forms of malnutrition worldwide, and ensure universal access to healthier and more sustainable diets – for all people, whoever they are and wherever they live. However, combating malnutrition in all its forms is one of the greatest global health challenges.

The International Conference on Nutrition (ICN2) co-organized by the Food and Agriculture Organization (FAO) and the WHO in November 2014 in Rome, Italy revealed that though much progress has been made, there still remains a lot to be done. The State of Food Security and Nutrition in the World 2018 report stated that in 2017, 821 million people were undernourished. There has been an increase in anaemia in women with one in three women of reproductive age being anaemic.

The UNDP reports that progress in achieving the health-related Sustainable Development Goals (SDG), has been uneven between and within countries. National averages may not always reflect the fact that programmes may not reach all of the populations they are intended for, equally. The Covid-19 pandemic is a contributory factor to global poverty and in impeding progress towards achieving the goals. Multi-sectorial, rights-based and gender-

sensitive approaches are essential to address inequalities, build good health for all and ensure no-one is left behind.

The SDG implicating nutrition and population health include the following:

*SDG 2 Goal 2. End hunger, achieve food security and improved nutrition and promote sustainable agriculture.*

2.1 By 2030, end hunger and ensure access by all people, in particular the poor and people in vulnerable situations, including infants, to safe, nutritious and sufficient food all year round.

2.1.1 Prevalence of undernourishment

2.1.2 Prevalence of moderate or severe food insecurity in the population, based on the Food Insecurity Experience Scale (FIES)

2.2 By 2030, end all forms of malnutrition, including achieving, by 2025, “... the nutritional needs of adolescent girls, pregnant and lactating women and older persons” and

2.2.3 Prevalence of anaemia in women aged 15 to 49 years, by pregnancy status (percentage)

*SDG 3 Goal 3. Ensure healthy lives and promote well-being for all at all ages*

3.4.1 By 2030, reduce by one third premature mortality from non-communicable diseases through prevention and treatment and promote mental health and well-being

3.4.1 Mortality rate attributed to cardiovascular disease, cancer, diabetes or chronic respiratory disease.

The Minimum Dietary Diversity for Women (MDD-W) is a food group diversity indicator that may assess one key dimension of diet quality - micronutrient adequacy – that is summarized across 11 micro-nutrients: vitamin A, thiamine, riboflavin, niacin, vitamin B-6, folate, vitamin B-12, vitamin C, calcium, iron and zinc. Thus, the proportion of women of reproductive age (WRA) i.e. aged 15 -49 years who achieve the minimum of five groups out of ten defined food groups, serve as a proxy indicator for higher micronutrient adequacy in

this population sub -group. In other words, a higher prevalence of MDD-W among a group of WRA indicates better micro-nutrient adequacy in a given population.

While all micronutrients are important for physiological health, a selected few may be used as indicators of population health. Therefore, biomarkers of selected micronutrients of public health concern that may provide baseline or updated data to promulgate policy and intervention program implementation are especially significant in the Rodriguan context as indicated by our past surveys, for instance: Iron, Folate, Vitamin B12 and Vitamin D.

### 3. COUNTRY SITUATION

NCDs remain a major public health issue in Rodrigues, as has been shown by consecutive risk factor surveys from 1999 to 2022. A rising prevalence of several risk factors has been documented across the past five Rodrigues Non-Communicable Diseases Surveys, including overweight, obesity and sedentary habits. Unhealthy diet and inadequate physical activity are responsible for most of the prevalent NCDs in Rodrigues. Besides diabetes prevalence, the findings of successive NCD surveys from 1999 to 2022 show that metabolic syndrome, a clustering of risk factors for cardiovascular disease including central or abdominal obesity, abnormal glucose tolerance, raised triglycerides, decreased high-density lipoprotein cholesterol (HDL-C), elevated blood pressure and hyperinsulinemia with underlying insulin resistance, are also common.

Cardiovascular diseases and diabetes mellitus are the first two principal underlying causes of death in Rodrigues. In 2022, the distribution of deaths by the chapters of the International Classification of Diseases (ICD-10) showed that *Heart and other diseases of the circulatory system* were accountable for 41.5% of all case mortality, of which 13.4% was due to acute myocardial infarction and other ischaemic heart diseases. These were followed by *Diabetes and other endocrine, nutritional and metabolic diseases* which accounted for 22.7% of all deaths, while 12.0% was due to *Cancer and other neoplasm*.

Rodrigues has one of the highest prevalence of hypertension in the world. The Rodrigues NCD Survey 2016 showed that the age-standardized prevalence of hypertension in the population aged 25-74 years was 30.5% and increased to 37.0% in 2022. The age-standardized prevalence of diabetes mellitus in this population has risen steadily from 8.1% in 1992 to **17.2%** in 2016 (an increase of over 60%). However, the most recent survey in 2022 has noted a small but significant decrease in diabetes prevalence since 2016 to **15.3%**,

in both men and women and in all age-groups. It is also worrying that among those people who have diabetes (known cases) 43.0% persons had a poor control of their diabetes, that is, HbA1c  $\geq$ 9.0% which is indicative of very high risk of developing diabetic complications, although this proportion has improved since the last survey in 2016.

The Rodrigues Non-Communicable Disease Survey 2022 found the age standardized prevalence of overweight amongst adult Rodriguans 25-74 years, using WHO ethnic reference cut-points has decreased from 35.9% in 2016 to 31.7% in 2022 whereas the prevalence of obesity has increased from 28.9% in 2016 to 37.7% in 2022.

Over the years, health problems related to over-nutrition and more sedentary lifestyles have become a major concern as shown by the successive Rodrigues Nutrition Surveys from 2004 to 2012, including the Salt Intake Study 2012. Results of the Rodrigues Nutrition Survey 2004 revealed that in the age group 5 to 11 years, 7.4% were overweight and 5.0% were obese. In adolescents aged 12 to 19 years, 6.7% were overweight and 6.2% were obese. In 2012, the Rodrigues Nutrition Survey found that in the age group 5 to 11 years, 6.3% of children were underweight, 8.4% were overweight, and 7.3% were obese. In the age group 12 to 19 years, 6.4% of adolescents were underweight, 8.7% were overweight, and 5.0% were obese.

The Rodrigues Nutrition Survey 2004 found that mild anaemia due to iron deficiency affected 22.3% adolescent girls and 16.9% women aged 20-49 years. In 2012, the Rodrigues Nutrition Survey report revealed the highest prevalence of anaemia was in females in the age group 20 to 49 years (25.2%), followed by those aged between 12 to 19 years (22.0%).

The findings of the successive Rodrigues Nutrition Surveys conducted regularly have supported policy formulation and programme planning. The 2004 Nutrition Survey helped to assess major trends and nutritional status of the population. It also helped in designing intervention programmes geared towards reducing the burden of nutrition related problems in the population. The findings of the Nutrition Survey 2012 provided important information which helped in the formulation of the National Nutrition Action Plan 2016-2020.

It also provided a set of baseline values which helped in re-engineering the different intervention programmes as well as in the formulation of new strategies in view of addressing, in a more focused manner, the different unhealthy eating and lifestyle related habits among children, adolescents and adults.

Rodrigues has been proactive in addressing the problem of NCDs, that has greatly contributed to control predicted increase in the prevalence of diabetes and other NCDs in order to avoid catastrophic public health and socio-economic consequences. . The policies to address non-communicable diseases developed by the Ministry of Health & Quality of Life/Wellness and the Rodrigues Health Commission, include comprehensive legislation concerning alcohol, tobacco and substance abuse, legislation regulating the level of saturated fatty acids in most imported food products, legislation for the sale of healthy foods in school canteens, ban on soft drinks in schools, imposing sugar tax on soft drinks and on all non-alcoholic sugar sweetened beverages as well as on locally manufactured and imported non-staple sweetened products and regulating the level of salt in commonly consumed bread. Mauritius (and Rodrigues), have adopted the 2008-2013 WHO Action Plan for the Global Strategy for the Prevention and Control of non-communicable diseases as the generic country plan.

Additionally, various Action Plans including the National Plan of Action on Nutrition (NPAN) 2016-2020 have been developed to address the main risk factors and they have reached various stages of implementation. Other Action Plans to address the main risk factors of NCDs have also been developed and are being implemented. These include:

- National Service Framework for Non-Communicable Diseases (NSF for NCDs)
- Integrated National Action Plan for Non-Communicable Diseases (NCDs)
- National Action Plan for Tobacco Control (2022 - 2026)
- National Action Plan to reduce the harmful use of Alcohol (2020 - 2024)
- National Action Plan for Cancer Control and Prevention (2010-2014)
- National Cancer Control Program (NCCP) (2022-2025)
- National Action Plan for Physical Activity (2011-2014)
- Food Act 2022, updated from Food Act 1998
- Food Standards Agency, 2022
- Food fortification 2023, (with selected micronutrients such as iron, zinc, vitamin B12 and folate).

Optimal health for Rodriguans can only be achieved when greater efforts are made in health promotion and prevention of illness, with nutrition as an integral part of these efforts. While adequate nutrition for all is the goal, balanced food and nutrient intake throughout the

lifespan contributes largely to health, life expectancy and quality of life. Improving nutrition practices and achieving healthy weight across the population as well as increasing physical activity can reduce the risk of the NCDs.

This Rodrigues Nutrition Survey 2023 was undertaken to provide up-to-date data on nutritional status, eating habits, dietary trends and consumption patterns for monitoring and continuous improvement of interventions in Rodrigues. Survey findings will support policy program planning and will help formulate the National Plan of Action on Nutrition, 2024-2030 (NPAN), by identifying new challenges and appropriate responsive strategies. The findings of the survey will also evaluate achievement of targets specified by the earlier NPAN 2016 -2020, and of progress made in the last decade, since the previous surveys.

## **4. OBJECTIVES OF THE RODRIGUES NUTRITION SURVEY 2023**

### **4.1 Overall Objectives**

To study food consumption patterns and assess the nutritional status of the population with a view to address diet and nutrition related health problems, and non-communicable diseases in the country.

### **4.2 Specific Objectives**

- To collect data on food and nutrient intakes in the population sub-groups.
- To determine trends in nutritional status of the population aged 5 to 74 years.
- To provide estimates of proportion of women 15-49 years (women of reproductive age, WRA, who are not pregnant or lactating):
  - with low BMI
  - receiving diets with Minimum Dietary Diversity (MDD-W)
- To determine the trends in prevalence of malnutrition (over and under-nutrition) in the target population (5 to 74 years).



- To determine trends in the prevalence of micronutrient malnutrition in children, adolescents and adults, concerning Iron, Folate, vitamin B12 & vitamin D status.
- To determine trends in dietary consumption status of the population.
- To examine the influence of the COVID-19 pandemic on eating habits and diet of adolescents and adults (12-74 years).
- To make appropriate recommendations thereof.

## 5. METHODOLOGY

### 5.1 Study Design

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

### 5.2 Target Population

The target population comprised individuals aged between 5 to 74 years and categorized into four age groups:

- (i) Children aged 5-11 years
- (ii) Adolescents aged 12-19 years
- (iii) Young adults aged 20-49 years
- (iv) Older adults aged 50-74 years

### 5.3 Sampling Method

A two-stage sampling method was used for the selection of respondents in the four target groups.

**1<sup>st</sup> Stage:** Taking into consideration the logistical issues involved in such a study mainly in regards to the organization of the survey at the different sites with various facilities and several personnel, 5 clusters have been randomly selected in Rodrigues. The 5 clusters were well-demarcated geographical areas within Rodrigues. Participants were drawn from all over the island to represent all socio-economic groups.

**2<sup>nd</sup> Stage:** Some 1,500 households were enumerated in Rodrigues, that is, 300 households per cluster. The selection of individuals within the 4 different age groups was carried out

after the enumeration. During this exercise, the distribution by age and sex of the listed population was considered in order to ensure that the samples are representative of the target groups.

#### **5.4 Sample size**

A sample size of approximately 950 subjects were randomly selected from the 5 clusters in Rodrigues. This was determined by considering the basic statistical reliability of the findings as well as other factors, such as logistic support.

**Table 1: Sample size**

Target Groups	No. of Clusters	Sample Size
5-11 years	5	200
12-19 years	5	200
20-49 years	5	300
50-74 years	5	250
<b>Total</b>		<b>950</b>

An adult aged 18 years or over was invited to accompany each of the respondents aged less than 18 years old. These adults provided the necessary consent for blood tests and other survey procedures, and assisted their selected household member to complete the relevant modules of the questionnaire.

The inclusion and exclusion criteria for the survey were as follows:

- Only Rodriguan residents aged 5-74 years were included.
- Those unable to provide written informed consent were excluded.

#### **5.5 Ethical Considerations**

Ethical clearance was obtained from the ethics committee of the Ministry of Health and Wellness. Written consent (*as per Annex 1*) for all participants was obtained prior to survey administration. Confidentiality and anonymity were maintained during all survey procedures. The questionnaires did not include information that will allow respondents to be

traced. Individual information will not be disseminated. Only aggregated data will be published. Participation in the study was completely voluntary.

### 5.6 Interviewer Training

Survey interview officers attended a one-day comprehensive training program on 24 July 2023 on interview techniques and guidelines to standardize data collection through questionnaires. Interview supervisors ensured quality control of questionnaires/data collection on survey sites.

### 5.7 Data Collection

The Rodrigues Nutrition Survey 2023 was conducted from 25 July to 04 August 2023 at 5 sites. The same team worked at each survey site and stayed for 2 days at each site for the survey procedures to be completed.

### 5.8 Survey Process

Survey activities and data collection were organized in a systematic manner to facilitate participants.

### 5.9 Survey Instruments

#### **i. Anthropometry**

Anthropometric measurements including height, weight, waist and hip circumference were taken at the survey site by trained staff. Minors were accompanied by their parents/guardians.

- **Weight:** Good quality heavy duty weighing scale 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 0.1 centimetre, using a stadiometer.
- **Waist and Hip Circumference:** Waist girth was measured 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. Hip girth was recorded as the maximum circumference around the buttocks posteriorly and indicated anteriorly by the

symphysis pubis, to the nearest 0.1 centimetre. Measurements were repeated following both initial recordings.

*Note: Waist and Hip circumference were not measured for subjects aged 5–17 years.*

- **Body Fat Mass:** A Body Composition Analysis Apparatus was used to obtain bioelectrical impedance analysis (BIA) with all participants in order to measure fat-free mass, and the percent body fat.

## ii. **Blood Pressure**

Blood pressure (BP) was measured in subjects aged 12-74 years. Blood pressure was not measured in children aged 5-11 years. An automated blood pressure monitor was used (Omron blood pressure machine SEM-1) that was regularly calibrated.

## iii. **Blood Collection**

Blood samples were taken by venepuncture for all participants. All participants aged 5 to 11 years had their blood taken for Hb/Full Blood Count, Haemoglobin, Ferritin, Folate, Vitamin B12, Vitamin D. Participants aged 12-19 years and 20-74 years provided blood samples for these biochemical tests as well as for additional tests for HbA1c, Total Cholesterol and Triglycerides.

## **5.10 Questionnaire Coverage/Module**

In total 4 questionnaires were used:

- (i) Questionnaire A: children aged 5-11 years
- (ii) Questionnaire B: adolescents aged 12-19 years
- (iii) Questionnaire C: adults aged 20-74 years
- (iv) Minimum Dietary Diversity for Women (MDD-W)

The questionnaires included various sections on aspects of personal data, dietary knowledge/attitudes and behaviour/practice, and physical activity for all participants.

The quantitative Food Frequency Questionnaire was used with selected sub-sample of participants aged 12-74 years. Detailed information of food items consumed daily/weekly/monthly basis during the preceding three months was obtained. The estimated amounts in grams of the foods consumed by the participants were also recorded, using standardized household measures and/or food models as aids during the interview.

The Minimum Dietary Diversity for Women (MDD-W) of reproductive age (15- 49 years): a short list-based questionnaire of selected foods consumed from defined food groups in the preceding 24 hours, was also administered to selected participants in this age group.

### **5.11 Response Rate**

**Table 2: Response rate among the participants**

<b>AGE GROUP</b>	<b>Number of participants</b>	<b>Response Rate (%)</b>
<b>5 – 11 years</b>	195	98
<b>12 – 19 years</b>	198	99
<b>20 – 49 years</b>	280	93
<b>50 – 74 years</b>	237	95
<b>Total</b>	<b>910</b>	<b>96</b>

A total of 910 out of 950 invited respondents attended the survey, that is, a response rate of 96%. The response rate was above 90% in all the age groups as shown in (Table 2).

### **5.12 Data Management**

The completed questionnaires were verified for completeness and consistency (quality control). Data entry was completed using Epi Info. Data analysis was undertaken on Excel and SPSS Version 21. Validated findings are presented in the following section.

## 6. RESULTS

The findings of the Rodrigues Nutrition Survey 2023 have been presented in this report. The reference cut-point values for the different parameters that have been reported in this survey are given at Annex 2. It must be noted here that due to differences in methodology and/or reference cut-points for this survey from previous surveys on nutrition and non-communicable diseases, trends in dietary behaviour and disease prevalence have not been reported.

### 6.1 Respondent's Profile

This section included questions on basic demographics, educational level, occupation, total household income, household composition and basic facilities available in the home to obtain a comprehensive profile of survey participants, as shown below in Tables 3-8. A total of 910 persons participated in this survey.

#### 6.1.1 Age and Sex distribution

**Table 3: Distribution of participants by age group and sex**

AGE GROUP	Male	Female	Total
5 – 11 years	96	99	195
12 – 19 years	91	107	198
20 – 49 years	115	165	280
50 – 74 years	113	124	237
<b>Total</b>	<b>415</b>	<b>495</b>	<b>910</b>

### 6.1.2 Educational level

**Table 4: Percentage distribution of participants by educational level**

Education Level	Percentage (%)
None/Pre-primary	2.2
Primary	48.7
Secondary (Grade 7-10)	26.9
Secondary SC	14.4
Secondary HSC	3.3
Tertiary/Diploma	3.8

**Table 5: Percentage distribution of educational level of father and mother of respondents aged 5-19 years**

Education Level	Father (%)	Mother (%)
None/Pre-primary	1.3	1.8
Primary	36.9	36.3
Secondary (Grade 7-10)	21.6	21.2
Secondary SC	17.4	26.7
Secondary HSC	6.1	3.4
Tertiary/Diploma	6.9	7.3
Don't Know/ N/A	9.8	3.4

### 6.1.3 Occupational status

**Table 6: Percentage distribution of participants by occupational status**

Occupation	Percentage (%)
Managers and Administrators	0.3
Professionals	2.2
Associate Professionals	2.6
Tradespersons and related workers	4.0
Clerical and Service workers I	0.4
Clerical, Sales and Service workers II	3.7
Clerical, Sales and Service workers III	3.8
Intermediate Production and Transport Workers	3.6
Laborers and Related Workers	13.5
Student	42.3
Unemployed	5.8
Housewife	9.7
Retired	7.9

### 6.1.4 Average monthly household income

**Table 7: Percentage distribution of participants by average monthly household income**

Income	Percentage (%)
Up to Rs 10,000	17.8
Rs 10,001 –Rs 20,000	34.5
Rs 20,001 – Rs 35,000	29.9
Rs 35,001 – Rs 50,000	10.9
Above Rs 50,000	5.3



## 6.1.5 Household Facilities

**Table 8: Percentage of household facilities**

Household Items	Percentage (%)
Refrigerator	96.8
Microwave	34.2
Oven	61.3
TV	96.0
Radio	81.0
Internet	79.7

### 6.1.5.1 Managing regular household expenses

**Table 9: Number of times participants experienced difficulty in managing regular expenses for food, rent, bills in the last 12 months by age group**

Age group years	None (%)	At least once (%)
5-11	51.3	48.7
12-19	59.1	40.9
20-49	40.7	59.3
50-74	23.2	76.8

Concerning regular household expenses for food, rent and bills in the preceding 12 months, 51.3%, 59.1% and 40.7% of parents /caregivers of survey participants aged 5-11 years, 12-19 years and 20-49 years respectively, reported having no difficulty in managing these expenses compared with 23.2% aged 50-74 years that experienced no difficulty. Difficulty in managing household expenses (once or more than once) was reported by 40.9% of parents /caregivers accompanying their children 5-11 years, 59.3% of adults aged 20-49 years and 76.8% of those aged 50-74 years also reported the same. (Table 9).

## 6.2 Measurements

### 6.2.1 Body weight

BMI-index-for-age and gender (male and female) based on z-scores recommended by the WHO was used to categories body weight of children 5-11 years and adolescents 12-19 years. The classification provides BMI range on a single-year-age-sex-specific basis. Adult body weight for participants aged 20-74 years was assessed using the WHO reference cut-off values based on ethnicity (see Annex 2A, 2B and 2C: BMI reference cut-points).

**Table 10a: Body Weight –Standardised Prevalence (%) in participants aged 5-74 years, by age and gender**

Age	ALL				MALE				FEMALE			
	UW	NW	OW	O	UW	NW	OW	O	UW	NW	OW	O
5-11	2.6	77.4	11.8	8.2	5.2	72.9	11.5	10.4	0.0	81.8	12.1	6.1
12-19	2.5	69.7	13.1	14.6	4.4	70.3	14.3	11.0	0.9	69.2	12.1	17.8
20-49	1.8	24.1	34.2	39.9	0.9	31.9	41.4	25.9	2.5	18.5	29.0	50.0
50-74	0.0	26.3	32.6	41.1	0.0	33.9	35.7	30.4	0.0	19.4	29.8	50.8

Key: UW- Underweight

NW- Normal Weight

OW- Overweight

O- Obese

Overall, more children aged 5-11 years and adolescents aged 12-19 years were found to have normal weight at 77.4% and 69.7% respectively compared with adults aged 20-49 years at 24.1% and those aged 50-74 years at 26.3%.

Overall, underweight was found to be low in all participants aged 5-49 years at less than 3%, and showed a negative trend with increasing age: 2.6% in children aged 5-11 years (5.2% in boys and 0.0% in girls), 2.5% in adolescents aged 12-19 years (4.4% boys and 0.9% girls), 1.8% in adults aged 20-49 years (2.5% men and 0.9% women). No underweight noted amongst older adults aged 50-74 years in both sexes.

Overweight shows a positive trend with age: from 11.8% in children aged 5-11 years, 13.1% in adolescents 12-19 years, 34.2% in adults aged 20-49 years and 32.6% in those aged 50-74 years respectively. Overweight is higher amongst males compared with female participants:

14.3% boys compared with 12.1% girls ; 41.4% in men aged 20-49 years compared with 29.0% in women of same age; and 35.7% in men aged 50 -74years compared with 29.8% in women of the same age.

Overall, a positive trend was also noted for obesity, steadily increasing with age: 8.2% in children 5-11 years (10.4% in boys and 6.1% in girls), 14.6% in adolescents 12-19 years (11.0% in boys and 17.8% in girls), 39.9% in adults 20-49 years (25.9% in men, 50.0% in women), and 41.1%in older adults 50-74 years (30.4% in men and 50.8% in women).

**Table 10b: BMI status (%) of women aged 15 – 49 years**

	Percentage (%)
Underweight	2.2
Normal weight	33.3
Overweight	24.1
Obese	40.4

Low body weight in women of reproductive age (15-49 years) may adversely affect maternal and child health outcomes. The survey found 2.2% of women in this age group were underweight compared with 24.1% that were overweight and 40.4% that were obese (Table 10b).

### 6.2.2 Waist circumference

Waist circumference is an indicator of central obesity and elevated waist circumference is a considered as a high-risk factor for NCD's.

**Table 11: Percentage of participants (18-74 years) with elevated waist circumference, by age and gender**

Years	18-49 years	50-74 years
Male	42.5	57.1
Female	78.8	93.5
Both sexes	<b>63.5</b>	<b>76.3</b>

Using ethnic based reference cut-off points (Annex 2D) it was found that 63.5% of the survey participants aged 18-49 years had elevated waist circumference (42.5% in men and 78.8% in women). In the age group 50-74 years, 76.3% had elevated waist circumference ( 57.1% of men and 93.5% of women), higher than recommended (Table 11).

### 6.2.3 Body Fat Mass

Reference cut-points that are used to assess body fat mass of individuals are both age and gender dependent, according to expert advisory (see Annex 2E).

**Table 12 : Percentage of participants (5-74 years) with elevated body fat mass, by age and gender**

Age years	MALE	FEMALE
5-11	22.9	16.2
12-19	22.2	57.0
20-49	69.3	67.3
50-74	71.4	75.8

The prevalence of body fat mass above normal was found to increase with age and also noted more among female participants in all age groups. It was highest amongst adult women aged 50-74 years at 75.8% compared with 71.4% of men of the same age. In adults aged 20 -49 years, 69.3% of men had elevated body fat mass compared with 67.3% of women. The lowest prevalence was noted in girls aged 5-11 years at 16.2% compared with boys of same age at 22.9%. A notably higher prevalence of elevated fat mass was found amongst adolescent girls at 57.0% compared with boys of same age at 22.2%. (Table 12).

#### 6.2.4 Blood pressure

Blood pressure reference cut-points by age group that were used to assess hypertension prevalence are found in Annex 2F.

**Table 13: Percentage prevalence of hypertension in participants 12-74 years,by gender and age group**

Years	12-19 years	20-49 years	50-74 years	Total 12-74 years
Male	3.3	27.8	56.6	<b>31.0</b>
Female	6.5	15.8	56.5	<b>26.0</b>
<b>Total</b>	5.1	20.7	56.5	<b>28.3</b>

Overall, hypertension was found to be 28.3% in the survey participants aged 12-74 years, and found to increase with age: 5.1% in adolescents aged 12-19 years, 20.7% in adults aged 20-49 years and 56.5% in older adults aged 50-74 years. In older adults hypertension prevalence was similar for both men and women. In participants aged 20-49 years, hypertension prevalence was found to be higher among men at 27.8% than in women of same age at 15.8% whereas a prevalence of 6.5% was noted in adolescent girls compared to 3.3% in adolescent boys.

It must be noted that blood pressure was not measured in participants aged 5-11 years.

## 6.2.5 Results of blood tests

### 6.2.5.1 Prevalence of anaemia

Serum haemoglobin was used as indicator of iron deficiency anaemia. Reference cut-points by age that were used to assess prevalence are found in Annex 2G.

**Table 14: Percentage prevalence of anaemia in participants aged 5-74 years, by gender and age**

Years	5-11		12-19		20-49		50-74	
	M	F	M	F	M	F	M	F
Mild	8.3	8.1	12.1	24.3	8.7	20.6	14.2	13.7
Moderate	6.3	2.0	2.2	20.6	0.0	15.2	3.5	4.8
Severe	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Overall	<b>14.6</b>	<b>10.1</b>	<b>14.3</b>	<b>44.9</b>	<b>8.7</b>	<b>35.8</b>	<b>17.7</b>	<b>18.5</b>

Overall, the highest prevalence of anaemia was found amongst female adolescents aged 12-19 years at 44.9%, followed by that found in women aged 20-49 years at 35.8%. The prevalence of mild anaemia in these 2 groups was found to be: 24.3% in adolescents and 20.6% amongst women aged 20-49 years. Moderate anaemia in the same groups was 20.6% and 15.2% respectively. Severe anaemia was not found in any survey group. In children aged 5-11 years higher prevalence of anaemia was noted amongst boys at 14.6% than amongst girls at 10.1%. In all participants aged 12-74 years, anaemia was found to be more prevalent amongst females than males (Table 14).

Prevalence of anaemia in the population (sub-groups) above 30.0% may be indicative of a public health problem that may be addressed by public health intervention programs such as appropriate fortification of common foods and/or supplementation with iron and folic acid for vulnerable population groups at risk.

### 6.2.5.2 Serum ferritin status

The level of serum ferritin serves as an indicator for iron stores available in the body and is a sensitive test for anaemia related to iron deficiency and other blood disorders. Reference cut points to assess serum ferritin levels for the different population sub-groups are found in Annex 2H.

**Table 10a: Status of serum ferritin levels (%) in participants aged 5-74 years, by age group**

Years	5-11	12-19	20-49	50-74	5-74
Below normal	0.5	22.2	8.6	5.9	9.1
Normal	97.9	73.2	77.1	61.6	76.7
Above normal	1.5	4.5	14.3	32.5	14.2

Overall prevalence of low serum ferritin in participants aged 5-74 years was 9.1%. Results found highest prevalence of below normal levels of serum ferritin amongst adolescents aged 12-19 years at 22.6% followed by 8.6% amongst younger adults aged 20-49 years (Table 15a). Above normal levels of serum ferritin were also noted at 14.2% of all survey participants aged 5-74 years, with highest prevalence at 32.5% noted amongst adults aged 50-74 years.

**Table 15b: Percentage prevalence of below normal serum ferritin (%) in participants aged 5-74 years, by gender and age group**

Years	5-11	12-19	20-49	50-74
Male	0.0	37.4	12.2	10.6
Female	1.0	9.3	6.1	1.6

Below normal level of serum ferritin was more prevalent in adolescent boys at 37.4% compared to adolescent girls at 9.3% or to any other sub-group. Similarly, in participants aged 20-74 years, higher prevalence of low serum ferritin levels was noted more in men compared with women. Amongst children 5-11 years, however, low serum ferritin was found

more amongst girls at 1.0% compared with nil prevalence amongst boys of same age (Table 15b).

**Table 15c: Percentage prevalence of above normal serum ferritin (%) in participants aged 5-74 years, by gender and age group**

Years	5-11	12-19	20-49	50-74
Male	2.1	0.0	1.7	7.1
Female	1.0	8.4	23.0	55.6

Highest prevalence of above normal levels of serum ferritin were noted amongst women aged 50-74 years at 55.6%. This population sub-group has lower requirements of dietary iron compared with younger women of reproductive age (due to menopause). Self-perception of poor health/weakness may lead to compensatory practices such as OTC iron supplementation and /or increased dietary intake (Table 15c). Above normal levels of serum ferritin may also be indicative of other health conditions or lifestyle habits. It may be pointed out that 23.0% women aged 20-49 years showed above normal levels of serum ferritin.

### **6.2.5.3 Serum vitamin B12 status**

Serum B12 is most commonly used to assess cobalamin deficiency that may be suggestive of pernicious anaemia, or other conditions such as parasite infestations or hyperthyroidism. Reference cut points to assess serum vitamin B12 levels for the different population sub-groups are found in Annex 2H.

**Table 16a: Status of serum vitamin B12 (%) in participants aged 5-74 years, by age group**

Percentage	5-11	12-19	20-49	50-74	5-74
Below normal	4.6	1.5	1.1	3.8	2.6
Normal	92.8	89.9	92.5	85.2	90.1
Above normal	2.6	8.6	6.4	11.0	7.3

Overall, 2.6% participants aged 5-74 years were found with low level of serum vitamin B12 and 7.3% had above normal levels. Prevalence of below normal levels of serum B12 was



noted more in children aged 5-11 years at 4.6% and amongst those aged 50-74 years at 3.8%. Levels higher than normal of this vitamin was noted more amongst adolescents at 8.6% and older adults aged 50-74 years at 11.0% (Table 16a).

**Table 16b: Percentage Prevalence of below normal serum vitamin B12 in participants aged 5-74 years, by gender and age group**

Years	5-11	12-19	20-49	50-74
Male	5.2	1.1	0.9	1.8
Female	4.0	1.9	1.2	5.6

The prevalence of below normal serum vitamin B12 was noted more amongst boys aged 5-11 years at 5.2 % than girls at 4.0%; and more amongst women aged 50-74 years at 5.6% than men of same age at 1.8% (Table 16b).

#### **6.2.5.4 Serum folate (Vitamin B9) status**

Serum folate, also known as vitamin B9, is often used to detect megaloblastic anaemia. It rarely occurs on its own and is often associated with other nutrient deficiencies because of its strong association with poor diet, alcoholism, and malabsorptive disorders. Reference cut points to assess serum folate levels for the different population sub-groups are found in Annex 2H.

**Table 17a: Status of serum folate /vitamin B9 (%) in participants aged 5-74 years**

Years	5-11	12-19	20-49	50-74	5-74
Below normal	18.5	12.6	13.2	2.5	11.4
Normal	80.5	86.9	86.4	96.6	87.9
Above normal	1.0	0.5	0.4	0.8	0.7

Overall, 11.4% of participants aged 5-74 years had a low level of serum folate. Level of this vitamin below normal was found to be more so amongst 18.5% children, 13.2% amongst those aged 20-49 years, 12.6% amongst adolescents 12-19 years old, and 2.5% amongst older adults 50-74 years (Table 17a).

**Table 17b: Percentage Prevalence of below normal serum folate /vitamin B9 (%) in participants aged 5-74 years, by gender and age group**

Years	5-11	12-19	20-49	50-74
Male	17.7	11.0	13.0	4.4
Female	19.2	14.0	13.3	0.8

Highest prevalence was noted in children 5-11 years:19.2% girls and 17.7% boys showing low levels of folate, followed by 14.0% in adolescent girls, and 13.3% amongst younger women aged 20-49 years. Lowest prevalence was amongst the older adults aged 50-74 years with was noted amongst 0.8% in older women compared with 4.4% noted in older men.

#### ***6.2.4.5 Serum vitamin D status***

Serum levels of 25-hydroxy vitamin D of individuals may be influenced not only by their eating habits and dietary intakes, but more so by other factors such as the time spent outdoors being exposed to the sun. It is well known that this important micro-nutrient contributes to improved bone health and immunity, or its deficiency may be a potential risk factor for cardio-vascular disease, diabetes, bone fractures, cancer, cognitive decline and depression. A growing perception of an increasing trend of rickets amongst the population has been noted by medical professionals in the public sector. Reference cut-points to assess the Vitamin D status amongst the different age groups are provided in Annex 2H.

**Table 18a: Status of serum vitamin D (%) in participants aged 5-74 years, by age group**

Years	5-11	12-19	20-49	50-74	5-74
Below normal	39.0	80.8	48.6	53.4	54.8
Normal	61.0	18.7	41.1	33.9	38.6
Above normal	0.0	0.5	10.4	12.7	6.6

The results showed that the prevalence of below normal levels of serum vitamin D overall was 54.8% and was highest amongst adolescents 12-19 years at 80.8 % , followed by 53.4% in older adults aged 50-74 years (Table 18a).

**Table 18b: Prevalence of below normal serum vitamin D (%) in participants aged 5-74 years, by gender and age group**

Years	5-11	12-19	20-49	50-74
Male	32.3	78.0	52.2	46.9
Female	42.1	83.2	46.1	59.3

A higher prevalence of below normal levels of vitamin D was found amongst adolescent girls at 83.2% and amongst boys of same age at 78.0% compared with other age groups in the survey. Amongst older adults aged 50-74 years also, a higher prevalence was noted in women at 59.3% compared with 46.9% in men, whereas in men aged 20-49 years prevalence of low vitamin D was 52.2% compared with 46.1 % women of same age. Amongst the children 5-11 years low level was more amongst the girls at 42.1% compared with boys at 32.3% (Table 18b).

#### 2.4.6 HbA1c

HbA1c was measured for participants aged 12-74 years, from blood samples collected. The HbA1c is an indicator of the average blood sugar levels over the past three months that may be influenced by the dietary intake in the same period. Reference cut-points used to assess HbA1c status are found in Annex 2I.

**Table 19a: Percentage Prevalence of elevated HbA1c in participants aged 12-74 years, by gender**

<u>Diabetes</u>		<u>Pre-diabetes</u>	
	%		%
Male	18.5	Male	48.3
Female	17.4	Female	49.0
<b>Total</b>	<b>17.9</b>	<b>Total</b>	<b>48.7</b>

Overall, prevalence of diabetes (HbA1c  $\geq 6.5\%$ ) in participants aged 12-74 years, was found to be 17.9%:18.5% in males, 17.4% in females. Overall, the prevalence of pre-diabetes (HbA1c 5.7-6.4%) in the same age group, was found to be 48.7%:49.0% in females, 48.3% in males.

**Table 19b: Percentage prevalence of elevated HbA1c in participants aged 12-19 years, by gender**

	Male	Female	Total
<b>Pre-diabetes (5.7-6.4%)</b>	58.2	43.9	50.5
<b>Diabetes (≥6.5%)</b>	1.1	0.9	1.0

In the age group 12-19 years, the prevalence of elevated HbA1c in the diabetes range (HbA1c  $\geq 6.5\%$ ) was low at 1.0%:1.1% in boys, 0.9% in girls. Prevalence of pre-diabetes (elevated HbA1c in the range between 5.7 to 6.4%) in adolescents was found to be 50.5%: 58.2% in boys and 43.9% in girls (Table 19b).

**Table 19c: Percentage prevalence of elevated HbA1c in participants aged 20-49 years, by gender**

	Male	Female	Total
<b>Pre-diabetes (5.7-6.4%)</b>	52.2	57.0	55.0
<b>Diabetes (≥6.5%)</b>	14.8	7.9	10.7

In the age group 20 to 49 years, the prevalence of elevated HbA1c in the diabetes range (HbA1c  $\geq 6.5\%$ ) was 10.7%:14.8% in men, 7.9% in women. Prevalence of pre-diabetes (elevated HbA1c in the range between 5.7 to 6.4%) in this group was found to be 55.0%: 57.0% in women, 52.2% in men (Table 19c).

**Table 19d: Percentage prevalence of elevated HbA1c in participants aged 50-74yrs, by gender**

	Male	Female	Total
<b>Pre-diabetes (5.7-6.4%)</b>	36.3	42.7	39.7
<b>Diabetes (≥6.5%)</b>	36.3	44.4	40.5

In the age group 50 to 74 years, the prevalence of elevated HbA1c in the diabetes range (HbA1c ≥6.5%) was 40.5%:44.4% in women, 36.3% in men. Prevalence of pre-diabetes (elevated HbA1c in the range between 5.7 to 6.4%) in this group was found to be 39.7%: 42.7% in women, 36.3% in men (Table 19d).

Individuals with elevated HbA1c categorized as pre-diabetes are at higher risk of progressing to diabetes and therefore take preventive action by following dietary and lifestyle advice to achieve normoglycemia.

#### ***6.2.4.7 Serum Lipids***

Serum lipids (total cholesterol and triglycerides) was measured in participants 12-74 years. Reference cut-points used to assess the status of blood lipids (cholesterol and triglycerides) are found in Annex 2J.

#### **(i) Elevated total cholesterol (> 5.2 mmol/L)**

**Table 20: Prevalence of elevated cholesterol (> 5.2mmol/l) in participants aged 12-74 years by age group and gender (%)**

Years	12-19	20-49	50-74	12-74
<b>Male</b>	4.4	38.3	54.9	30.7
<b>Female</b>	9.3	27.3	40.0	30.6
<b>Total</b>	7.1	31.8	48.9	30.6

Overall prevalence of elevated blood cholesterol was 30.6%, irrespective of gender. The prevalence of elevated total cholesterol was found to be age related: highest amongst older participants aged 50-74 years at 48.9 % :54.9 % in men, 40.9% in women. In the age group 20 to 49 years, 31.8 % of participants had elevated serum cholesterol: 38.3% in men, 27.3% in women. In the age group of 12 to 19 years, 7.1% of participants had elevated cholesterol: 9.3% in girls and 4.4% in boys (Table 20).

## **(ii) Elevated Triglycerides**

**Table 21: Percentage prevalence of elevated triglycerides in participants aged 12-74 years, by gender and age group**

<b>Years</b>	<b>12-19</b>	<b>20-49</b>	<b>50-74</b>	<b>12-74</b>
<b>Male</b>	0.0	13.9	12.4	9.4
<b>Female</b>	0.0	1.7	5.6	1.8
<b>Total</b>	<b>0.0</b>	<b>6.4</b>	<b>8.9</b>	<b>5.5</b>

Overall prevalence of elevated triglycerides was 5.5%: 9.4% in males, 1.8 % in females. Prevalence of elevated triglycerides was highest amongst adults aged 50-74 years at 8.9%:12.4% in men, 5.6% women. In adults aged 20-49 years the prevalence of elevated triglycerides was 6.4 %:13.9 % in men, 1.7% in women. Amongst adolescents 12 to 19 years, elevated triglycerides was nil (Table 21).

Hypercholesterolemia and hypertriglyceridemia are risk factors for cardiac disease and mortality. Healthy population and persons at risk of dyslipidaemias must adhere to recommended dietary and lifestyle practices, in order to achieve optimal lipid profile that is cardio-protective.

## **6.3 Dietary Habits**

This section focuses on key dietary habits and patterns, including the dietary preference, consumption of meals, snacks, and key foods such as vegetables and fruits, as well as water intake, salt/ sugar/fats and oil intakes, food sources, food preparation and cooking practices amongst others.

### 6.3.1 Dietary Preferences

**Table 22a: Dietary preferences of participants aged 5-74 years (%), by gender**

	Male	Female	Both sexes
Vegan (plant based/no animal foods)	0.5	1.4	1.0
Lacto-vegetarian (allow milk products+ plant based)	0.5	0.0	0.2
Lacto-ovo vegetarian (allow eggs and milk products)	0.2	0.4	0.3
Semi vegetarian (allow one flesh food)	1.2	1.0	1.1
Non vegetarian	97.6	97.2	97.4

At least 97.0% of the survey population aged 5-74 years reported eating a wide variety of animal foods, irrespective of gender. Practice of semi-vegetarian, lacto-ovo vegetarian, lacto-vegetarian, and vegan diets was low at: 1.1%, 0.3%, 0.2% and 1.0% respectively. More female participants than males reported being vegan (consume only plant products) at 1.4% (Table 22a).

**Table 22b: Dietary preferences in participants aged 5-74 years (%), by age group**

	5-11 years	12-19 years	20-49 years	50-74 years
Vegan (no animal products)	0.0	0.0	1.4	2.1
Lacto-vegetarian (allow milk products)	1.0	0.0	0.0	0.0
Lacto-ovo vegetarian (allow eggs and milk products)	0.0	0.5	0.4	0.4
Semi vegetarian	1.0	1.0	1.1	1.3
Non vegetarian	97.9	98.5	97.1	96.2

Non vegetarianism was most prevalent amongst all age groups with at least 96.2% reporting same. Veganism was more amongst older adults 50-74 years old at 2.1%, and nil amongst children and adolescents (Table 22b).

### 6.3.2 Skipping Main Meals

#### 6.3.2.1 Skipping breakfast

**Table 23: Percentage of participants skipping breakfast in a week in participants aged 5-74 years, by age group**

	5-11 years	12-19 years	20-49 years	50-74 years
Never skip breakfast	82.1	57.1	70.4	86.5
Skip breakfast on all 7 days/week	1.0	8.1	4.3	0.8

On average, the habit of skipping breakfast on all days of the week was reported by 8.1% of adolescents aged 12-19 compared with other age groups at less than 4.5% (Table 23). More older adults aged 50-74 years ate breakfast on all 7 days as reported by 86.5% and comparably by 82.1% of children, and 70.4% younger adults aged 20-49 years, with lowest reported by 57.1% adolescents.

#### 6.3.2.2 Skipping lunch

**Table 24: Percentage of participants aged 5-74 years, skipping lunch in a week**

	5-11 years	12-19 years	20-49 years	50-74 years
Never skip lunch	92.8	87.9	79.6	85.7
Skip lunch on all 7 days/week	0.0	0.0	1.4	0.4

On average, 92.8% children aged 5-11 years and 87.9% adolescents never skipped their lunch. Around 1.4% adults aged 20-49 years reported that they skipped lunch daily (Table 24).



### 6.3.2.3 Skipping dinner

**Table 25: Percentage of participants aged 5-74 years, skipping dinner in a week**

Years	5-11	12-19	20-49	50-74
Never skip dinner	96.4	89.4	90.0	90.7
Skip dinner on all 7 days/week	0.5	0.0	0.7	0.4

Regarding dinner, at least 90.0% of all survey participants reported consuming this meal daily (Table 25). It appears that dinner is the most popular meal across all age groups.

### 6.3.3 Foods commonly consumed at breakfast

**Table 26: Food items commonly consumed for breakfast in a week by participants aged 5-74 years (%)**

Years	5-11	12-19	20-49	50-74
Bread	91.8	88.9	91.4	90.7
Cereal/cereal bar, specify usual type: plain, salt/sweet/high fibre/variety	76.9	50.0	31.8	42.6
Margarine/butter	85.1	79.3	78.2	80.2
Cheese	85.1	74.2	74.6	72.2
Plain milk	66.2	52.5	51.4	54.0
Chocolate milk or other Flavors	34.9	24.2	12.1	13.1
Yoghurt/yoghurt products	42.1	25.8	25.0	30.4
Banana	76.4	55.6	69.3	83.5
Other fruits	52.8	42.9	40.7	52.3
Jam	47.7	35.4	35.0	30.0
Peanut butter	49.7	41.9	34.6	27.0
Chocolate spread	27.7	25.8	9.6	10.1
Egg	66.7	58.1	62.9	60.8
Tea	92.3	82.3	87.5	90.7
Juice	48.2	39.4	43.6	41.8
Add sugar in milk/cereal/juice	77.4	73.2	63.6	52.3

Bread, butter, cheese, and tea are the most commonly consumed breakfast foods across all age groups 5-74 years: with at least 88.9 % having bread, at least 78.2% had butter, at least 72.2% had cheese, and at least 82.3 % drank tea (Table 26). Banana was more consumed: 83.5% of older adults aged 50-74 years, 76.4% children aged 5-11 years, 69.3% younger adults aged 20-74 years and 55.6% adolescents than other fruit at breakfast. At least 52.3 % of participants reported adding sugar in milk/cereal/juice.

Cereal/cereal bar consumption was 76.9 % amongst children 5-11 years and lowest at 31.8% of young adults aged 20-49 years. Plain milk consumption was 66.2 %, and egg consumption was 66.7 % among other items reported for breakfast by children, compared with other age groups.

#### 6.3.4 Food items most commonly consumed for lunch

**Table 27: Food items most commonly consumed for lunch at least once weekly, by participants aged 5-74 years (%)**

Years	5-11	12-19	20-49	50-74
Bread	74.9	75.3	46.1	33.8
Cereal/Energy Bar	3.6	6.6	3.6	6.8
Rice	92.8	72.7	94.3	93.2
Pasta/Noodles	87.2	69.7	70.7	60.8
Roti/Faratas	29.2	32.3	47.5	44.7
Chips	69.7	65.2	43.9	38.8
Pulses/Soya	86.7	61.1	96.1	92.8
Egg	88.7	76.8	91.8	83.5
Chicken	97.4	97.0	97.5	95.4
Fish/sea-foods	85.1	77.8	95.4	96.2
Processed meat/products	83.6	90.4	70.4	62.9
Vegetables/Salad	93.8	87.9	96.8	97.0
Fruit	83.1	68.2	73.6	78.1
Cheese	40.0	34.3	29.3	30.8
Yoghurt/yoghurt products	52.3	39.9	37.5	37.1

Amongst all age groups the most commonly consumed foods at lunch were rice with chicken and vegetables /salad and a fruit for lunch. 87.2% children aged 5 to 11 years also reported having pasta/noodles at lunch compared with 74.9% that had bread. Bread was equally consumed by 75.3% adolescents as rice at 72.7%. Fish / egg/ processed meat products/and pulses were also commonly consumed by children aged 5-11 years and adults aged 20-74 years, whereas adolescents showed preferred chicken and processed meat/products (Table 27).

### 6.3.5 Daily water consumption

**Table 28: Daily water consumption by participants, aged 5-74 years (%)**

	5-11 years	12-19 years	20-49 years	50-74 years
< 3 glasses	30.3	21.2	11.8	5.9
4-6 Glasses	44.6	31.3	15.7	24.1
>6 glasses	25.1	47.5	72.5	70.0

Daily water intake of more than 6 glasses of water as recommended for adults and adolescents was reported by 72.5% participants aged 20-49 years and 70.0 % of those aged 50 -74 years. At least 30.0% do not achieve the recommended target. Only 47.5 % adolescents met daily target or 52.5% need to increase their daily water intake. Recommended intake of 4-6 glasses (>3 glasses) for children aged 5-11 years was achieved by 69.7 % with at least 30.0% failing to do so.

The importance of adequate water intake in tropical countries cannot be over emphasized for its multiple health benefits and to prevent problems such as urinary tract infections and stone formation as well as to maintain normal blood pressure (Table 28).

### 6.3.6 Consumption of meals/snacks/beverages which were not prepared at home (or eaten outside)

**Table 29: Percentage of participants aged 12-74 years consuming meals /snacks bought from outside the home on weekly basis**

	12-19 years	20-49 years	50-74 years
1-2 days per week	45.5	48.2	41.8
3-4 days per week	19.7	11.8	3.0
5 or more days per week	12.6	5.0	3.8
Never	22.2	35.0	51.5

Highest consumption of foods not prepared at home or that were bought from outside at least once or twice weekly was found to be: 77.8% in adolescents, followed by 65.0 % in younger adults 20-49 years and less being reported by older adults at 48.6%. 51.5 % older adults reported never buying foods from outside or consuming foods that were not home-made (Table 29).

**Table 30: Percentage of children 5-11 years consuming food (other than snacks) not prepared at home on weekly basis**

	% children 5-11 years
Never	41.0
1-2 days	40.0
3-4 days	11.3
≥5 days	7.7

59.0% children 5-11 years reported eating food (other than snacks) prepared outside at least once or twice weekly (Table 30).

**Table 31: Percentage of participants aged 5-74 years reporting consumption of meals (fast food) not prepared at home at least once weekly**

	5-11 years	12 -19 years	20-49 years	50-74 years
Briani/fried rice	36.9	50.5	47.5	29.5
‘Mine bouillie’	27.2	49.0	43.6	22.8
Fried noodles	36.4	49.0	47.9	27.0
Fried Chicken/Grillade	33.3	47.0	40.7	17.7
Burger/Rounder/Pain Kebab/Pain Fourré	23.6	54.5	27.9	9.7
Dhollpuris/Roti/Farathas	46.2	67.7	51.8	29.1
Halim	21.5	39.4	29.3	16.0
‘Boulette’	30.3	37.9	32.1	21.5

Most popular meals/fast foods bought from outside was ‘dholpuri/roti/faratha’ reported by 67.7% of adolescents, 51.8% of young adults aged 20-49 years and 46.2 % of children aged 5-11 years; followed by ‘burgers/rounders /pain kebab/pain fourré’ that was popular with 54.5 % of adolescents, and ‘briani/fried rice’ at 50.5% in the same age group. At least 40.0% adolescents and young adults reported a higher consumption of foods bought outside that included items such as ‘mine bouillie’ (boiled noodles), fried noodles, fried/grilled chicken. Comparatively lower consumption of foods bought outside was noted amongst older adults aged 50-74 years in each category of foods listed (Table 31).

**Table 32: Percentage of participants aged 5-74 years that bought snacks/ beverages regularly from outside the house**

	5-11 years	12-19 years	20 – 49 years	50 – 74 years
Fried snacks	33.8	61.1	42.1	31.6
Sweets	49.7	61.1	31.1	21.9
Pastry/“gateau patisserie”	35.4	65.7	49.6	36.3
Yogurt drinks/yogurt/flavoured milk	20.5	49.5	50.4	38.0
Sugary drinks	39.5	58.6	51.8	31.6

Regular consumption of fried snacks, sweets, pastry, and sugary drinks was found to be highest amongst adolescents at 61.1%, 61.1%, 65.7%, and 58.6% respectively. Young adults aged 20-49 years also enjoyed these foods (exception of sweets), compared with children and older adults aged 50-74 years. Yoghurt and flavoured milks were more popular with young adults (50.4%) and adolescents (49.5%). Less older adults reported buying sweets regularly at 21.9% and more reported by children at 49.7% compared with the other food categories (Table 32).

**Table 33: Percentage of children and adolescents consuming other snacks/foods regularly**

FOOD ITEM	%	
	5-11 years	12-19 years
Boiled Arouille/Maize/Manioc/Patate Douce	7.2	17.2
Peanuts, ‘gramme’, nuts	16.4	35.4
Pudding: Maize/Vermicelli/Manioc	28.2	35.4
Pancakes: sweet or savoury	22.6	37.4
Idli, poutou, ounde	5.6	6.1
Fruits (fresh)	17.4	62.6
Fruits (dried or canned)	35.4	38.4
Biscuits	34.9	58.1
Flavoured milks, Ice cream, Piksidou (with milk)	30.3	53.0
Confit, Salades des fruits/legumes	30.3	49.0
Yogurt , ‘special canteen’	15.9	21.7
Packeted Snacks (sweet/savoury)	45.6	67.2

Concerning other snack items consumed by children and adolescents, it was found that 45.6 % children and 67.2% adolescents consumed packeted snacks, 35.4 % children and 38.4% adolescents consumed dried fruit, 34.9 % children and 58.1% adolescents ate biscuits, 30.3% children and 49.0% adolescents enjoyed ‘confits’, ‘salads des fruits/legumes’, 30.3% children and 53.0% adolescents had flavoured milks/ice creams/piksidou with milk. Fresh fruit as snacks was more popular with 62.6% adolescents compared with 17.4% children (Table 33).

**Table 34: Percentage of children and adolescents buying snacks from school canteen/other vendors**

Foods bought	5-11 years	12-19 years
From school	66.7	57.1
Nearby school	63.1	N/A
Work canteen	N/A	14.6
Restaurants /food courts	N/A	66.7

It was found that 66.7% children reported buying snacks from the school canteen compared with 57.1% adolescents. 66.7 % of adolescents also reported buying foods from restaurants and food courts (Table 34).

### 6.3.7 Foods most commonly consumed by children aged 5-11 years on daily basis

**Table 35: % Daily consumption of food items by children 5 – 11 years**

	% Daily consumption
Rice	79.5
Bread	68.2
Pasta, noodles	6.7
Faratha, dhollpuri	6.7
Pulses/pulse products	27.7
Eggs	10.8
Fish	17.4
Meat	10.3
Processed meat products	11.3
Milk and dairy products	63.6
Other	8.2

On a daily basis, 79.5% children aged 5-11 years reported consuming rice, 68.2% ate bread and 63.6% reported consuming milk/dairy products. More children reported pulse or pulse products consumption (27.7%), along with fish, meat and processed meat products, and eggs serving as alternate sources of protein (Table 35).

**Table 36: Percentage of Children consuming hot meal at school, 5-11 years**

Consumption of hot meal	% Children 5-11 years
Yes	96.9
No	3.1

The majority of children reported eating a hot meal at school: 96.9 % (Table 36).

**Table 37: Percentage of children 5-11 years consuming hot meal brought from home or from school at lunch on schooldays**

Hot meal from school/home	% Children 5-11 years
Hot meal from school	18.0
Home-made hot meal	82.0

82.0% brought their own hot meal for lunch from home compared with 18.0 % that obtained their hot meal at school (Table 37).

**Table 38: Percentage of participants aged 12-74 years bringing lunch to school/work**

Age Group	% positive response
12-19	82.8
20-49	49.3
50-74	37.1

82.8% of participants aged 12-19 years, 49.3% of those aged 20-49 years and 37.1% of those aged 50-74 years brought lunch to school/work (Table 38). It must be pointed out that in the last category of older adults, many respondents may be retired persons.



**Table 39: % Daily fruit consumption by children 5-11 years**

Daily fruit consumption	% Children 5-11 years
None	9.2
Half fruit	10.3
One fruit	48.7
Two fruit	23.1
≥ Three fruit	8.7

80.5% children aged 5-11 years reported eating at least one fruit daily, 31.8% reported eating at least 2 fruits daily and 9.2% reported not consuming any fruit (Table 39)

**Table 40: Number of vegetables consumed daily (at lunch and dinner) by children 5-11 years (%)**

Daily vegetable consumption	% Children 5-11 years
None	7.2
One vegetable	43.6
Two vegetables	37.4
≥Three vegetables	11.8

49.2% of children aged 5-11 years reported consuming at least 2 vegetables daily (at lunch and dinner) compared with 43.6 % reported consuming only one vegetable daily, and 7.2 % that did not consume any vegetables daily (Table 40).

**Table 41: Daily frequency of milk consumption by children 5-11 years (%)**

Daily milk consumption	% Children 5-11 years
1 time	49.7
2 times	27.2
3 times	7.2
4 times	4.6
Does not drink milk	11.3

11.3% children aged 5-11 years reported they did not consume any milk compared with 49.7 % of children who consumed milk only once daily, 27.2% that consumed milk twice daily and around 11.8% that had milk at least thrice daily (Table 41).

**Table 42: Type of milk and/or milk products regularly consumed ( $\geq 3$ times per week) by children 5 – 11 years (%).**

	% Children 5-11 years
Plain milk, no added sugar	33.3
Sweetened milk	70.3
Chocolate-flavoured milk	37.9
Commercial flavoured milk/milkshake/alouda	28.7
Yoghurt/yoghurt drinks	71.3
Soy milk	4.6
Nut-based milk	8.2
Milk-based dessert (la mousse, flan, custard)	52.3
Yoghurt or any milk based smoothies	31.3

71.3% children aged 5-11 years reported consuming yoghurt /yoghurt drinks regularly ( $\geq 3$ times per week), 70.3% reported consuming sweetened milk, and 52.3 % reported consuming milk-based desserts such as ‘la mousse’, flan, custard compared with 33.3% consuming plain milk (Table 42).

**Table 43: Percentage of children aged 5-11 years consuming soft drinks/sweetened drinks on weekly basis**

Consumption of soft drinks/ sweetened drinks	% Children 5-11 years
1-2 days	65.6
3-4 days	12.3
5-6 days	1.0
7 days	2.1
Never	19.0

65.6 % of children aged 5-11 years reported consuming soft drinks/sweetened drinks once or twice weekly while 19.0% reported not consuming soft drinks on a weekly basis Table 43).

#### **6.4 Dietary Knowledge, Behaviours and Practices**

This section examined respondents knowledge and perceptions on nutrition, diet and health, as well as food preparation and cooking practices, and included survey participants aged 12-74 years. Foods most commonly consumed, their frequency of consumption and the household consumption of salt and oil are also reported. Some key findings are presented below (additional tables are at Annex 3).

##### **6.4.1 Special diets and sources of dietary advice**

**Table 44: Percentage of participants aged 5-74 years following special diets for health reasons**

	5-11 years	12-19 years	20-49 years	50-74 years
Weight reducing (low calorie)	1.5	5.1	11.4	10.1
Weight gain	0.0	0.5	2.1	1.7
Anaemia	1.5	1.5	0.7	0.8
Diabetes	0.0	0.5	2.9	19.0
Constipation	0.0	0.0	0.4	0.8

Special diets for diabetes were more reported , more so by those aged 50-74 years:19.0 %. Participants also reported following diet for weight reduction: 11.4 % of those aged 20-49 years and 10.1 % of those aged 50-74 years reported following low calorie diets (Table 44).

**Table 45:Percentage of participants aged 5-74 years and source of dietary advice on special diets**

	5-11 years	12-19 years	20-49 years	50-74 years	5-74 years
<b>Health professional</b>	36.4	16.4	14.5	34.0	24.0
<b>Nutritionist</b>	21.2	14.5	14.5	20.4	17.3
<b>Internet</b>	6.1	7.3	3.5	0.5	2.9
<b>Social Media</b>	9.1	5.5	1.5	3.7	3.3
<b>Paper media</b>	0.0	1.8	4.5	1.0	2.5
<b>Friends/Relatives</b>	0.0	5.5	3.0	2.1	2.7
<b>School</b>	3.0	3.6	0.5	0.5	1.0
<b>Others</b>	24.2	45.5	58.0	37.7	46.1

Regarding dietary advice overall and concerning special diets, 46.1 % participants aged 5-74 years reported receiving such information from ‘other sources’ (for instance from a coach /teacher). Notably 58.0 % of young adults aged 20-49 years and 37.7% of older adults reported doing so. Health professional was identified as the 2<sup>nd</sup> major source of dietary advice by the participants: 24.0 % overall across all age groups and highest by children aged 5-11 years at 36.4% and older adults aged 50-74 years at 34.0%. Overall, 17.3% reported receiving dietary advice from the Nutritionist (Table 45).

## 6.4.2 Consumption of healthy foods

**Table 46: Percentage of participants aged 12-74 years reporting *not* consuming healthy foods, by age group**

FOOD ITEM	12- 19 years	20-49 years	50-74 years
Skimmed milk	70.7	70.7	65.0
Cereal, plain, high fibre (e.g., oatmeal)	32.3	23.2	24.9
Bread, brown	33.8	33.2	30.4
Whole wheat preparations (e.g., roti/ faratha/ crepe/ other)	24.2	30.0	31.2
Yoghurt, plain, non-fat	38.9	35.4	35.9
Unsalted nuts	35.9	37.1	39.7
Seeds (chia, flaxseed, sunflower, pumpkin)	44.9	47.9	49.8
Quinoa	68.2	71.4	68.4
Brown rice	74.7	81.8	73.4
Brown pasta	78.3	83.2	82.7
Brown noodles	76.8	83.2	81.9
Local fruits (Papaya, litchi, watermelon, mango, etc.)	2.0	1.4	2.5
Local vegetables (lalo, margoz, bringelle, brede, etc.)	1.5	1.8	0.8

Among healthy foods, brown noodles and pasta, brown rice, quinoa, skimmed milk, and seeds were the least popular (at least 65% disliked these foods) and brown bread, low fat plain yoghurts, unsalted nuts, whole wheat preparations (at least 24.2%) were also reported by participants (Table 46). The main reasons noted for non-consumption of these foods were: firstly these foods were not easily available in the locality, secondly that these foods were not liked by the whole family, and thirdly such foods did not taste good (not enjoyable).

### 6.4.3 Cooking methods used most regularly by household cook

**Table 47: Cooking methods most regularly used by household cook (%) to prepare food**

	12-19 years	20-49 years	50-74 years
Steam/pressure cook/boil	86.9	86.1	88.6
Braise/roast	35.9	39.3	35.4
Bake/grill/ microwave	34.3	40.4	34.2
Frying/shallow frying	91.4	92.5	86.9
Saute/Stir-fry/'fricasee'	87.4	97.9	94.1

The most common cooking method used by the participants, reported across all age groups (12-74 years) was frying/shallow frying: 91.4 % in those aged 12-19 years, 92.5 % in those aged 20-49 years and 86.9 % in those aged 50-74 years. Cooking methods such as 'saute/stir-fry/fricasee' was also popular as reported by 87.4 % adolescents, 97.9 % younger adults and 94.1 % of older adults. Preparation methods such as steaming /pressure cooking/boiling were also used by the participants almost equally as reported by 86.9 % participants 12-19 years, 86.1% of those aged 20-49 years and 88.6 % of those aged 50-74 years (Table 47).

### 6.4.4 Household consumption of cooking oil

**Table 48 a: Average monthly household oil consumption (%), in food preparation**

Amount of oil, L	12-19 years	20-49 years	50-74 years
1 ½ - 2	17.7	33.2	27.0
2 ½ - 4	22.7	28.6	30.4

Younger adults aged 20-49 years reported using 1 ½ -2 l of cooking oil on a monthly basis for the household (33.2 %) compared with older adults aged 50-74 years that reported using 2 ½ - 4 l of cooking oil in the same period (30.4%) (Table 48a). It must be noted that meals may be shared by several family members (see additional tables at Annex 3). It is pertinent to note here

that frying and shallow frying has been reported by more than 80.0% and therefore a low amount reported on a monthly basis raises the possibility that oil for frying is being re-used for cooking.

#### 6.4.4.1 Types of cooking oil used in food preparation

**Table 48b: Average monthly household consumption of different types of oils in food preparation (%)**

Type of oil	% respondents consuming
Blended oil (soya:palm)	66.0
Polyunsaturated Oil (PUFA)	22.0
Monounsaturated oils (MUFA)	1.5

Blended oil was found to be most commonly used by 66.0 % of the population. Blended oil most widely available on the island is a mix of soya-bean and palm oils. Following legislation regulating the composition of such oil, products must conform to a ratio of 3:1 or 75% of soybean oil and 25% palm oil for optimal health benefits (Table 48b).

#### 6.4.5 Household consumption of salt

**Table 49: Average monthly household consumption of salt used in cooking (%)**

Years	12-19	20-49	50-74
≤ ½ pkt	15.2	26.4	36.3
1 pkt	37.4	44.3	42.2
1 ½ - 2 pkt	11.6	11.1	5.9
> 2pkts	9.1	7.9	6.3
Other	0.5	1.1	2.1
Don't know	0.0	0.0	0.0
	26.3	9.3	7.2

At least 37.4 % of participants aged 12-74 years reported using 1 packet (500grams) of salt in cooking for the household on a monthly-basis, and 36.3 % of older adults aged 50-74 years reported using ½ packet (250 grams) or less of salt (Table 49).

### **6.5 Influence of COVID-19 on Diet and Eating Habits**

This section reports on the survey findings regarding the influence of the pandemic situation on diet and eating habits, that was asked to all participants 12-74 years old.

**Table 50: Percentage of participants reporting changes in eating habits during and after COVID-19 lockdowns.**

Age Group/ years	During COVID-19 Lock down	After COVID-19 Lock down
12-19	75.5	28.6
20-49	78.1	33.3
50-74	72.4	36.2

More participants reported changes in their eating habits during the COVID-19 lockdowns compared with changes after lockdown: at least 72.4 % compared with at least 28.6% post COVID. Changes in eating habits after the COVID-19 lockdown appeared to be influenced by age: 33.3% in adults 20-49 years old and 36.2% in older adults compared with 28.6% adolescents (Table 50).

**Table 51: Percentage of participants reporting change in total amounts of food consumed influenced by the pandemic lockdowns**

Age Group	The food consumption increased	The food consumption decreased	The food consumption remained the same
12-19	12.6	8.1	79.3
20-49	17.5	13.2	69.3
50-74	11.4	11.0	77.6



The majority of participants reported no change in quantity of food consumed: 79.3 % of participants aged 12-19 years, 69.3 % of participants aged 20-49 years and 77.6 % of older adults aged 50-74 years reported their consumption remained stable (Table 51).

**Table 52: Percentage of participants reporting decreased consumption of food items during the pandemic lockdowns**

Food items	Consumed Less		
	12-19 years	20-49 years	50-74 years
Vegetables	12.1	13.6	13.1
Fruits	16.2	18.9	15.6
Pulses and legumes	6.6	10.0	8.9
Fish	12.6	15.0	12.7
Seafoods	25.3	29.6	27.4
Chicken	7.1	13.9	14.8
Meat	7.1	20.0	16.9
Eggs	11.6	14.3	16.5
Rice	7.6	11.1	12.7
Bread	16.7	18.2	19.0
Pasta	14.6	17.5	27.0
Roti	33.8	38.9	36.3
Dhollpuri	40.4	48.6	44.3
Milk	12.1	22.5	16.0
Milk products e.g. Cheese, yogurt	16.2	30.0	29.1
Fast foods/Takeaways	42.9	52.5	48.1
Desserts/Sweets	30.3	35.4	35.0
Salty snacks/Baked products	26.3	31.8	35.4
Water	7.1	6.4	5.1
Soft/sweetened drinks	22.7	36.1	31.6
Fresh juice, 100%, unsweetened	14.6	21.1	21.1
Coffee/tea	11.1	15.0	11.0

Regarding specific food items/groups, the most notable changes in eating habits during the pandemic lockdowns concerned reduced consumption of popular food and drinks that are available commercially from street vendors and fast-food outlets that were closed during the lockdowns: 42.9 % participants aged 12-19 years, 52.5 % aged 20-49 years and 48.1 % of those aged 50-74 years reported reduced consumption of fast foods/take-aways. It was also noted that 40.4% participants aged 12-19 years, 48.6% of those aged 20-49 years and 44.3 % of those aged 50-74 years reported eating less 'dhollpuri', a popular flatbread that is available as a street food in normal times. Similarly, reduced consumption of 'roti' (another flatbread /street food), desserts and sweets, salty snacks /baked products and soft/sweetened drinks were noted. Reductions in consumption of staple foods such as rice, pulses, fish and chicken were reported by around 15.0% or less of the survey population. Less than one fifth of the participants noted reduction of foods such as bread, eggs, sea-foods, meat, vegetables and fruits (refer Table 52).

**Table 53: Percentage of participants aged 12-74 years reporting increased consumption of certain food items during the pandemic**

Food items	Consumed more		
	12-19 years	20-49 years	50-74 years
Vegetables	19.7	24.3	17.3
Fruits	17.7	18.2	14.3
Pulses and legumes	19.2	27.1	16.9
Fish	17.7	23.6	16.5
Seafoods	9.6	12.9	7.6
Chicken	19.2	17.1	12.7
Meat	18.7	15.4	9.7
Eggs	15.7	18.2	8.4
Rice	17.7	18.6	13.1
Bread	14.1	17.1	8.9
Pasta	16.2	15.4	6.8
Roti	11.1	12.5	6.3
Dhollpuri	7.1	8.2	3.8
Milk	12.6	15.0	9.7
Milk products e.g., Cheese, yogurt	12.6	10.0	6.8
Fast foods/Takeaways	5.1	4.6	3.8
Desserts/Sweets	12.1	11.4	6.3
Salty snacks/Baked products	12.6	13.9	5.9
Water	23.2	35.7	30.0
Soft/sweetened drinks	16.2	11.8	3.8
Fresh juice, 100%, unsweetened	19.2	20.7	13.1
Coffee/tea	13.1	16.8	9.3

Notably, water consumption was reported to have increased in all the age groups: 23.2% in those aged 12-19 years, 35.7 % in those aged 20-49 years, and 30.0 % in those aged 50-74 years. Increased consumption of vegetables, fruits, fresh juice, pulses, fish, and rice was reported more by younger adults. Increases in consumption of other items (meat, chicken, eggs,

sweets, soft drinks, salty snacks, milk and milk products were more notable in adolescents. Overall, less older adults reported increased consumption (Table 53).

## **6.6 Physical Activity**

The Ministry of Health and Wellness promotes the ‘Global Recommendations on Physical Activity for Health’ of the World Health Organization. It is well known that the practice of regular physical activity provides multiple health benefits for the active individual: weight management, prevention and management of non-communicable diseases, stress management, improved performance and productivity. Also well documented are the multiple health risks associated with increased sedentary, as noted by the statement ‘sitting is the new smoking’.

### **Meeting recommended standards of physical activity**

Children and adolescents must aim to practice 420 minutes of moderate to vigorous physical activity on a weekly basis and adults must aim for 150 minutes or more in a week as recommended by the World Health Organization guidelines.

**Table 54a: Percentage of respondents 5-74 years meeting standards of physical activity**

	5-11 years	12-19 years	20-49 years	50-74 years
Male	59.4	58.2	47.8	31.0
Female	46.5	21.5	38.8	36.3
Both Sexes	52.8	38.4	42.5	33.8

Survey findings showed that 52.8% of the younger participants aged 5-11 years and 42.5% of the younger adults aged 20 -49 years met the standards of physical activity as recommended for health and wellness with 38.4 % adolescents and 33.8% older adults lagging behind (Table 54a). In all age groups, girls and women were less active with the exception of older women aged 50 years/above (Table 54a).

## Sedentary leisure activity

**Table 54b: Average number of hours spent daily watching TV/video/VCD/DVD, on the computer, playing computer/video games, sending SMS, reading and/or other sedentary activities**

	5-11 years	12-19 years	20-49 years	50-74 years
Male	2.1	2.9	2.4	1.9
Female	1.8	2.8	2.1	1.7
Both Sexes	<b>2.0</b>	<b>2.9</b>	<b>2.2</b>	<b>1.8</b>

The participants also reported on the amount of time they spent daily in sedentary activities in their leisure time, such as ‘screen time’ (watching TV or video or DVD video / on computer/or computer games/ sending SMS) or reading/other seated activities: highest noted amongst adolescents at 2.9 hours, 2.2 hours amongst younger adults (20-49 years), 2.0 hours amongst children (5-11years) and least noted amongst older adults (50-74 years) at 1.8 hours. Both males and females spend almost similar amounts of time in sedentary activities (Table 54b).

## Occupational physical activity

**Table 55: Percentage of participants 18-74 years and self-reported levels of occupational physical activity**

	18-49 years	50-74 years	All ages (18-74 years)
Sedentary	7.9	8.4	8.0
Lightly active	28.9	16.5	23.3
Moderately active	24.7	15.2	20.5
Vigorously active	12.7	21.1	16.5

Participants who attended work (18-74 years) reported on their occupational physical activity: 8.0 % overall were engaged in sedentary occupations, 23.3 % reported light activity at work, 20.5 % were moderately active and 16.5 % described their work activity as vigorous. More

participants aged 18-49 years reported being engaged in light and moderate activity at work compared with older participants aged 50-74 years: 28.9% and 24.7 % compared with 16.5 % and 15.2 % respectively; whereas older participants reported more vigorous activity at 21.1 % than younger groups at 12.7% (Table 55).

### **6.7 Estimated Average Daily Food Consumption**

This section presents results based on quantitative information concerning habitual food intake of survey participants during preceding 3 months using an extensive food list comprising 123 items. Participants aged 12-74 years reported on consumption frequency on daily/weekly/monthly basis. Portion size for each item was also recorded using standardized food models/serving sizes for reference/aids, for each item on the list. As far as possible, food items asked referred to cooked items and commonly used preparation styles.

Daily consumption in grams was computed using the frequency of consumption and portion size for each item recorded as being eaten by participant. The food composition database used in Mauritius Nutrition Survey 2012 (and Rodrigues ), was updated using international tables of food composition (USDA Food Central, FAO, Indian and West African tables). Nutritional value of the daily diet was subsequently computed using this updated database.

In order to facilitate presentation of results, foods were categorized in terms of nutritional composition and findings are shown for commonly consumed foods in each category. The frequency of consumption of selected items in each food category, and the estimated daily consumption or daily mean per capita by age group for the survey participants aged 12-74 years are presented in this section.

**6.7.1 Grains and products** including starchy vegetables were included in this category of foods that are rich in complex carbohydrates (and energy).

**Table 56a: Frequency of consumption of grains/ grain products and starchy vegetables**

Food items	% Respondent consuming	% Frequency of consumption (among respondents who consumed)		
		Daily	Weekly	Monthly
Grains (inclusive white roots and tubers, and starchy vegetables) of which				
<i>Rice, plain, cooked</i>	97.1	89.0	10.5	0.5
<i>Bread white</i>	91.0	77.3	21.9	0.8
<i>Bread, brown</i>	20.0	39.0	52.4	8.5
<i>Oats</i>	27.7	10.5	57.9	31.6
<i>'Weetabix'</i>	30.4	16.0	68.8	15.2
<i>Pasta</i>	82.5	16.0	68.8	15.2
<i>Noodles, fried</i>	71.8	0.7	37.6	61.7
<i>Noodles, boiled</i>	63.0	0.8	46.3	52.9
<i>Roti / farata , white</i>	74.4	2.6	54.7	42.7
<i>Dhollpuri</i>	34.8	1.4	45.5	53.1
<i>Potatoes</i>	94.4	2.3	75.5	22.2
<i>Other white tubers</i>	66.4	2.2	36.6	61.2
<i>Corn</i>	52.6	2.8	28.2	69.0
<i>'Diriz maïs' (rice + maize)</i>	52.6	2.8	37.5	59.7

Rice was most commonly consumed on a daily basis by 97.1% of the population, and it is pertinent to note that the majority of survey participants reported twice daily intake. White bread was also almost equally consumed by 91.0% of the participants. Amongst starchy vegetables, potato consumption was reported by 94.4% of the respondents, generally on a weekly basis.

‘Farata/roti’ (Indian unleavened flatbreads) was popular with 74.4% of the population and was consumed on weekly and monthly basis by the population aged 12-74 years. Similarly, ‘dhollpuri’, another traditional Indian item was consumed by 34.8% of those surveyed. Other popular foods consumed more on a weekly basis were: pasta, reported by 82.5% of participants; and noodles, consumed as both fried and boiled preparations by at least 63.0% of the population, more on a monthly basis. Foods such as ‘farata/roti, dhollpuri’ and noodles are nowadays more commonly available on the island as street foods.

High fibre foods such as oats, wheat biscuits (‘Weetabix’) and brown bread consumption was reported by 27.7%, 30.4% and 20.0% of survey participants, generally on a weekly basis.

‘Di riz mais’, a traditional dish made with equal amounts of rice and cornmeal boiled together, that replaces plain boiled rice at main meals, was reported by 52.2% of the population. Consumption of this food was reported more on a monthly basis by 68.3% of survey participants (Table 56a).



**Table 56b: Estimated daily consumption of grains/grain products and starchy vegetables**

	Age/ years	12-19	20-49	50-74	12-74
Food items	% Respondents consuming	Mean per capita (g)	Mean per capita (g)	Mean per capita (g)	Mean per capita (g)
Grains and products, white roots and tubers, and starchy vegetables (cooked), of which	..	1296.0	1214.6	1019.5	1165.9
<i>Grains and products only (excluding starchy vegetables)</i>	..	1260.5	1170.9	990.7	1129.6
<i>Rice, plain, cooked</i>	97.1	764.4	762.9	700.8	742.2
<i>Bread, white</i>	91.0	90.8	77.8	62.4	76.1
<i>Farata/roti, white</i>	74.4	52.0	37.9	25.3	37.9
<i>Pasta</i>	82.5	61.5	60.0	39.6	53.6
<i>Noodles, fried</i>	71.8	43.8	38.1	19.6	34.3
<i>Noodles, boiled</i>	63.0	18.4	18.8	9.1	16.1
<i>Dhollpuri</i>	34.8	53.9	45.8	36.3	44.0
<i>Potatoes</i>	94.4	34.9	33.0	24.6	30.6
<i>Oats</i>	27.7	19.0	32.1	29.1	28.0
<i>Weetabix</i>	13.2	7.6	12.2	10.8	21.4
<i>'Diriz maïs' (rice + maize)</i>	52.2	78.2	70.7	73.7	73.6

Overall, daily mean capita of all starchy foods, including potatoes and other starchy vegetables, was 1165.9 grams compared with 1129.6 grams for grains and grain products only. Daily mean per capita of plain cooked rice overall for participants aged 12-74 years was 742.2 grams and consumed on a twice daily basis by the majority of respondents (that is, 371.1grams at one meal). White bread had a daily mean per capita of 76.1grams. Amongst starchy vegetables, daily mean capita for potato consumption was found to be 30.6 grams. The daily mean capita for 'diriz maïs' was found to be 73.6 grams (Table 56b).

**6.7.2 Pulses** and their products such as soya and tofu /teokon contribute plant proteins to the diet as well as dietary fibre with negligible amounts of fats and cholesterol.

**Table 57a: Frequency of consumption of pulses and pulse products**

Food items	% Respondent consuming	% Frequency of consumption (among respondents who consumed)		
		Daily	Weekly	Monthly
<b>Pulses and products, of which</b>	..			
<i>Pulses</i>	96.6	13.1	84.9	2.0
<i>Soya beans ('soya')</i>	15.6	6.3	45.3	48.4
<i>Tofu /teokon</i>	6.8	0.0	39.3	60.7
<i>Preserved /processed soya products</i>	0.0	0.0	0.0	0.0

Pulses and legumes (such as lentils, white/red beans and other varieties) were consumed by 96.6% of the population of which 84.9% consumed these items on a weekly basis. Soya and tofu consumption was reported by 15.6% and 6.8% of the survey participants. While soya was consumed on a weekly basis and monthly basis equally by at least 45.3% of the population, 60.7% consumed teokon/tofu more on a monthly basis. Preserved/processed products consumption was not reported by survey participants, perhaps due to limited availability (Tables 57a).

**Table 57b: Estimated daily consumption of pulses and pulse products**

		12-19 years	20-49 years	50-74 years	12-74 years
Food items	% Respondents consuming	Mean per capita (g)	Mean per capita (g)	Mean per capita (g)	Mean per capita (g)
Pulses, including soya, teokon & products, of which	..	141.3	137.5	108.8	128.3
<i>Pulses</i>	96.6	144.4	139.5	111.6	130.9
<i>Soya</i>	15.6	11.5	13.0	4.8	9.4
<i>Tofu/teokon</i>	6.8	11.6	6.1	2.8	6.6

Pulses and pulse products (such as soya, tofu/teokon) were consumed at a daily mean per capita of 128.3 grams (Tables 57b), with pulses being the most consumed at 130.9 grams per capita.

**6.7.3 Nuts and seeds** are a valuable source of plant protein, especially for those whose dietary habits are vegan and vegetarian. These foods also contribute healthy fats and dietary fibre in the diet.

**Table 58a: Frequency of consumption of nuts and seeds**

Food items	% Respondent consuming	% Frequency of consumption (among respondents who consumed)		
		Daily	Weekly	Monthly
<i>Nuts &amp; Seeds, of which</i>				
<i>Nuts</i>	29.2	7.5	49.2	43.3
<i>Peanuts, salted/unsalted</i>	64.2	1.9	50.0	48.1
<i>Seeds</i>	17.0	4.3	51.4	44.3
<i>Quinoa</i>	0.5	0.0	0.0	100.0

Nuts (all varieties) were consumed by 29.0%, usually on a weekly and monthly basis. Peanuts, especially were popular in this category, reported by 64.2% participants. Seeds such as pumpkin/sunflower / others were consumed by 17.0% of population surveyed (Table 58a).

**Table 58 b: Estimated daily consumption of nuts and seeds**

		12-19 years	20-49 years	50-74 years	12-74 years
Food items	% Respondents consuming	Mean per capita (g)	Mean per capita(g)	Mean per capita (g)	Mean per capita (g)
Nuts & seeds, of which	..	8.1	5.0	4.3	5.5
<i>Nuts</i>	29.2	6.5	4.3	5.1	5.2
<i>Peanuts</i>	64.2	4.8	3.7	2.3	3.5
<i>Seeds</i>	17.0	2.7	3.0	3.2	3.0

Nuts (all varieties) are consumed at a daily mean per capita of 5.2 grams with peanut consumption at a daily mean per capita of 3.5 grams. Seeds such as pumpkin/sunflower / others consumption was at a daily mean per capita of 3.0 grams (Table58b).

**6.7.4 Milk and milk products** such as cheese and yoghurt provide good quality animal protein along with calcium and other micro-nutrients. Milk protein, along with egg proteins serve as reference for protein quality of foods. Full cream milk and milk products also contribute saturated fats and cholesterol, while cheese contributes added salt (and sodium) to the diet.

**Table 59a: Frequency of consumption of milk and dairy products**

Food items	% Respondent consuming	% Frequency of consumption (among respondents who consumed)		
		Daily	Weekly	Monthly
<i>Milk and Dairy, of which</i>				
<i>Cow's milk, liquid</i>	10.2	50.0	35.7	14.3
<i>Cow's milk, powder</i>	84.2	83.5	12.4	4.0
<i>Other milk</i>	2.7	63.6	0.0	36.4
<i>Cheese</i>	78.6	21.7	61.0	17.3
<i>Yoghurt, plain</i>	7.5	9.7	48.4	41.9

Cow's milk powder was more commonly reported by 84.2% of the survey population, and 83.5% reported consumption on daily basis compared with liquid milk. Among milk products, cheese was widely consumed by 78.6% of the population, of which 61.0% consumed this item on a weekly basis. Plain yoghurt was less consumed: by 7.5% of the population, on a weekly and monthly basis (Table 59a).

**Table 59b: Estimated daily consumption of milk and dairy products**

		12-19 years	20-49 years	50-74 years	12-74 years
Food items	% Respondents consuming	Mean per capita (g)*	Mean per capita (g)*	Mean per capita (g)*	Mean per capita (g)*
<b>Milk and Dairy, of which</b>					
<i>Cow's Milk, powder</i>	84.2	18.7	16.3	15.8	16.8
<i>Cheese</i>	78.6	18.6	12.5	10.2	13.1
<i>Cow's Milk, liquid*</i>	10.2	255.9	191.5	248.9	233.1
<i>Yoghurt, plain</i>	7.5	53.6	17.5	30.0	29.5

*\*Note: unit of measurement for cow's milk, liquid is in millilitres*

Cow's milk powder consumption was reported at a daily mean per capita of 16.8 grams compared with liquid cow's milk at 233.1 milliliters. Cheese was found to be consumed at a daily mean capita of 13.1 grams. Plain yoghurt consumption was found to have a daily mean capita of 29.5 grams (Table 59b). Taken together, this represents a lower than recommended intake of milk and milk products.

**6.7.5 Meat and products** included all flesh foods such as red meats, poultry, fish and seafood, offal (organ meats such as liver, brain, kidney) and all preserved and processed products of these foods.

**Table 60a: Frequency of consumption of meat and products**

Food items	% Respondent consuming	% Frequency of consumption (among respondents who consumed)		
		Daily	Weekly	Monthly
Meat, fish & seafood, poultry, organs meats, preserved meat & products, of which				
<i>Fish, fresh/frozen</i>	97.1	13.0	84.5	2.5
<i>Fish, salted/smoked</i>	33.1	1.5	37.5	61.0
<i>Fish, canned</i>	48.2	0.5	66.2	33.3
<i>Seafood, fresh/frozen</i>	61.1	1.6	41.0	57.4
<i>Lamb/mutton</i>	11.7	0.0	29.2	70.8
<i>Venison</i>	2.2	0.0	44.4	55.6
<i>Poultry or white meat</i>	96.6	2.5	91.2	6.3
<i>Preserved/processed meat/chicken products</i>	57.4	2.1	74.6	23.3
<i>Offal</i>	33.1	0.7	46.3	52.9

Fish and poultry consumption were reported equally by 97.1% and 96.6 % of the survey population aged 12-74 years respectively, with the majority reporting consumption of these foods on a weekly basis. Canned fish was reported by 42.2% and was consumed more on a weekly basis. Salted/smoked was reported by 38.1% and was usually consumed on monthly basis. Seafood was consumed by 61.1% of the population, with majority reporting monthly consumption. Preserved/processed meat/poultry products was consumed by 57.4% of the population, usually on a weekly basis. Beef was reported by 55.2% and pork by 82.5%, consumption being more on a monthly basis. While offal consumption was by 33.1% of the population on a weekly and monthly basis, much lower consumption was reported for red meats such as lamb/mutton at 11.7% (Table 60a).

**Table 60b: Estimated daily consumption of meat and products**

		12-19 years	20-49 years	50-74 years	12-74 years
Food items	% Respondents consuming	Mean per capita (g)	Mean per capita (g)	Mean per capita (g)	Mean per capita (g)
<i>Meat, including all flesh foods (red meat, poultry, fish, seafood, offal, all products), of which</i>	..	186.9	186.2	156.5	175.9
<i>Fish fresh frozen</i>	97.1	84.7	105.9	103.7	99.9
<i>Fish salted /smoked</i>	33.1	4.9	7.4	3.3	5.5
<i>Fish, canned</i>	48.2	12.9	8.4	4.4	8.3
<i>Seafood fresh/frozen</i>	61.1	25.5	17.7	9.1	16.8
<i>Lamb/mutton</i>	11.7	2.8	5.0	2.5	3.9
<i>Goat/Venison</i>	2.2	10.5	19.9	7.9	13.8
<i>Poultry or white meat</i>	96.6	46.0	40.6	34.9	39.9
<i>Beef</i>	55.2	6.6	6.3	4.5	5.9
<i>Pork</i>	82.5	7.2	6.4	5.9	6.4
<i>Preserved/processed meat/chicken products</i>	57.4	21.7	16.1	7.5	15.5
<i>Offal</i>	33.1	11.9	8.7	8.6	9.4
<i>Fish preserved /processed products</i>	14.4	20.1	8.0	7.2	12.9
<i>Seafood, processed</i>	12.7	9.8	8.8	5.9	8.2

The daily mean per capita of all flesh foods consumed (red meat, poultry, fish and seafood, offal (organ meats) and their preserved and processed products) was found to be 175.9 grams, as reported by the survey population aged 12-74 years. Adolescents aged 12-19 years and younger adults 20-49 years reported consuming at least 186 grams of these foods. The daily mean per capita of fresh /frozen fish was 99.9 grams, poultry or white meat was 39.9 grams, pork 6.4 grams and beef 5.9 grams (Table 60b).



**6.7.6 Egg** is a valuable source of high biological value protein as well as various micro-nutrients such as Vitamins A and D, and iron in the diet.

**Table 61a: Frequency of consumption of eggs**

Food items	% Respondent consuming	% Frequency of consumption (among respondents who consumed)		
		Daily	Weekly	Monthly
<i>Eggs, of which</i>				
<i>Egg fried</i>	75.9	4.5	82.7	12.8
<i>Egg boiled</i>	68.9	3.5	76.3	20.1
<i>Egg omelette</i>	48.9	2.0	81.6	16.4

Of those participants who reported egg consumption, 75.9 % preferred fried eggs, and 68.9% enjoyed boiled egg compared with egg ‘omelette’. These foods were consumed usually on a weekly basis (Table 61a).

**Table 61b: Estimated daily consumption of eggs**

		12-19 years	20-49 years	50-74 years	12-74 years
Food items	% Respondents consuming	Mean per capita (g)	Mean per capita (g)	Mean per capita (g)	Mean per capita (g)
<i>Eggs, of which</i>	..	42.2	39.0	28.4	36.0
<i>Eggs , fried</i>	75.9	24.0	19.5	15.9	19.7
<i>Egg, boiled</i>	68.9	20.1	21.9	19.7	20.6
<i>Egg, omelette</i>	48.9	14.9	15.1	11.8	14.1

Daily mean per capita of egg consumption was found to be 36.0 grams overall (Table 61b). Due to high cholesterol content of egg, healthy populations are advised to limit egg consumption to around 3 units per week (average unit weighing around 50-60 grams).

**6.7.8 Vegetables** are amongst the food groups that are recommended to be eaten by nutrition professionals in as wide a variety as possible and in quantities that may exceed recommendations for daily intake, but are usually found to be lacking in the diet of most population sub groups. The nutritional and other benefits of vegetable consumption on health and wellness are well known.

**Table 62a: Frequency of consumption of vegetables**

Food items	% Respondent consuming	% Frequency of consumption (among respondents who consumed)		
		Daily	Weekly	Monthly
<i>Vegetables, of which</i>				
<i>Dark green leafy vegetables</i>	98.1	16.9	81.6	1.5
<i>Red/ orange/yellow vegetables</i>	97.8	10.4	84.8	4.7
<i>Salads, raw</i>	97.1	37.6	59.9	2.5
<i>Other vegetables, cooked</i>	95.6	21.9	75.3	2.8

At least 95.6% of the survey population reported consuming various varieties of vegetables overall. At least 37.6% respondents reported consuming raw salads daily. Survey respondents reported consuming dark green leafy vegetables, red/orange and yellow vegetables, other vegetables, and raw salads more often on a weekly basis: 81.6%, 84.8%, 75.3% and 59.9% respectively (Table 62a).

**Table 62b: Estimated daily food consumption of vegetables**

		12-19 years	20-49 years	50-74 years	12-74 years
Food items	% Respondents consuming	Mean per capita (g)	Mean per capita (g)	Mean per capita (g)	Mean per capita (g)
<i>Vegetables, total of which</i>	..	82.8	97.2	76.8	86.4
<i>Dark green leafy vegetables</i>	98.1	20.6	26.1	21.9	23.3
<i>Red/ Yellow /orange vegetables</i>	97.8	31.2	34.4	25.5	30.5
<i>Other vegetables, cooked</i>	95.6	17.7	17.2	15.6	16.8
<i>Salads, raw</i>	97.1	17.2	21.5	15.3	18.3

The daily mean per capita of all varieties of vegetable was found to be 86.4 grams. Portion size of all categories of vegetables and salads was found to be low, at less than 50 grams (Table 62b).

**6.7.9 Fruits** appeared to be more popular, with the survey participants reporting higher consumption. Fruits are highly recommended in the daily diet due to health benefits derived from a range of micro- nutrients, phytonutrients, and both soluble/insoluble dietary fibres found in these foods. A variety of fruit/products were included in this category.

**Table 63a: Frequency of consumption of fruits**

Food items	% respondent consuming	% Frequency of consumption (among respondents who consumed)		
		Daily	Weekly	Monthly
<i>Fruits, of which</i>				
<i>Yellow/orange fruits</i>	91.5	25.3	65.4	9.3
<i>Other fresh fruit</i>	90.5	32.0	59.1	8.9
<i>Dried fruit</i>	55.2	4.4	60.4	35.2

91.5% reported consuming yellow /orange fruit such as mango/papaya/apricot and 90.5% of survey population reported consumption of ‘other fruit’ (such as apples/ oranges/ pears/ nectarines/ similar fruits), more on a weekly basis. Dried fruit were popular with 55.2% of respondents, and also consumed usually on a weekly basis (Table 63a).

**Table 63b: Estimated daily consumption of fruits**

		12-19 years	20-49 years	50-74 years	12-74 years
Food items	% Respondents consuming	Mean per capita (g)	Mean per capita (g)	Mean per capita (g)	Mean per capita (g)
<i>Fruits, of which</i>	..	146.3	170.3	187.6	170.5
<i>Fruits (fresh+yellow/orange/red)</i>	..	143.1	168.3	185.5	168.1
<i>Other fruit, fresh</i>	90.5	60.7	80.7	74.6	73.5
<i>Yellow/orange/red fruit</i>	91.5	97.3	110.2	121.0	111.1
<i>Dried fruit</i>	55.2	5.0	4.1	3.9	4.3
<i>Fruits, canned</i>	15.1	7.9	7.9	4.3	7.0

Daily mean per capita of fruit intake was found to be 170.5 grams, of which fresh fruit and yellow/orange /red fruit was reported at 168.1 grams. A fruit portion may be the equivalent of a medium sized fruit/cup of fruit (~100 grams). The recommendation for healthy people is to consume at least 2 fruits daily for their numerous valuable health benefits (Table 63b).

**Table 63c: Estimated daily consumption for vegetables and fruits taken together**

Age group	12-19 years	20-49 years	50-74 years	12-74 years
Food items	Mean per capita (g)	Mean per capita (g)	Mean per capita (g)	Mean per capita (g)
<b>Vegetables and fruits</b>	225.9	265.4	262.3	254.5

The World Health Organization recommends at least 400 grams of vegetable and fruit intake daily, for healthy adults and adolescents. Taken together, the consumption of vegetable and fruit by the survey respondents was found to be 254.5 grams, representing approximately 63.6% of the recommended daily intake (Table 63c).

**6.7.10 Fats and Oils** are found in foods (invisible fats), as well as added during food preparation (visible fat). These foods are energy dense and it is well known that their excess consumption can lead to overweight amongst individuals consuming high calorie diets. In general, a minimum amount of fats and oils is required in the daily diet for healthy physiological function. However, not all fats are created equal: as those with higher unsaturated fatty acid profile provide health benefits compared with those fats that have higher saturated fatty acid profile that are damaging for health, besides the negative impact of trans-fatty acids that are usually found in processed foods. The quantity of total daily intake of fats and oils and their quality (fatty acid profile), by individuals and the population must therefore be considered in the prevention of non- communicable diseases.

**Table 64a: Frequency of consumption of added fats and oils**

Food items	% Respondent consuming	% Frequency of consumption (among respondents who consumed)		
		Daily	Weekly	Monthly
<i>Fats and Oils of which</i>				
<i>Margarine</i>	60.3	64.9	30.6	4.4
<i>Butter</i>	13.1	50.0	42.6	7.4
<i>Spread</i>	12.7	75.0	25.0	0.0
<i>Ghee</i>	2.9	0.0	8.3	91.7
<i>Cream</i>	8.0	0.0	36.4	63.6
<i>Oil, blend</i>	69.6	94.4	4.2	1.4
<i>Oil, PUFA</i>	28.0	94.8	3.5	1.7
<i>Oil, MUFA</i>	3.6	46.7	46.7	6.7

Margarine and blended oil were most commonly used by the survey population on a daily basis: 60.0% of the survey population consumed margarine of which 64.9 % used it on daily basis. Blended oil was consumed by 69.6% of the population of which 94.4% reported using same on daily basis; while 28.0% reported using polyunsaturated oils (PUFA) with 94.8% using same on a daily basis (Table 64a). Most widely available/commonly used blended oil on the island is a soyabean/palm oil based blend, whose composition is regulated by legislation.

**Table 64b: Estimated daily consumption of fats and oils added in cooking/at table**

		12-19 years	20-49 years	50-74 years	12-74 years
Food items	% Respondents consuming	Mean per capita (g)	Mean per capita (g)	Mean per capita (g)	Mean per capita (g)
<i>Fats and Oils, of which</i>	..	33.7	27.6	24.6	28.1
<i>Margarine</i>	60.3	8.5	5.5	4.6	6.0
<i>Oil, palm blend</i>	69.6	25.4	22.9	22.9	23.5
<i>Oil, PUFA</i>	28.0	28.3	23.2	17.9	22.3
<i>Oil, MUFA</i>	3.6	1.4	6.2	4.8	5.3
<i>Oil, (all types)</i>	..	26.2	22.4	20.8	22.8

The daily mean per capita of total consumption of fats and oils added in food preparation was found to be 28.2 grams. Daily mean capita of margarine was found to be 6 grams or about a teaspoon, and per capita consumption of oil overall was found to be 22.8 grams that is approximately 2 tablespoons that is approximately 2 tablespoons. Blended oil consumption was at a daily per capita of 23.5 grams, while reported use of polyunsaturated oils (PUFA) was found to be almost similar at 22.3 grams by those using this type of oil (Table 64b).

**6.7.11 Fast foods, snacks and beverages related to risk of NCD's** including sweetened foods/drinks are generally considered to be energy dense and/or nutrient poor dietary choices thereby with high content of fats, saturated fats and trans-fats, sugars and/or sodium increasing risks for overweight/hypertension/dyslipidaemias/hyperglycaemia. Regular intake of these items combined with amounts consumed, have cumulative and negative impacts on health in the long term.

**Table 65a: Frequency of consumption of fast foods, snacks and beverages related to risk of NCD's**

Food items	% Respondent consuming	% Frequency of consumption (among respondents who consumed)		
		Daily	Weekly	Monthly
<i>Snacks &amp; Fast Food, of which</i>				
<i>Snacks /Fried foods, salty</i>	60.1	6.1	55.9	38.1
<i>Snacks /Fried foods, sweet</i>	29.2	7.5	50.0	42.5
<i>Pastry, sweets</i>	53.0	4.1	51.8	44.0
<i>Pizza</i>	55.0	0.4	19.9	79.6
<i>Shawarma</i>	3.6	0.0	40.0	60.0
<i>Burger</i>	24.1	1.0	58.6	40.4
<i>Ice cream, scoop</i>	40.4	1.8	25.3	72.9
<i>Soft drinks</i>	68.4	7.5	56.9	35.6
<i>Sugar in Tea/coffee/cereal/juice</i>	80.3	89.1	10.0	0.9
<i>Pastry, Savory</i>	38.9	3.8	42.5	53.8
<i>Sweetened drinks</i>	48.9	16.4	62.2	21.4
<i>Sports drink/energy drinks</i>	26.5	3.7	25.7	70.6
<i>Chocolate</i>	46.2	4.7	46.8	48.4

Soft drink consumption was reported by 68.4% of the population, with 56.9% consuming these on a weekly basis; 60.1% of the population aged 12- 74 years consumed salty fried snacks, of which 55.9% reported weekly consumption; 55.0% consumed pizza, of which 79.6% enjoyed these on a monthly basis; and 53.0% reported enjoying sweet pastry, of which at least 51.8% consumed these items on a weekly basis. Sugar added to tea/coffee /cereal/juice was reported by 80.3% of the population with 89.1% consuming on a daily basis (Table 65a).

**Table 65b: Estimated daily consumption of fast foods, snacks and beverages related to risk of NCD's**

		12-19 years	20-49 years	50-74 years	12-74 years
<b>Food items</b>	<b>% Respondents consuming</b>	<b>Mean per capita (g)*</b>	<b>Mean per capita (g)*</b>	<b>Mean per capita (g)*</b>	<b>Mean per capita (g)*</b>
<b>Fast food&amp; snacks, including sweetened foods / beverages, of which</b>	..				
<i>Biscuits, salty</i>	68.1	31.1	19.5	20.2	22.8
<i>Snacks/fried foods, salty</i>	60.1	31.4	15.4	14.8	20.0
<i>Pizza</i>	55.0	27.4	14.1	18.9	19.4
<i>Pastries, sweet</i>	53.0	18.4	18.6	10.9	16.1
<i>Boulette</i>	49.4	14.0	11.6	8.1	11.4
<i>Biscuits, sweet</i>	54.7	9.1	7.9	7.0	8.1
<i>Soft drinks*</i>	68.4	139.8	171.1	80.1	136.1
<i>Yoghurt, sweetened</i>	63.7	30.1	32.0	30.6	31.0
<i>Flavoured milk*</i>	47.4	74.8	42.2	50.9	54.7
<i>Sugar added in tea/coffee/cereals/juice</i>	80.3	10.5	9.5	7.8	9.3
<i>Sweetened drinks*</i>	48.9	166.4	149.6	136.0	151.5

\*Note: unit of measurement for liquids is in millilitres

Soft drinks were consumed at daily mean capita of 136.1 ml. Other sweetened drinks were also consumed at a mean per capita of 151.5 ml. Sugar added to beverages was reported at a mean per capita of 9.3 grams. It was notable that the majority of participants reported drinking juice made from locally produced citrus fruit such as lime and lemon varieties that require adding high amount of sugar to improve palatability. Daily consumption of different foods and drinks in this category can lead to a significant cumulative dietary intake of energy, total fat, especially saturated fats and /or trans-fats along with sugar and salt/sodium from these food sources and that increase risks for development / management of NCD conditions (Table 65b).



**6.7.12 Beverages** includes a variety of fluids that may be consumed by different age groups, other than water, which was asked separately. Whilst some beverages are healthier, others may contribute more sugar, fat and/or sodium and alcohol, depending on ingredients used, that are detrimental to health, and these latter, have been reported separately at a later section.

**Table 66a: Frequency of consumption of beverages without added sugars**

Food items	% respondent consuming	% Frequency of consumption (among respondents who consumed)		
		Daily	Weekly	Monthly
<b>11. Beverages, of which</b>				
<i>Tea/coffee, plain</i>	45.5	54.5	39.6	5.9
<i>Tea/coffee with milk</i>	74.7	84.7	12.1	3.3
<i>Tea/coffee, with creamer</i>	2.9	75.0	25.0	0.0
<i>Juice, fresh/ 100% , no sugar added</i>	46.0	19.6	61.4	19.0

Plain tea/coffee with milk was consumed by 74.7% of those surveyed, generally on a daily basis. Fresh juice, 100% and without added sugar was consumed by 46.0% of survey participants, of the majority reported having these on a weekly basis (Table 66a).

**Table 66b: Estimated daily food consumption of beverages, without added sugars**

Food items	% respondents consuming	12-19	20-49	50-74	12-74
		years	years	years	years
		Mean per capita (ml)	Mean per capita (ml)	Mean per capita (ml)	Mean per capita (ml)
<b>Beverages, of which</b>	..				
<i>Juice, fresh/ 100%/ no sugar</i>	46.0	178.6	187.9	128.9	167.9
<i>Tea/coffee , plain</i>	45.5	263.4	299.9	240.4	266.2
<i>Tea/coffee, milk</i>	74.7	556.5	477.6	534.4	518.3
<i>Other milks, (soya, almond..)</i>	2.7	625.0	129.2	200.0	264.4

Daily mean per capita for tea /coffee with milk was found to be the equivalent of approximately 2 cups, at 518.3 ml. Other milks such as soya milk was also reported by a low 2.7% at a daily mean per capita of 264.4 mL, with adolescents reporting up-to 625.0mL (Table 66b).

### **6.7.13 Average daily consumption per capita of nutrients by Mauritians aged 12 – 74 years.**

In this section, results of quantitative information of all food and drinks reported to have been consumed by the participants aged 12-74 years are presented in terms of the nutritional composition of the daily diet. In interpreting these findings, it must be borne in mind that differences in the data collection methodology used and the number of items included in the questionnaire/analyses may not permit direct comparison with the results obtained in previous national surveys. The National Nutrition Survey 2012 used a 24-hour recall and included 40 out of 55 commonly consumed items compared with 123 items in the quantitative Food Frequency Questionnaire used in the present survey. It is also well known that no ‘gold standard’ exists to obtain this complex dietary information and while 24-hour recall methods may underestimate dietary energy / other nutrient intake, the quantitative food frequency may over-estimate the same for survey populations. Findings of population dietary surveys must therefore be interpreted in conjunction with trends in body weight and health status of the population surveyed, and with respect consider global trends in consumption patterns. The WHO standards of Population Nutrient Intake Goals (see Annex 2K), serve as a basis of evaluating average daily consumption with respect to nutrient intakes of the survey participants.

#### **6.7.13.1 Energy**

The World Health Organization recommends daily energy intake from food energy that is sufficient to maintain healthy body weight. In the interpretation of the results, it must be borne in mind that human energy (and nutrient) requirements vary with age, gender and physical activity level within categorized groups in the survey and that the population under consideration is multi-ethnic (comprising Asian, African and European migrants/descendants).

**Table 67a: Average daily consumption per capita of energy and macro-nutrients**

Age years	Energy (E) kcal	Carbohydrates g	Sugars* g	Protein g	Fat g	SFA g	MFA g	PFA g
12-19	4660.4	637.9	137.9	182.6	154.0	56.1	46.2	26.7
20-49	4090.1	560.5	114.6	140.7	129.9	45.9	38.4	23.4
50-74	3377.5	469.8	88.4	123.2	105.9	38.0	32.0	18.6
12-74	<b>3980.3</b>	<b>547.7</b>	<b>111.2</b>	<b>144.9</b>	<b>127.4</b>	<b>45.7</b>	<b>38.1</b>	<b>22.5</b>
Dietary Contribution		55.0% of total E (kcal)	11.2% of total E <i>*see also Table 69c</i>	14.6% of total E	28.8% of total E	10.3% of total E	8.6% of total E	5.1% of total E
WHO Recommended Population Nutrient Intake Goals	To maintain healthy BMI	55-75%	<10% <i>*see also Table 69c</i>	10-15%	15- 30%	<10%	<i>By difference</i>	6-10%

The findings showed that the average daily dietary energy per capita by the Rodriguan population aged 12-74 years was 3980.3 kilocalories. Adolescents aged 12-19 years showed highest mean per capita of energy intake at 4660.4 kcals compared with older adults aged 50-74 years at 3377.5 kcals (Table 67a).

According to a joint report released by an expert consultation on human energy requirements (FAO /WHO/UNU, 2004) this level of energy intake is much higher than recommended for individuals aged 12-74 years with active or moderately active lifestyle (see Annex 2L). The average energy consumption of this population showed significant positive variation from the recommended intakes across age groups, and more so for girls and women. It is pertinent to note that, in fact the survey findings regarding average daily energy consumption per capita by the population aged 12-74 years is at a level compatible with recommended intake for adolescent boys aged 17-18 years who perform vigorous or strenuous physical activity and for young adults 18-29 years, as per the expert consultation (Human Energy Requirements FAO/WHO/UNU, 2004).

Moderate physical activity as recommended for health, has been reported by around one-third of participants aged 12-74 years and vigorous physical activity at work has been reported by less than one-fifth of the same age group. Underweight has been found to be quite low amongst

survey participants of these age groups and showing a negative trend from previous surveys. An increasing trend has been noted concerning overweight and obesity and was found in at least 70.0% of participants 20-74 years, and amongst 24.0% of those aged 12-19 years. Energy consumption in excess of requirements results in weight gain and is associated with health problems, and the converse is also true: inadequate energy consumption that may reflect inadequate dietary intake overall, leads to underweight, poor micro-nutrient status, and health problems over time. It is also useful to consider the significant contribution of fast foods and snacks with respect to energy intakes as noted at a later section of this report (see 6.7.13.9).

Dietary energy is supplied mainly by the consumption of foods rich in carbohydrates (both complex carbohydrates and simple sugars), as well as by dietary fats, and proteins, supplied by the food intake. Although the macro-nutrient profiles appear to conform to population intake goals of WHO, where energy consumption is in excess of requirements, it follows that the survey findings regarding consumption carbohydrates, proteins and fats are also higher than recommended.

According to a listing by FAO in 2018 on the daily supply of kilocalories per person, Mauritius was ranked 62 out of 170 countries with average daily dietary energy consumption per capita of 3051 kcals, that included Ireland (3885 kcals), USA (3782 kcals), China (3206 kcals), Iran (3087 kcals), South Africa (2,899 kcals), and India (2533 kcals).

#### **6.7.13.2 Carbohydrates**

The average daily consumption per capita of carbohydrates was found to be 547.7 grams for participants aged 12-74 years (Table 67a). Adolescents and younger adults consumed more carbohydrates than older participants. The WHO population nutrient intake goal specifies that 55-75% of total energy intake may be from complex carbohydrates. The survey findings while appearing to be in line with this recommendation, is in fact higher, in terms of energy consumption above requirements. It is also pertinent to note that the major contributors of dietary carbohydrates consumed are foods high in refined carbohydrates (see Table 56a, b), that is, they lack dietary fibre and some important micronutrients found in whole grains and products foods that supply both complex carbohydrates and dietary fibre. As pointed out earlier, an excess intake of carbohydrates overall, contributes to weight gain and may also be reflected in increased blood sugar levels in the long term, especially in elevated HbA1c, as both carbohydrate quality and quantity influence blood glycaemia.

Dietary sugars are classified as simple carbohydrates and findings reported in this section reflect per capita intake of total sugars present naturally in food and drinks as well as sugar added in food/drink preparations and appear to be in excess of the population nutrient intake goals (Table 67a).

### 6.7.13.3 Protein

The average daily consumption per capita of protein was noted to be 144.9 grams or 14.56% of total energy intake. Adolescents consumed the maximum amount of protein at 182.6 grams and the least amount consumed was 123.2 grams in older adults 50-74 years. Protein consumption is found to be at the maximum limit (10-15% of total energy intake) as recommended by the population nutrient goals of the WHO (Table 67a).

### 6.7.13.4 Fats

The average daily consumption per capita of total fat intake was 127.4 grams or 28.8% of total dietary energy. This includes fats from all sources (fats naturally present in foods and those that are added at table and in food preparation). Lowest consumption of fat was by older adults at 105.9 grams compared with 154.0 grams consumed by adolescents that participated in the survey (Table 67a). The WHO recommends 15-30% of total energy from dietary fat. Daily mean per capita of saturated fats was 45.7 grams (10.3%), of polyunsaturated fats was 22.5 grams (5.02%) and of monounsaturated fats 38.1 grams (8.6%) as noted in (Table 67a).

**Table 67b: average daily consumption per capita of dietary fibre, cholesterol and sodium**

Age years	Dietary Fiber (g)	Dietary Cholesterol (mg)	Dietary Sodium (mg)
12-19	29.5	462.2	3647.0
20-49	26.8	482.8	3238.9
50-74	22.6	370.8	2487.9
12-74	<b>26.0</b>	<b>438.2</b>	<b>3075.2</b>
<b>Recommended Population Nutrient Intake Goals</b>	<b>from foods* (15g/1000 kcal)</b>	<b>&lt; 300</b>	<b>&lt; 2000</b>

**6.7.13.5 Dietary Fiber** is a dietary component that is essential to gut health and general well-being with valuable benefits to modulate glycaemia, cholesterol, prevention of colorectal and other cancers and cardio-vascular diseases, and helps in weight management. Average daily consumption per capita intake was found to be 26.0 grams, slightly lower than the WHO recommended amounts. Participants aged 12-19 years were consuming 29.5 grams compared with lower intake of 22.6 grams noted amongst older adults aged 50 years and above, which reflects the dietary quality in terms of dietary fibre and total food intake (Table 67b).

**6.7.13.6 Dietary cholesterol** the average daily consumption per capita was found to be 438.2 milligrams, which is above the recommended limit and highest intake was noted amongst participants aged 20-49 years at 482.8 mg. Amongst those aged 50-74 years, consumption was at 370.8 mg (Table 67b).

**6.7.13.7 Dietary sodium** the average daily consumption per capita of dietary sodium (from all foods consumed) was found to be 3075.2 mg per capita. The WHO recommends less than 2000 mg daily of sodium from sodium chloride (or less than 5g salt). Consumption of dietary sodium was found to be 3647.0 mg of sodium among adolescents, 3238.9 mgs in younger adults at and 2487.9 mg in older adults. Higher intake of sodium above recommended limits may increase risks of hypertension, cardiovascular disease, and some cancers as well (Table 67b).

**Table 67c: average daily consumption per capita of added sugars by age group**

Age years	Added Sugar grams
12-19	74.0
20-49	53.2
50-74	31.7
12-74	<b>50.8</b>
Dietary contribution	<b>6.38% of total E</b>
WHO Population Nutrient Intake Goals	<b>&lt;10% of total energy</b>

**6.7.13.8 Added sugars** refers to sugar used to sweeten food /drink preparations that may lead to a positive energy balance resulting in unhealthy weight gain. Therefore, restriction of this category of free sugars to less than 10% in the daily diet is recommended by WHO. Consumption of added sugar across all age groups was found to be 6.38% (50.8 grams) of total energy intake and appears to meet goals for population intake below 10% (Table 67c). WHO recommends sugar consumption below 50 grams daily (less than 10 teaspoons). Adolescents showed highest per capita consumption of added sugars at 74.0 grams followed by younger adults 20-49 years that consumed 53.2 grams. It is also pertinent to recall that average energy consumption per capita is higher than recommended, for population with moderately active lifestyles, and therefore sugar consumption at maximum limit may reflect poor diet quality.

**Table 67d: average daily consumption per capita of nutrients from foods, snacks and drinks that increase risk of NCD**

Age years	Energy (kcal)	Protein (g)	Fat (g)	SFA (g)	Carbohydrates (g)	Dietary fibre (g)	Cholesterol (mg)	Sodium (g)
12-19	720.9	11.5	24.4	10.3	113.2	3.3	60.0	561.5
20-49	510.9	8.3	16.0	6.8	76.1	1.9	118.0	468.5
50-74	355.2	6.5	12.5	5.1	49.8	1.5	103.5	372.8
12-74	508.1	8.5	16.8	7.1	76.0	2.1	98.5	457.9

Note: a. Dietary fibre is included here to show the poor contribution made by this category of foods of this dietary component that is NCD and health protective; b. alcohol consumption reported for participants of legal age >18 year.

### **6.7.13.9 Consumption of energy dense/nutrient poor foods**

In assessing the daily energy per capita of the survey participants, it is useful to consider the contribution of energy dense, nutrient poor foods in the daily diet such as fast foods, sweetened beverages, fried foods and pastry, that are popular across all age groups as discussed earlier. As shown in Table 67d, an average of 508.1 kilocalories were consumed by all survey participants aged 12-74 years, through the intake of such foods, snacks and drinks. This level of energy intake in excess of requirements can contribute to a weight gain of 1-1½ kg on a monthly basis. Higher than average intake of energy from such foods and beverages is noted amongst adolescents and adults aged 20-49 years, whereas survey participants aged 50-74 years show lower than average intakes that are still significant to total daily energy consumption. The

energy intake reported here includes energy contribution from alcoholic beverages, that is reported for participants aged 18 years and above (see Annex 2).

Foods that are higher in fats, especially saturated fats, as well as sodium and cholesterol are adverse to health while contributing negligible amounts of health protective dietary components such as micro-nutrients and/or dietary fibre. Due to paucity of data on trans-fats in international food composition tables, it may be assumed that intakes of this unhealthy form of fat is also higher than compatible with health from processed foods and fast foods/snacks.

It is clear that significant contribution of energy intake in excess of requirements is associated more with food/beverage choices from this category. Healthier dietary choices with lower energy content by the population may combat unhealthy weight gain as well as micro-nutrient imbalances/inadequacies, especially in vulnerable population sub-groups (Table 67d).

### **6.8 Minimum Dietary Diversity for Women (MDD-W) Of Reproductive Age (WRA) Aged 15-49 Years**

Minimum dietary diversity for women (MDD-W) of reproductive age (WRA) is an indicator for higher micro-nutrient adequacy or better micro-nutrient adequacy in this population sub-group and is achieved by the consumption of at least 5 out of ten defined food groups.

**Table 68: Minimum Dietary Diversity for Women (MDD-W) (Women aged 15-49 years)**

Food groups score	%
<5	24.3
≥5	<b>75.7</b>

The findings show that 75.7 % of women aged 15-49 years consumed at least 5 food groups out of ten defined food groups in the preceding 24 hours and thus met the standard (Table 68).



**Figure 1: Distribution of WRA (%) and Food groups consumption score**

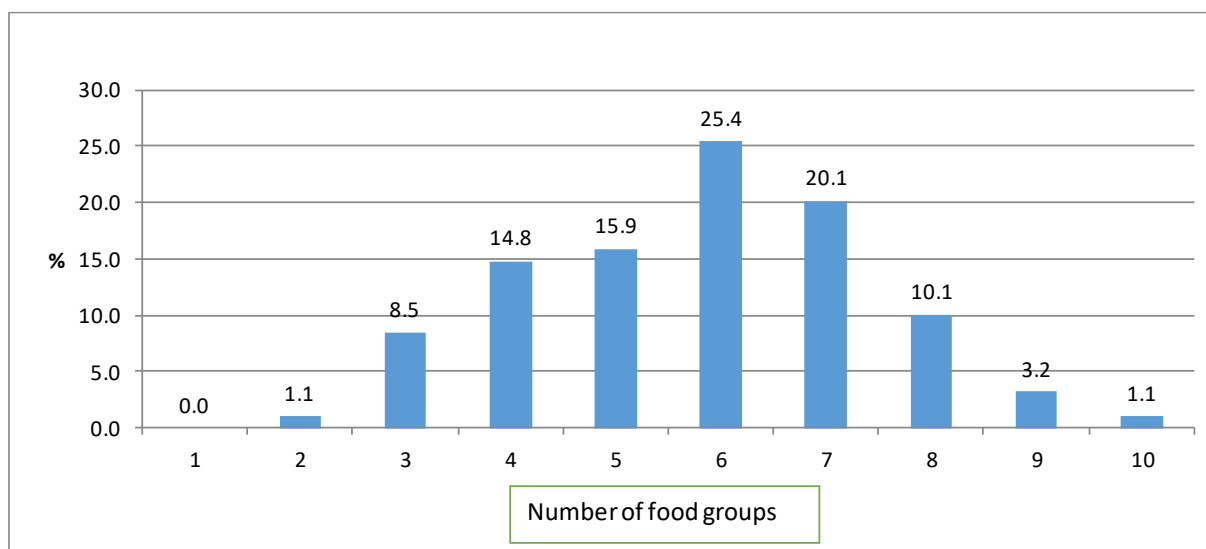
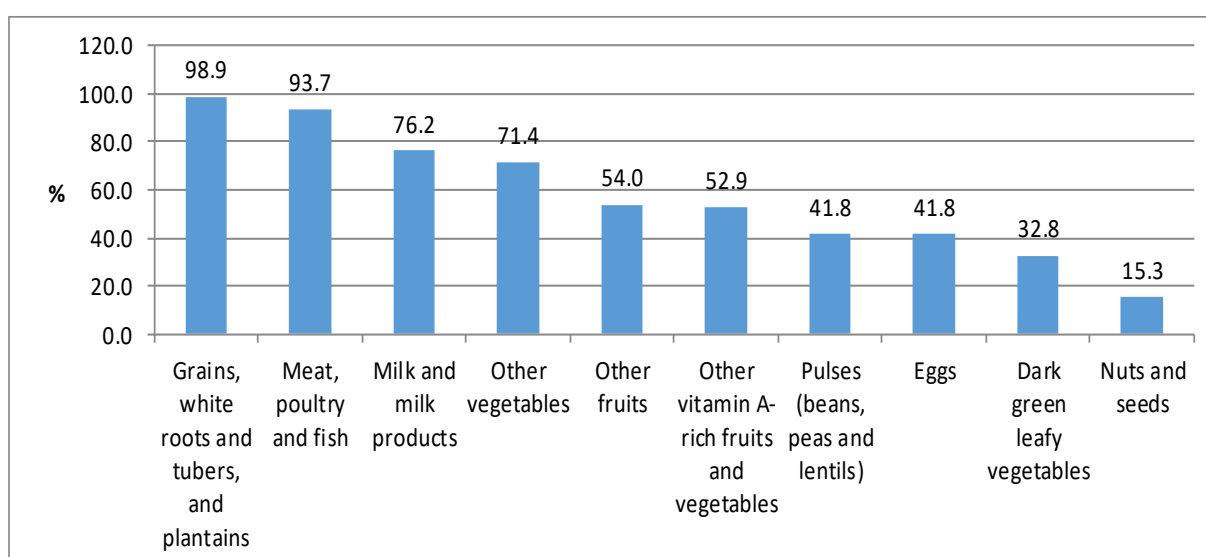


Figure 1 shows that 15.9% WRA reported consuming at least 5 food groups out of ten and thus achieved minimum dietary diversity (or adequacy); a maximum of 25.4% of women reported consuming 6 food groups and 20.1% consumed 7 food groups, over the preceding 24 hours. Of those consuming less than recommended diversity diet, 14.8% reported consuming 4 out of 10 food groups, 8.5% consumed only 3 food groups and 1.1% consumed only 2 food groups.

**Figure 2: Distribution of WRA (%) and consumption of specific food groups**



The findings showed the most consumed food groups reported by these respondents as follows: 98.9% selected foods from the group ‘grains, white roots and tubers’, 93.7% had consumed ‘meat, poultry and fish’, 76.2% had consumed ‘milk and milk products’, 71.4% had eaten ‘other vegetables’, 54.0% ‘other fruits’, 52.9% ‘other vitamin A rich fruits and vegetables’. Less than 42.0% WRA reported consuming pulses, eggs, dark green leafy vegetables, nuts and seeds (Figure 2) that are of good nutritional value.

**Table 69: Percentage consumption by food items (sorted by most consumed)**

Food Items	%
Rice, couscous, pasta, noodles	86.8
Food made from any wheat flour: Bread, Roti, Dhol Puri, Puri, Wraps, Pizza, Pita, Panini, Crepes, Pancakes	69.8
Milk (Dairy)	66.1
Beetroot, cabbage, tomato, cucumbers, onion, radish	60.8
Chicken, Duck	59.8
Apple, avocado, banana (ripe), berries, pineapple, orange, watermelon, guava, coconut flesh, mandarine, grapes, pear, jackfruit (ripe), grapefruit, lemon, kiwi, litchi, longane, star fruit, prune, pomegranate, peach, tamarind	54.0
Octopus, fish, shrimp, crab, prawn, calamari	48.1
Haricot rouge/blanc, Gros pois, Dhol, lentils, teokon, soya	41.8
Eggs (chicken or any bird)	41.8
Pumpkin, carrots, red pepper, patisson	38.6
Cauliflower, courgette, eggplant, mushroom, green beans, chouchou, green pepper, okra (lalo)	37.6
Potatoes, arouille, manioc, patate, green bananas, ‘Fruit a pain’, Jackfruit (green)	34.9
Dairy products such as cheese, unsweetened yoghurt/yoghurt drink, paneer, lait caillé	34.4
Spinach, kale, brede, watercress, broccoli, dark green lettuce	32.8
Sausage, bacon, macon, salami, jambon, corned mutton/poule/beef, luncheon meat, burger, nuggets	29.1
Ripe papaya, apricot, ripe passion fruit, ripe mango	29.1
Beef, lamb, pork, cerf, bouc, lapin/lièvre	21.2
Oats, Weetabix, Nestum, Branflakes, Muesli, Granola, Cococrunch, Honey stars	14.8
Peanut, almond, cashew nut, walnut, pistachio	12.2
Liver, kidney (zézié)	10.6
Melon seeds, pumpkin seeds, chia seeds, sunflower seeds, flaxseeds	6.3

The most popular foods consumed by the women were starchy foods such as rice, pasta, noodles at 86.8%; compared with 69.8% WRA that reported consumption of foods made with wheat flour (such as bread, 'roti, dhollpuri, puri', wraps, pizza, pita, panini, crepes, pancakes). Milk consumption was reported by 66.1%, 60.8% ate other vegetables (such as beetroot, cabbage, tomatoes, cucumber, radish, onion), 59.8% consumed chicken and duck compared with 21.2% reporting beef/pork /lamb, 54.0 % ate other fruits (such as apple, avocado, banana, pineapple), 32.8 % ate dark green leafy vegetables (such as spinach and other greens, lettuce, watercress, broccoli and so on), 34.4% had milk products such as cheese and yoghurt and % consumed pulses. Concerning vitamin A rich vegetables and fruit, 38.6% women consumed vegetables such as pumpkin/carrots compared with 29.1% that consumed fruit such as papaya/mango. Organ meats such as liver were less consumed with 10.6% reporting same and seeds were least consumed by 6.3% of women surveyed (Table 69).

## **7. CONCLUSION**

The Rodrigues Nutrition Survey 2023 has provided timely and much needed data regarding the eating habits and nutritional status of the population aged 5-74 years. While prevalence of underweight amongst all age groups has decreased significantly, overweight and obesity prevalence show an increasing trend in each sub-group from previous surveys. The majority of women of reproductive age (15-49 years), are overweight or obese, and is a matter of concern. Body fat mass is also found to be high amongst adolescent girls, and adults aged 20-74 years, irrespective of gender. Trends in iron deficiency anaemia continue to be of increasing concern, especially amongst adolescent girls and women aged 20-49 years. At the same time some level of micro-nutrient deficiency is noted, concerning vitamin B12, vitamin B9 (folate), and vitamin D. There is an urgent need to promote healthy eating habits with emphasis on dietary quality compatible with age specific requirements, and encourage physical activity practices to achieve healthy weight and prevent/control diet related conditions such as anaemia, micro-nutrient imbalances, and NCDs such as pre-diabetes and diabetes, hypertension, hypelidemia and cardio-vascular conditions.

## 8. RECOMMENDATIONS

The findings of the Rodrigues Nutrition Survey 2023, as well as those of other surveys that have been recently conducted, such as the Rodrigues NCD Survey 2022, will be used to update and formulate the National Plan of Action for Nutrition (NPAN) 2023-2028, that encompasses the Rodrigues context. The policy document will provide the framework that informs the strategies targeting eating habits and diet related behaviours in order to promote good nutritional status and well-being of the Rodriguan population, and more so of vulnerable sub-groups. Other plans of action may focus on physical activity, obesity and other lifestyle behaviours.

New data and trend related information obtained from this Nutrition Survey will aid program planning and strengthen ongoing interventions adapted to the local context, that better address nutrition and diet related issues such as anaemia, other micro-nutrient imbalances, overweight and obesity, and NCD's. Health and nutrition focused interventions/programs that are effective and results oriented may also be scaled up/re-engineered effectively in order to prevent/manage the problem of non-communicable diseases, their risk factors, and diet related health conditions such as weight management, hyperlipidaemias and anaemia amongst others.

Promoting nutritional well-being and sustainable food security based on food based dietary guidelines using the life cycle approach, conducting population wide awareness campaigns to increase vegetable and fruit consumption, healthy food/snack/beverage choices, extension of School Meal Program, ensuring compliance to food standards and regulations of Food Act Regulations and Food Standards Agency by all food service providers such as schools /hospital /other public outlets island wide, nutrition preparedness plans for efficient response to emergencies such as cyclones and pandemics, promoting uptake of population based interventions such as use of fortified wheat flour are strategies for further consideration by local health agency.

Health promotion activities and sensitisation campaigns using innovative /other media, mass media and education materials using needs based approach and that are adapted to local context may also be broadened and reinforced to address gaps in nutrition knowledge and healthy lifestyle practices. Communication and counselling skills of health/ nutrition professionals may be enhanced that will benefit the target populations.

Supportive environments that strengthen physical activity practices in order to reduce ‘screen time’, and making healthier food choices the ‘easier’ choice by improving food availability/ affordability/ accessibility as well as developing healthier taste preference are all part and parcel of promoting active healthy lifestyles and healthy weight. Family based strategies that encourage healthy lifestyle practices and habit formation from young age are essential to prevent the drift towards the modern inactive lifestyle and overconsumption of less healthy foods. Coordinated approaches using local expertise that is both multi-disciplinary and multi-sectorial, may support the battle against the trends in NCDs and related co-morbidities.

Studies and surveys such as the Salt Intake Study need to be conducted urgently to obtain trend data that will facilitate nutrition focused program planning and interventions to benefit the population and track progress towards national and international goals and norms set by WHO. Further research is also feasible for in depth study and analyses targeting specific micro-nutrients and the multiple factors influencing physiological status, such as dietary behaviour and socio-economic status, to aid appropriate policy action and public health interventions. Capacity building and training as required may better serve population needs in order to achieve effective and efficient program delivery meeting national and global targets on diet, nutrition and health.

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## **10. ANNEXES**

Annex 1: Consent Form

Annex 2: Cut-off Values

Annex 3: Additional tables

Annex 4: Members of the Steering Committee

Annex 5: Members of the Technical Committee

Annex 6: List of Clusters

Annex 7: List of Survey Staff

**Ministry of Health and Wellness /  
Commission for Health and Others**

**RODRIGUES NUTRITION SURVEY 2023  
Consent Form  
(For participants aged 18 to 74 years)**

Survey No

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1. I, the undersigned ..... hereby consent to my participating in the Rodrigues Nutrition Survey 2023 which is being undertaken by the Ministry of Health & Wellness and Rodrigues Regional Assembly / Commission for Health & Others in collaboration with Monash University, Melbourne, Australia; University of Helsinki, Finland; Umea University Hospital, Sweden; and University of South Florida, USA.
2. I acknowledge that the nature, purpose and contemplated effects of the survey so far as it affects me have been fully explained to my satisfaction by the staff and my consent is given voluntarily.
3. I have received the Explanatory Statement and am familiar with the nature of the study including the anticipated length of time the study will take, the frequency with which visits and tests will be performed, and an indication of any discomfort which may be expected.
4. Although I understand that the purpose of this survey is to improve the quality of life, it has also been explained that my involvement may not be of any benefit to me directly.
5. I also understand that I will be asked to provide blood/urine samples and that I will be required to undergo physical examination to measure blood pressure, height, weight, waist and hip circumference and that the samples may be kept and sent overseas for further tests which are not done locally.
6. I have been informed that no information regarding my medical history will be divulged to unauthorised persons and that the results of any tests involving me will not be published in such a way as to reveal my identity.
7. I understand that my involvement in the survey will not affect my relationship with my medical advisers in their management of my health. I also understand that I am free to withdraw from the project at any stage.
8. I have been told that I will be asked some general questions about my health, lifestyle, physical activity, diet and my knowledge of good health.
9. I confirm that it has been explained to me that the Mauritius National Ethics Committee:
  - (a) has approved the above project
  - (b) has ensured that explanations that I have received conform to ethical standards which the Ministry of Health and Wellness is required to observe, and
  - (c) officers involved in this project and who are pledged to preserve the confidentiality of my involvement may be authorised to contact me to check whether the proper standards are being observed.

Signed ..... this day ...../...../.....

Witness Name..... Signature..... this day ...../...../.....

**Ministry of Health and Wellness /  
Commission for Health and Others**

**RODRIGUES NUTRITION SURVEY 2023**

**Consent Form**

(For participants under 18 years)

Survey No. 

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1. I, the undersigned ..... hereby give my consent for my son / daughter / ward to participate in the Rodrigues Nutrition Survey 2023 which is being undertaken by the Ministry of Health and Wellness and Rodrigues Regional Assembly / Commission for Health & Others in collaboration with Monash University, Melbourne, Australia; University of Helsinki, Finland; Umea University Hospital, Sweden; and University of South Florida, USA.

2. I have received the Explanatory Statement and am familiar with the nature of the study including the anticipated length of time the study will take, the frequency with which visits and tests will be performed, and an indication of any discomfort which may be expected.

3. I acknowledge that the nature, purpose and contemplated effects of the survey so far as it affects my son / daughter / ward have been fully explained to my satisfaction by the staff and my consent is given voluntarily.

4. Although I understand that the purpose of this research project is to improve the quality of life, it has also been explained that my son's / daughter's / ward's involvement may not be of any benefit to him/her directly.

5. I also understand that he/she will be asked to provide blood/urine samples and that he/she will be required to undergo physical examination to measure blood pressure, height, weight, waist and hip circumference and that the samples may be kept and sent overseas for further tests which are not done locally.

6. I have been informed that no information regarding the medical history of my son / daughter / ward will be divulged to unauthorised persons and that the results of any tests involving my son / daughter / ward will not be published in such a way as to reveal his/her identity.

7. I understand that his/her involvement in the survey will not affect his/her relationship with their medical advisers in the management of his/her health. I also understand that he/she is free to withdraw from the project at any stage.

8. I have been told that I/he/she will be asked some general questions about his/her health, lifestyle, physical activity, diet and knowledge of good health.

9. I confirm that it has been explained to me that the Mauritius National Ethics Committee:

- (a) has approved the above project
- (b) has ensured that explanations that I have received conform to ethical standards which the Ministry of Health and Wellness is required to observe, and
- (c) officers involved in this project and who are pledged to preserve the confidentiality of my involvement may be authorised to contact me to check whether the proper standards are being observed.

Signed ..... this day ...../...../.....

Witness Name.....Signature..... this day ...../...../.....

**CUT-OFF VALUES****2A. BMI Cut Off Values – Male 5-19 years**

AGE (YRS)	THINNESS	NORMAL	OVERWEIGHT	OBESE
5	< 13.0	13.0 - 16.6	> 16.6	> 18.3
6	< 13.0	13.0 - 16.8	> 16.8	> 18.5
7	< 13.1	13.1 - 17.0	> 17.0	> 19.0
8	< 13.3	13.3 - 17.4	> 17.4	> 19.7
9	< 13.5	13.5 - 17.9	> 17.9	> 20.5
10	< 13.7	13.7 - 18.5	> 18.5	> 21.4
11	< 14.1	14.1 - 19.2	> 19.2	> 22.5
12	< 14.5	14.5 - 19.9	> 19.9	> 23.6
13	< 14.9	14.9 - 20.8	> 20.8	> 24.8
14	< 15.5	15.5 - 21.8	> 21.8	> 25.9
15	< 16.0	16.0 - 22.7	> 22.7	> 27.0
16	< 16.5	16.5 - 23.5	> 23.5	> 27.9
17	< 16.9	16.9 - 24.3	> 24.3	> 28.6
18	< 17.3	17.3 - 24.9	> 24.9	> 29.2
19	< 17.6	17.6 - 25.4	> 25.4	> 29.7

**2B. BMI status – Female 5-19 years**

AGE (YRS)	THINNESS	NORMAL	OVERWEIGHT	OBESE
5	< 12.7	12.7 - 16.9	> 16.9	> 18.9
6	< 12.7	12.7 - 17.0	> 17.0	> 19.2
7	< 12.7	12.7 - 17.3	> 17.3	> 19.8
8	< 12.9	12.9 - 17.7	> 17.7	> 20.6
9	< 13.1	13.1 - 18.3	> 18.3	> 21.5
10	< 13.5	13.5 - 19.0	> 19.0	> 22.6
11	< 13.9	13.9 - 19.9	> 19.9	> 23.7
12	< 14.4	14.4 - 20.8	> 20.8	> 25.0
13	< 14.9	14.9 - 21.8	> 21.8	> 26.2
14	< 15.4	15.4 - 22.7	> 22.7	> 27.3
15	< 15.9	15.9 - 23.5	> 23.5	> 28.2
16	< 16.2	16.2 - 24.1	> 24.1	> 28.9
17	< 16.4	16.4 - 24.5	> 24.5	> 29.3
18	< 16.4	16.4 - 24.8	> 24.8	> 29.5
19	< 16.5	16.5 - 25.0	> 25.0	> 29.7

**BMI cut-points for Boys (5-19 yrs) and Girls (5-19 yrs) based on WHO Z-scores**

**2C. BMI cut points for adults 20-64 years**

Nutritional Status	Creoles	Indian Asians / Chinese
<b>Underweight</b>	<18.5	<18.5
<b>Normal</b>	18.5 – 24.9	18.5 – 22.9
<b>Overweight</b>	25 – 29.9	23 – 27.4
<b>Obese</b>	30+	27.5+

**BMI cut-points for Adults based on WHO cut-points by ethnic group.**

**2D. Waist circumference**

**IDF cut off values as per ethnicity and country**

Country or ethnic group	Waist Circumference (cm)		Risk of metabolic complications
	Man	Woman	
<b>European</b>	>94	>80	Increased
<b>South Asian</b>	>90	>80	Increased
<b>Chinese</b>	>90	>80	Increased
<b>Sub Saharan Africa</b>	>94	>80	Increased

**Waist circumference cut-points for Adults based on WHO cut-points by ethnic group are similar.**

## 2E. Body Fat Mass

Age group	Male	Female
5-11 years	>25%	>30%
12-19 years	>25%	>30%
20-39 years	8-20%	21-33%
40-59 years	11-22%	23-34%
60-74 years	13-25%	24-36%

### Article extract for cut off values of bio-impedance (*body fat mass in children*)

For all tests, significance was set at  $P < 0.05$ . The accuracy of BMI in the diagnosis of OB was performed using standard diagnostic performance indicators, with excess adiposity defined as percentage body fat above 25 % in boys and above 30 % in girls<sup>(37)</sup>. Using the MEDCALC statistical software version

Source: H. Ramuth, S. Hunma, V. Ramessur, M. Ramuth, C. Momard, J. Montani, Y. Schutz, N. Joonas and A. G. Dulloo, *Body composition-derived BMI cut-offs for overweight and obesity in ethnic Indian and Creole urban children of Mauritius*. *British Journal of Nutrition*; 2020, 124: 481–492. <https://doi.org/10.1017/S0007114519003404>

**2F. Blood Pressure level for BOYS by Age and Height Percentile (5th to 95th Percentile)**

Age (Years)	Height in cm	BP Range (Normal)
<b>11</b>	132 - 134.9	99/59 - 113/74
	135 - 138.9	100/59 - 114/74
	139 - 143.9	102/60 - 115/75
	144 - 147.9	104/61 - 117/76
	148 - 152.9	105/62 - 119/77
	153 - 154.9	107/63 - 120/78
	155 and above	107/63 - 121/78
<b>12</b>	137 - 138.9	101/59 - 115/74
	139 - 143.9	102/60 - 116/75
	144 - 148.9	104/61 - 118/75
	149 - 149.9	106/62 - 120/76
	150 - 158.9	108/63 - 121/77
	159 - 159.9	109/63 - 123/78
	160 & above	110/64 - 123/79
<b>13</b>	143 - 144.9	104/60 - 117/75
	145 - 149.9	105/60 - 118/75
	150 - 155.9	106/61 - 120/76
	156 - 160.9	108/62 - 122/77
	161 - 165.9	110/63 - 125/78
	166 - 169.9	111/64 - 125/79
	170 & above	112/64 - 126/79
<b>14</b>	150 - 153.9	106/60 - 120/75
	154 - 158.9	107/61 - 121/76
	159 - 164.9	109/62 - 123/77
	165 - 169.9	111/63 - 125/78
	170 - 173.9	113/64 - 126/79
	174 - 176.9	114/65 - 128/79
	177 & above	115/65 - 128/80
<b>15</b>	156 - 159.9	109/61 - 122/76
	160 - 164.9	110/62 - 124/77
	165 - 169.9	112/63 - 125/78
	170 - 174.9	113/64 - 127/79
	175 - 179.9	115/65 - 129/80
	180 - 181.9	117/66 - 130/80
	182 & above	117/66 - 131/81
<b>16</b>	161 - 163.9	111/63 - 125/78
	164 - 167.9	112/63 - 126/78
	168 - 173.9	114/63 - 128/79
	174 - 178.9	116/65 - 130/80
	179 - 182.9	118/66 - 131/81
	183 - 185.9	119/67 - 133/82
	186 & above	120/67 - 134/82

**Blood Pressure level for GIRLS by Age and Height Percentile (5th to 95th percentile)**

Age (Years)	Height in cm	BP Range (Normal)
11	132 - 134.9	100/60 - 114/74
	135 - 138.9	101/60 - 114/74
	139 - 143.9	102/60 - 116/74
	144 - 148.9	103/61 - 117/75
	149 - 153.9	105/62 - 118/76
	154 - 156.9	106/63 - 119/77
	157 and above	107/63 - 120/77
12	139 - 140.9	102/61 - 116/75
	141 - 145.9	103/61 - 116/75
	146 - 150.9	104/61 - 117/75
	151 - 155.9	105/62 - 119/76
	156 - 160.9	107/63 - 120/77
	161 - 163.9	108/64 - 121/78
	164 & above	109/64 - 122/78
13	145 - 147.9	104/62 - 117/76
	148 - 152.9	105/62 - 118/76
	153 - 157.9	106/62 - 119/76
	158 - 161.9	107/63 - 121/77
	162 - 165.9	109/64 - 122/78
	166 - 168.9	110/65 - 123/79
	169 & above	110/65 - 124/79
14	150 - 151.9	106/63 - 119/77
	152 - 155.9	106/63 - 120/77
	156 - 159.9	107/63 - 121/77
	160 - 164.9	109/64 - 122/78
	165 - 168.9	110/65 - 124/79
	169 - 170.9	111/66 - 125/80
	171 & above	112/66 - 125/80
15	151 - 153.9	106/63 - 119/77
	154 - 157.9	106/63 - 120/77
	158 - 161.9	107/63 - 121/77
	162 - 165.9	109/64 - 122/78
	166 - 169.9	110/65 - 124/79
	170 - 172.9	111/66 - 125/80
	173 & above	112/66 - 125/80
16	152 - 153.9	108/64 - 121/78
	154 - 158.9	108/64 - 122/78
	159 - 162.9	110/65 - 123/79
	163 - 166.9	111/66 - 124/80
	167 - 170.9	112/66 - 126/81
	171 - 172.9	114/67 - 127/81
	173 & above	114/68 - 128/82



**Blood Pressure in children and adolescents using the following formula**

**Systolic Blood Pressure (1-17 Yrs):**

100 + (Age in years x 2)

**Diastolic Blood Pressure (1-10 Yrs):**

60 + (Age in years x 2)

**Diastolic Blood Pressure (11-17 Yrs):**

70 + Age in years

**CDC Guidelines on blood pressure cut-points in children and adolescents.**

**2G. Haemoglobin (g/dL)**

	Mild Anaemia	Moderate Anaemia	Severe Anaemia	No Anaemia
<b>Children (5-11 years)</b>	11 - 11.4	8 - 10.9	< 8	≥ 11.5
<b>Adolescents (12-14 years)</b>	11 - 11.9	8 - 10.9	< 8	≥ 12
<b>Women (&gt; 15 years)</b>	11 - 11.9	8 - 10.9	< 8	≥ 12
<b>Men (&gt; 15 years)</b>	11 - 12.9	8 - 10.9	< 8	≥ 13

- I. **Cut-points for adolescents and adults issued by Central Laboratory, Ministry of Health and Wellness**
- II. **Cut-points for children are based on Indian references (provided by Expert Advisory, Ministry of Health and Wellness)**

**2H. Serum values for selected micro-nutrients: ferritin, vitamin B12, folate, vitamin D**

Age	5-11 years	12-19 years	20 – 74 years
<b>Ferritin</b>	7 – 140 ng/mL	<b>Male:</b> 38 – 457 ng/mL <b>Female:</b> 7 – 73 ng/mL	<b>Male:</b> 38 – 457 ng/mL <b>Female:</b> 7 – 73 ng/mL
<b>Vitamin B12</b>	260 – 1200 pmol	138 – 652 pmol	138 – 652 pmol
<b>Folate*</b>	11 – 47 nmol/L	7 – 46.4 nmol/L	7 – 46.4 nmol/L
<b>Vitamin D</b>	62 – 199 nmol/L	75 – 100 nmol/L	75 – 100 nmol/L

- I. Cut-points for adolescents and adults issued by Central Laboratory, Ministry of Health
- II. Cut-points for children are based on Indian references (provided by Expert Advisory, Ministry of Health and Wellness)

\*see Article extract for cut off values of folate

**EXPECTED VALUES**

It is recommended that each laboratory establish its own normal and deficient ranges, which may be unique to the population it serves depending upon geographical, patient, dietary, or environmental factors.

A study was performed based on guidance from Clinical and Laboratory Standards Institute (CLSI) document C28-A3.<sup>17</sup> The nutritional status of the specimen donors was unknown. All specimens tested were from fasting, apparently healthy males and non-pregnant females greater than 18 years old from a UK population. Serum and whole blood samples were tested for serum/plasma and red blood cell folate using the ARCHITECT Folate assay. Data from this study are summarized in the following table.

	Expected Values Data Statistics			
	n	Min	Max	Expected Values
Serum/Plasma	155	1.6 (3.6)	19.5 (44.2)	3.1 - 20.5 (7.0 - 46.4)
Whole Blood	168	58.5 (132.5)	733.1 (1660.5)	126.0 - 651.1 (285.4 - 1474.7)

Source: Architect System Folate, package insert. 1P74, G5-6843/ R06, B1P740, Revised November 2015. <http://www.abbottdiagnostics.com/>

**2I. Glucose levels in HbA1C (12-74 years)**

<b>Normal</b>	<b>4.0 – 5.6%</b>
<b>Pre DM</b>	<b>5.7 – 6.4</b>
<b>DM</b>	<b>≥ 6.5</b>

Cut-points issued by Central Laboratory, Ministry of Health

**2J. Lipids**

**i. D.1 Total Cholesterol**

Normal Reference Values: 3.6 – 5.2 mmol/L

**ii. D.2 Triglycerides**

Normal Reference Value for triglycerides: 0.4 – 2.2 mmol/L

**Cut-points issued by Central Laboratory, Ministry of Health**

**2K. Ranges of population nutrient intake goals: *Energy and nutrient requirements issued by FAO and WHO***

Dietary factor	Goal (% of total energy, unless otherwise stated)
<b>Energy</b>	<i>Sufficient food energy to maintain healthy BMI*</i>
<b>Total fat</b>	15 - 30%
Saturated fatty acids	<10%
Polyunsaturated fatty acids (PUFAs)	6 - 10%
n-6 Polyunsaturated fatty acids (PUFAs)	5 - 8%
n-3 Polyunsaturated fatty acids (PUFAs)	1 - 2%
Trans fatty acids	<1%
Monounsaturated fatty acids (MUFAs)	By difference <sup>a</sup>
<b>Total carbohydrate</b>	55 - 75% <sup>b</sup>
<b>Free sugars<sup>c</sup></b>	<10%
<b>Protein</b>	10 - 15% <sup>d</sup>
<b>Cholesterol</b>	<300 mg per day
<b>Sodium chloride (sodium)<sup>e</sup></b>	<5 g per day (<2 g per day)
<b>Fruits and vegetables</b>	≥ 400 g per day
<b>Total dietary fibre</b>	From foods <sup>f</sup>
<b>Non-starch polysaccharides (NSP)</b>	From foods <sup>f</sup>

<sup>a</sup>This is calculated as: total fat - (saturated fatty acids + polyunsaturated fatty acids + trans fatty acids).

<sup>b</sup>The percentage of total energy available after taking into account that consumed as protein and fat, hence the wide range.

<sup>c</sup>The term “free sugars” refers to all monosaccharides and disaccharides added to foods by the manufacturer, cook or consumer, plus sugars naturally present in honey, syrups and fruit juices.

**2L. FAO, Human energy requirements: Report of a Joint FAO/WHO/UNU Expert Consultation, 2004.**

For population with 'active or moderately active lifestyle'

Age (years)	Daily energy requirement (kcal/d)	
	Male	Female
<b>12-13</b>	2548	2276
<b>13-14</b>	2770	2379
<b>14-15</b>	2990	2449
<b>15-16</b>	3178	2491
<b>16-17</b>	3322	2503
<b>17-18</b>	3410	2503
<b>18-30<sup>a</sup></b>	3050	2550
<b>30-60<sup>a</sup></b>	2950	2400
<b>≥ 60<sup>a</sup></b>	2450	2200

*Note:*

<sup>a</sup>the recommended mean energy intake for a population of this age group, by gender, with mean height, lifestyle activity with a mean PAL of 1.75, and to maintain an optimum population median BMI of 21.0.

\* it is pertinent to note here that the energy requirements for sedentary/less active populations and highly active/vigorously active populations is variable, being lower /higher according to level of physical activity.

## Energy Requirement for Indians: Revised Dietary Guidelines / RDA for Indians 2020

Age Group	Category	Body weights	kcal/d
<b>Men</b>	Sedentary work	65.0	2110
	Moderate work	65.0	2710
	Heavy work	65.0	3470
<b>Women</b>	Sedentary work	55.0	1660
	Moderate work	55.0	2130
	Heavy work	55.0	2720
<b>Children*</b>	5-6 y	18.3	1360
	7-9 y	25.3	1700
<b>Boys</b>	10-12 y	34.9	2220
<b>Girls</b>	10-12 y	36.4	2060
<b>Boys</b>	13-15 y	50.5	2860
<b>Girls</b>	13-15 y	49.6	2400
<b>Boys</b>	16-18 y	64.4	3320
<b>Girls</b>	16-18 y	55.7	2500

*Note:* Energy needs of children and adolescents have been computed for reference children and adolescents; with a moderate daily physical activity level.

## Additional tables

## 1. Self -perception of current weight (%)

	12-19	20-49	50-74
<b>A little too high</b>	21.2	33.9	21.5
<b>About right</b>	44.9	31.8	53.2
<b>Don't Know</b>	4.0	4.6	5.9
<b>Much too high</b>	12.1	21.8	12.2
<b>Too low</b>	17.7	7.9	7.2

## 2. Sharing of meals in household of participants (%)

	12-19	20-49	50-74
<b>Eat by myself</b>	5.6	3.2	8.9
<b>2 persons</b>	6.1	6.8	18.6
<b>3 persons</b>	15.2	16.4	30.4
<b>4 persons</b>	32.8	35.7	22.4
<b>Other</b>	40.4	37.9	19.8

## 3. Participant perception on amount of salt intake (%)

	12-19	20-49	50-74
<b>About right</b>	81.3	78.2	75.5
<b>Don't know</b>	6.6	3.9	5.5
<b>Too high</b>	8.1	13.6	12.7
<b>Too low</b>	4.0	4.3	6.3

## 4. Habit of adding salt to foods eaten (at table / other foods) before eating? (%)

	12-19	20-49	50-74
<b>Yes</b>	18.2	13.9	9.3
<b>No</b>	81.8	86.1	90.7

5. Perception on the amount of oil used in food preparation in your household: (%)

	12-19	20-49	50-74
<b>About right</b>	56.1	67.1	67.9
<b>Don't know</b>	23.7	7.9	7.2
<b>Not enough</b>	4.5	3.2	4.6
<b>Too much</b>	15.7	21.8	20.3

6. Participant knowledge of the effect of palm and coconut oils on health

Years	12-19	20-49	50-74
<b>contain more polyunsaturated fats</b>	6.6	15.0	13.1
<b>contain more saturated fats</b>	12.1	12.1	10.1
<b>Don't know</b>	77.3	68.2	74.7
<b>Are similar to other oil used in cooking</b>	4.0	4.6	2.1

7. Participant knowledge on cooking oils with relatively more polyunsaturated fats than saturated fats and their impact on heart disease

	12-19	20-49	50-74
<b>Don't know</b>	59.6	55.4	64.6
<b>Healthier</b>	26.3	26.8	22.4
<b>Less healthy</b>	11.6	14.3	9.7
<b>The same</b>	2.5	3.6	3.4

8. Knowledge of using same cooking oil more than once and its harmful effect on health

	12-19	20-49	50-74
<b>Don't Know</b>	13.1	8.2	7.2
<b>No</b>	40.4	37.1	43.5
<b>Yes</b>	46.5	54.6	49.4

**9. Knowledge about cholesterol is (%)**

	12-19	20-49	50-74
<b>A hormone</b>	1.0	0.4	0.8
<b>A mineral</b>	0.0	0.4	0.0
<b>A type of fat</b>	77.8	84.3	80.6
<b>A brand of margarine</b>	1.5	1.1	1.3
<b>Don't know</b>	19.7	13.9	17.3

**10. Knowledge of following foods should be avoided, if a person has too much cholesterol in the blood (%Yes)**

	12-19	20-49	50-74
<b>Seafood</b>	34.3	44.6	48.1
<b>Butter</b>	80.8	90.0	84.8
<b>Rice</b>	32.8	61.1	56.5
<b>Eggs</b>	55.1	75.4	70.9
<b>Fatty meat</b>	76.8	88.6	84.4
<b>Soft drink</b>	53.5	63.9	60.3
<b>Offal (organ meats)</b>	53.5	66.1	64.1

**11. Knowledge about foods with high proportion of fibre (%Yes)**

	12-19	20-49	50-74
<b>Sugar</b>	21.7	15.4	16.5
<b>Fruits</b>	65.7	73.6	58.6
<b>Meat</b>	33.3	36.8	29.5
<b>Vegetables</b>	63.1	73.9	60.8
<b>Margarine</b>	19.2	18.2	20.7
<b>Brown bread</b>	49.5	56.1	47.3

**12. Foods high in fibre are thought to be (%)**

	12-19	20-49	50-74
<b>Bad for health</b>	9.6	8.2	13.1
<b>Don't know</b>	32.8	24.6	36.7
<b>Good for health</b>	55.6	60.0	46.0
<b>Make no difference</b>	2.0	7.1	4.2



**13. Obesity may be caused by (%Yes)**

	<b>12-19</b>	<b>20-49</b>	<b>50-74</b>
<b>Eating too much food</b>	84.8	83.6	82.3
<b>Not doing enough exercise</b>	93.4	94.3	94.9
<b>Eating between meals</b>	90.4	94.3	93.2
<b>Eating a lot of fatty foods</b>	97.0	96.8	97.5
<b>Eating lots of sweets/ drinking sugary drinks</b>	89.4	94.3	91.6

**14. Knowledge on personal action to prevent diabetes (%Yes)**

	<b>12-19</b>	<b>20-49</b>	<b>50-74</b>
<b>Decrease fat in the diet</b>	62.6	75.7	83.5
<b>Decrease oil in the diet</b>	64.1	77.1	84.4
<b>Decrease sugar in the diet</b>	99.0	98.6	98.7
<b>Do exercise</b>	91.9	97.9	98.3
<b>Reduce stress</b>	85.4	93.9	97.0
<b>Maintain healthy weight</b>	87.9	93.2	94.9

**15. Knowledge on personal action to prevent heart disease and high blood pressure?  
(%Yes)**

	<b>12-19</b>	<b>20-49</b>	<b>50-74</b>
<b>Decrease fat in the diet</b>	90.9	95.0	94.9
<b>Decrease oil in the diet</b>	91.9	95.7	94.5
<b>Decrease weight if overweight/ obese</b>	91.9	96.1	96.6
<b>Do exercise</b>	93.4	97.5	98.7
<b>Reduce stress</b>	94.9	96.1	98.7
<b>Stop smoking</b>	93.4	95.0	97.5

**16. As a precaution against heart disease, full cream milk compared with skimmed or  
low fat milk is (%)**

	<b>12-19</b>	<b>20-49</b>	<b>50-74</b>
<b>Don't know</b>	28.8	29.6	24.1
<b>Healthier</b>	18.7	14.3	13.5
<b>Less healthy</b>	48.5	49.6	55.3
<b>The same</b>	4.0	6.4	7.2

**17. To maintain good physical condition one should exercise (%)**

	<b>12-19</b>	<b>20-49</b>	<b>50-74</b>
<b>Every day of the week</b>	50.5	58.6	59.5
<b>2-3 times per week</b>	44.9	32.1	26.6
<b>Once a week</b>	1.5	1.4	0.8
<b>1-2 times per month</b>	0.5	0.0	0.0
<b>Don't know</b>	2.5	7.9	13.1

**18. Regular rapid/brisk walking for 20-30 minutes is sufficient exercise for maintaining good physical condition (%)**

	<b>12-19</b>	<b>20-49</b>	<b>50-74</b>
<b>Yes</b>	80.3	73.6	72.2
<b>No</b>	13.6	18.2	12.7
<b>Don't know</b>	6.1	8.2	15.2

**19. Exercise affects your chances of getting heart disease (%)**

	<b>12-19</b>	<b>20-49</b>	<b>50-74</b>
<b>No effect</b>	7.6	2.9	4.6
<b>Increases chances</b>	3.0	2.5	4.2
<b>Decreases chances</b>	78.8	86.1	75.1
<b>Don't know</b>	10.6	8.6	16.0

**20. Exercise affects your chances of getting diabetes (%)**

	<b>12-19</b>	<b>20-49</b>	<b>50-74</b>
<b>No effect</b>	9.6	3.6	4.2
<b>Increases chances</b>	1.0	3.9	4.2
<b>Decreases chances</b>	79.3	83.2	78.9
<b>Don't know</b>	10.1	9.3	12.7

**21. Percentage of participants reporting changes in eating habits because of the COVID-19 compared with earlier diet, by age group**

Age/ years	Yes	No
<b>12-19</b>	24.2	75.8
<b>20-49</b>	34.3	65.7
<b>50-74</b>	24.5	75.5
<b>12 -74</b>	28.3	71.7

**22. Daily mean per capita of alcoholic drinks**

Years		12-19*	20-49	50-74	12-74
Food items	% respondents consuming	Mean per capita (ml)	Mean per capita (ml)	Mean per capita (ml)	Mean per capita (ml)
<i>Beer</i>	31.4	70.0	170.2	124.9	148.8
<i>Spirits</i>	18.5	4.2	51.1	43.4	46.3
<i>Wine</i>	17.5	6.6	17.7	17.3	17.0

*\*Note: for participants aged 18yrs and above*

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Mr. J.L.D. Bhujoharry	Assistant Permanent Secretary (Secretary)
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## List of Clusters

- 1. Port Mathurin**
- 2. Baie aux Huitres**
- 3. La Ferme**
- 4. Petit Gabriel**
- 5. Grande Montagne**

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## **11. ACKNOWLEDGEMENTS**

This Rodrigues Nutrition Survey 2023 could not have been completed without the contribution of a large number of individuals who each made unique and often unrecognized contributions to its realization.

**The initiative of Dr the Honourable Kailesh Kumar Singh Jagutpal, Minister of Health and Wellness for his tremendous interest, support and commitment is highly commendable and appreciated.**

**Our thanks also go to Mr Johnson Roussety, Chief Commissioner, Rodrigues Regional Assembly and Mr Jean Nicolas Volbert, Commissioner for Health and Others for their remarkable and outstanding contribution and unflinching support.**

We would like to thank Monash University, Australia; University of Helsinki, Finland; Umea University, Sweden; Imperial College, London, United Kingdom; Baker Heart and Diabetes Institute, Australia; and World Health Organization for their invaluable support and collaboration throughout the project.

**We also thank Mrs Devi Chand Anandi Rye Seewooruthun, Senior Chief Executive, Mrs Z. B. Lallmahomed, Permanent Secretary, Mr D. Conhye, Permanent Secretary, Mr D. Dassaye, Permanent Secretary, Mrs S. Kalasopatan-Chellen, Ag Deputy Permanent Secretary and Ms C. Prudence, Ag Departmental Head, Commission for Health and Others for their continuous encouragement, guidance, and collaboration.**

We extend our sincere thanks and gratitude to all those who assisted in the undertaking of this Survey. This includes the Ministry of Health and Wellness Officials, namely: Directors Health Services; Regional Health Directors; NCD Coordinators; Director Nursing; Regional Nursing Administrators; Regional Health Services Administrators; Health Director, Queen Elizabeth Hospital, Rodrigues; Mrs Larose, Nursing Administrator, Queen Elizabeth Hospital, Rodrigues; Manager Financial Operations; Manager Human Resources; Director Pharmaceutical Services; Mr B. Gowreesunker, Senior Manager and staff, Operation Support Services; Managers Procurement & Supply; Mr Ramjaun, Senior Procurement & Supply

Officer; Medical, Nursing and Para Medical Staff from Mauritius and Rodrigues; Staff of the Central Health Laboratory; Drivers; those responsible for motivating participants; all those staff who worked for the Survey; and many others not covered by these designations.

Our special thanks go to Mr D. Bhujoharry, Assistant Permanent Secretary; Mr. J. Heecharan, Nursing Supervisor; Dr D. Soobrayen Jhugroo; Dr K. Boodoo; Commission for Health and Others; Mr L. Casimir, Hospital Administrator, Queen Elizabeth Hospital, Rodrigues; and staff of the NCD, Health Promotion and Research Unit for the pivotal role in the organization and coordination of the project activities and we warmly welcome their continued support.

We would also like to thank Dr Anne Ancia, WHO Representative in Mauritius; and staff of the Statistics Mauritius for making the survey a success.

Our special gratitude and thanks to all the participants and their relatives who were instrumental in providing valuable information without which the project would not have been possible.