



Republic of Mauritius

## Ministry of Health and Wellness



# Mauritius Nutrition Survey 2022

## Report

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# **The Mauritius Nutrition Survey 2022**

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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 Mauritius Nutrition Survey 2022 (MNS2022) 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 behaviors

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

- Overall, 94.1% of survey participants aged 5-74 years were non-vegetarian (consume variety of animal foods), 3.9% were vegetarian that included milk and milk products in their diet, whilst 1.4% reported being strict vegan (no animal products).
- A total of 79.7% of children (aged 5-11 years), 68.5% of adolescents (aged 12-19 years), 79.2% adults aged 20 to 49 years, and 88.1% of older adults aged 50 to 74 years ate breakfast on all the 7 days of the week.
- 1.6% children aged 5-11 years and 7.1% 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.
- 53.2% of children aged 5-11 years reported eating at least 2 vegetables daily and 37.2% reported that they ate at least one vegetable daily.
- 80.2% children reported eating at least one fruit daily.
- 87.8% children drank milk daily compared with 74.1% of 12-74 years old participants that consumed milk.

## **Dietary knowledge and practices**

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

- 48.2% of participants reported that health professionals were the major source of dietary advice concerning special diets, and only 12.3% participants in this group noted they received dietary advice from a nutritionist.
- 12.0% reported that the Internet was a common source of dietary advice on special diets and more so by the younger sub-groups: 20.0%, 26.3% and 18.6% respectively in participants aged 5-11 years, 12-19 years and 20-49 years.
- At least 94% of participants aged 12-74 years reported regular use of cooking methods such as ‘saute/fricasee/etouffe’ and at least 77.7% also reported frying food regularly.
- Blended oil was most frequently used type of cooking oil in Mauritian households (69.6%).
- Boiled rice, white bread, pulses, vegetables, fruits, milk and dairy products formed part of the staple diet of Mauritians. Chicken was most popular, followed by fish consumption amongst flesh foods consumed.
- Salty biscuits, snacks and fried foods, ‘dhollpuri’ and pizza were items that were regularly consumed by the majority of the population.
- Adequate water consumption was reported by all age groups, and tea/coffee with milk was also consumed by majority of participants aged 12- 74 years.

## **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 452.4 grams by 97.1% of respondents.
- White bread was consumed by 93.1% of participants with a daily mean per capita of 122.8 grams.
- Brown bread was consumed by 22.1% of participants aged 12-74 years with a daily mean per capita of 79.9 grams.

- Potatoes were popular with 98% of the population aged 12-74 years with a daily mean per capita of 36.9 grams.
- Daily mean per capita of vegetables was found to be 77.2 grams for participants aged 12-74 years.
- Daily mean per capita of fruits was found to be 127.2 grams for participants aged 12-74 years.
- Together, mean per capita of vegetables and fruits was 198.2 grams and meets around 50% of the WHO recommendation of 400 grams daily 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 18.3 grams.
- Average daily per capita for following nutrients/dietary constituents were found to be:
  - Energy: 3092 kilocalories
  - Carbohydrates: 424.3 grams (55% of total energy)
  - Proteins: 101.9 grams (13.2% of total energy)
  - Fats: 101.2 grams (29.5% of total energy)
  - Dietary fiber: 23.8 grams
  - Dietary cholesterol: 325.5 milligrams
  - Dietary sodium: 2954.4 milligrams
  - Added sugar: 38.8 grams

## **Anemia**

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

- The prevalence of iron deficiency anemia was found to be higher amongst females than in males across all age groups.
- The highest prevalence was found amongst women aged 20-49 years at 38.4% and in girls aged 12-19 years at 37.1%.
- The prevalence of mild and moderate anemia in these 2 groups were noted as follows: 17.7% and 18.8% amongst women, and 21.2% and 15.1% amongst girls respectively.

- Prevalence of severe anemia was very low overall, at a maximum of 1.9% amongst women aged 20-49 years.

## **Body Mass Index (BMI)**

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

- In the age group 5 to 11 years:14.6% of the children were underweight, 14.6% were overweight, and 13.8% were obese
- In the age group 12 to 19 years:16.7% of the adolescents were underweight, 14.2% were overweight, and 9.0% were obese.
- In the age group 20 to 49 years: 5.4% of adults were underweight, 35.5% were overweight, and 31.2% were obese.
- In the age group 50 to 64 years:4.6% of the adults were underweight, 40.3% were overweight, and 28.6% were obese.
- In women aged 15-49 years , it was found that 7.4% were underweight compared with 29.2% that were overweight and 27.2% that were obese.

## **Waist circumference**

### *Findings for participants aged 18-74 years*

- In the age group 18-49 years: 48.2% of men and 54.4% of women were found to have elevated waist circumference.
- In the age group 50-74 years: 54.6% of men and 70.9% of women were found to have elevated waist circumference.

## **Body Fat Mass**

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

- Body fat mass above normal was found more amongst female participants compared with males aged 12-74 years, and more in boys than girls aged 5-11 years.
- Both men and women aged 20-49 years were found to have body fat mass above normal at 63.9% and 64.5% respectively.
- Lowest prevalence of elevated body fat mass was noted in adolescent boys aged 12-19 years at 5.1%.



## Status of serum micro-nutrients

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

#### Serum Ferritin status:

- Overall, 13.8% of participants aged 5-74 years had low level of serum ferritin.
- 29.8% adolescents aged 12-19 years showed low levels of serum ferritin, 40.8% boys and 19.2% girls of this age.
- 25.9% older adults aged 50-74 years had above normal level, found to be more amongst 46.4% of women.

#### Serum Folate status:

- Overall, 11.7% participants aged 5-74 years had low level of serum folate.
- Prevalence of low levels of serum folate was found to be inversely proportional with age: 17.3% in children aged 5-11 years, 14.7% in adolescents, 12.4% in adults aged 20-49 years, and 6.0% in adults aged 50-74 years.

#### Serum Vitamin B12 status:

- Overall, 8.0% participants aged 5-74 years had low level of serum vitamin B12.
- Below normal levels of vitamin B12 was noted amongst 20.9% of children aged 5-11 years, 6.4% older adults aged 50-74 years, and at least 5% of adolescents aged 12-19 years and younger adults aged 20-49 years.

#### Serum Vitamin D status:

- Overall, 86.5% participants aged 5-74 years had low level of serum vitamin D.
- Below normal levels of vitamin D were noted amongst 94.1% of adolescents aged 12-19 years, 88.6% younger adults aged 20-49 years, 82.3% of older adults aged 50-74 years and 78.8% of children aged 5-11 years.

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

- Findings show that 80.7% of women of reproductive age 15-49 years were consuming foods from at least 5 or more food groups and 19.3% 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: 99.8% had eaten a food from the group ‘grains, white roots and tubers and plantains’, 86.7% had eaten ‘other vegetables’, 85.1% had consumed ‘milk and milk products’, 75.1% had consumed ‘meat, poultry and fish’, and 63.6% had consumed ‘other fruits’.
- More specifically, the most common foods consumed in the preceding 24 hours by the women were reported as follows: 84.1% had eaten rice/pasta /noodles, 65.6% had oats/other breakfast cereals, 56.6% had dark green leafy vegetables, 50.8% had pulses, 46.2% had chicken, 44.1% had vitamin A rich vegetables and 13.3% had vitamin A-rich fruits.

## INFLUENCE OF COVID 19 ON DIET AND EATING HABITS

*Findings for participants aged 12-74 years showed that*

- Overall, 38.4% reported changes in dietary habits because of the COVID -19 compared with earlier dietary habits.
- 27.7% of adolescents aged 12-19 years reported overall **increased** food consumption, 23.0% of adults 20-49 years reported overall **decreased** food consumption and 71.4% of adults 50-74 years reported **no change** in food consumption.
- **During** the pandemic lockdown:
  - 57.9% adolescents, 50.2% adults aged 20-49 years and 48.5% adults 50-74 years reported consuming **less** ‘dhollpuri’.
  - 57.9% adolescents, 61.5% adults aged 20-49 years and 57.5% adults 50-74 years reported consuming **less** fast foods/take-away.
  - 30.4% adolescents, 42.3% adults aged 20-49 years and 40.8% adults 50 -74 years reported consuming **less** sweetened/soft drinks.

- 42.8% adults aged 20-49 years and 43.6% adults aged 50-74 years also reported consuming *less* desserts and sweets, with 41% less salty snacks /baked products consumed by both these age groups.
- 41.5% adolescents aged 12-19 years, 40.9% adults aged 20-49 years, and 35.9%, adults aged 50-74 years reported *increased* water consumption.
- 29.4% and 29.1% participants aged 12-19 years and 20-49 years reported *increased* consumption of coffee.

## Physical and leisure activity

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

- Regarding recommendations of physical activity for health, results showed that: 42.4% of respondents aged 5-11 years, 25.2% aged 12-19 years, 35.8% of respondents aged 20 to 49 years and 42.3% aged 50-74 years met the standard.
- 11% of all participants aged 18-74 years described their occupational physical activity as ‘vigorous’.
- All respondents (5-74 years) spent an average of between 1.8 - 2 hours daily watching TV/video/VCD/DVD, on the computer, playing electronic games, sending SMS, reading /other sedentary activities.

## Way forward

The findings of the MNS 2022 as well as those of other surveys that have been recently conducted, such as the Mauritius NCD SURVEY 2021, will be used to update and formulate the National Plan of Action for Nutrition (NPAN) 2023-2028. The forthcoming NPAN will propose strategies targeting eating habits and diet related behaviors of the Mauritian population to promote good nutritional status and well-being of the different population sub-groups. Effective interventions may be scaled up/re-engineered and program delivery enhanced to prevent/ manage the problem of non-communicable diseases, their risk factors and other diet related health conditions, such as, weight management, hyperlipidemias and anemia amongst others. Studies and surveys such as the Salt Intake Study must be conducted urgently to improve and sustain focus and delivery of on-going public health measures. Further research targeting specific micro-nutrients and the factors influencing physiological status, including dietary behavior, is essential for appropriate policy action and public health interventions. Capacity building and training are essential to achieve effective 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. 650 million adults, 340 million adolescents and 39 million children are obese according to a press release of the WHO made last year to mark the World Obesity Day 2022. 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).

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.

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 and morbidity in Mauritius, which closely reflects the global situation.

NCDs, also known as chronic diseases, tend to be of long duration and are the result of a combination of genetic, physiological, environmental and behavioral factors. The main types of NCDs are cardiovascular diseases (such as heart attacks and stroke), cancers, chronic respiratory diseases (such as chronic obstructive pulmonary disease and asthma) and diabetes. Tobacco use, physical inactivity, the harmful use of alcohol and unhealthy diets all increase the risk of dying from an NCD. NCDs kill 41 million people each year, equivalent to 74% of all deaths globally.

NCDs disproportionately affect people in low- and middle-income countries, where more than three quarters of global NCD deaths (31.4 million) occur. Each year, 17 million people die from a NCD before age 70; 86% of these premature deaths occur in low- and middle-income countries. Of all NCD deaths, 77% are in low- and middle-income countries. Cardiovascular diseases account for most NCD deaths, or 17.9 million people annually, followed by cancers (9.3 million), chronic respiratory diseases (4.1 million), and diabetes (2.0 million including kidney disease deaths caused by diabetes). These four groups of diseases account for over 80% of all premature NCD deaths.

The last Mauritius Nutrition Survey was conducted in 2012. Since then there have been significant developments in the Mauritian food and nutrition landscape including production, industry and marketing, along with socio-economic and lifestyle changes, as well as the COVID-19 pandemic situation that have impacted on eating habits and dietary consumption patterns as well as physical activity practices that influence individual health behavior and weight.

Optimal health for Mauritians 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 non-communicable diseases.

This National Nutrition Survey 2022 was undertaken to provide up-to-date national data on nutritional status, eating habits, dietary trends and consumption patterns for monitoring and continuous improvement of interventions. The evidence base will support policy and decision program planning and will build on the National Plan of Action on Nutrition (NPAN), by evaluating on-going programmes specified by the earlier NPAN 2016 -2020 and identifying new challenges and appropriate responsive strategies. The findings of the survey will also serve the purpose of monitoring and evaluation of progress made in the last decade, since the previous surveys.

## 2. SITUATIONAL ANALYSIS

Unhealthy diet and inadequate physical activity are responsible for most of the prevalent NCDs which have reached epidemic proportions in Mauritius. Cardiovascular diseases and diabetes mellitus are the first two principal underlying causes of death in the Republic of Mauritius. In 2021, the distribution of deaths by chapter of the International Classification of Diseases showed that diseases of the circulatory system were accountable for 32.1% of all case mortality, of which 21.3% was due to heart disease. These were followed by endocrine, nutritional and metabolic diseases which accounted for 20.4% of all deaths, while 10.6% was due to neoplasms.

The Mauritius Non-Communicable Disease Survey 2021 found the age standardized prevalence of overweight amongst adult Mauritians 25-74 years, using WHO ethnic reference cut-points has decreased from 39.4% in 2015 to 36.0% in 2021 as well as the prevalence of obesity has decreased from 45.5% in 2015 to 36.2% in 2021.

Mauritius has one of the highest prevalence of diabetes mellitus in the world. The Mauritius NCD Survey 2015 showed that the age-standardized prevalence of diabetes in the population aged 25-74 years has steadily risen from 14.3% in 1987 to 22.8% in 2015. However, the most recent survey in 2021 has noted a small but significant decrease since 2015 in both men and women and in all age-groups to 19.9%. It is also worrying that among those people who have diabetes (known cases) 31.7% 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 2015.

Successive Mauritius Nutrition Surveys undertaken from 1995 to 2012 show trends in overweight and obesity co-existing with underweight in children aged 5-11 years and adolescents aged 12-19 years contributing to the double burden of disease amongst this vulnerable population.

Results of the Mauritius Nutrition Survey 2004 revealed that in the age group 5 to 11 years, 8.15% were found to be obese and 7.7% were overweight, while in the age group 12 to 19 years, 7.3% of adolescents were obese and 8.4% were overweight. In 2012, the Mauritius Nutrition Survey found that in the age group 5 to 11 years, 15.4% of children were underweight, 11.9% were overweight, and 9.9% were obese. In the age group 12 to 19 years, 17.1% of adolescents were underweight, 9.5% were overweight, and 8.9% were obese.

The prevalence of anemia in some vulnerable groups as indicated in most recent nutrition surveys is of concern and requires further evaluation for intervention and policy in Mauritius through monitoring the serum hemoglobin, ferritin and folate.

The Mauritius Nutrition Survey 1995 found that anemia due to iron deficiency was uncommon in children (0-7 years), adults (25-50 years) and pregnant women in Mauritius but was still a problem amongst adults in Rodrigues. In 2004, the Mauritius Nutrition Survey found that anemia was prevalent among adolescent girls both in Mauritius as well as in Rodrigues. A total of 10.7% of the adolescents and 19% of women aged 20-49 years in Mauritius were anemic. In 2012, the Mauritius Nutrition Survey noted that the highest prevalence of anemia was in females in the age group 20 to 49 years (33.6%), followed by those aged between 12 to 19 years (28.5%).

Mauritius has been proactive in addressing the problem of NCDs, that has greatly contributed to avoid a more marked increase in the prevalence of diabetes and other NCDs with catastrophic public health and socio-economic consequences.

The policies to address non-communicable diseases developed by the Ministry of Health & Quality of Life/ Wellness, include comprehensive legislation concerning alcohol, tobacco and substance abuse, ban on soft drinks in schools and control of sale of foods in school canteens. Mauritius has 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.

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 Nutrition Action Plan (2016-2020)
- 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, vitamin B12 and folate).



The figures given below illustrate some achievements registered following various actions taken against non-communicable diseases in Mauritius:

- A general decreasing trend in admissions for diabetes treatments has been observed in government general hospitals from 5,413 admitted cases in 2015 to 4,247 cases admitted in 2021.
- In the period 2015 to 2021, mortality due to Diabetes Mellitus followed a decreasing trend from 24.1% to 20.0%.
- The number of persons who have had to undergo non-traumatic lower limb amputation has slightly decreased from 678 in 2017 to 658 in 2021.
- The standardized prevalence of smoking has shown a small decrease from 19.3% in 2015 to 18.1% in 2021.
- Overall alcohol consumption has decreased from 52.8% in 2015 to 40.4% in 2021.
- Physical activity has increased to 40.2% in adults in 2021 compared with 23.7% of adults aged 25 - 74 years as found by successive NCD surveys in the same years.

### 3. LITERATURE REVIEW

The 2014 Global Status Report of NCDs states that a significant shift in the quality and quantity of human diets and nutrition-related epidemiology has occurred in the past few decades influenced by economic and income growth, urbanization and globalization, Countries are now experiencing a fast-evolving and more complex nutrition paradigm.

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 anemia in women with one in three women of reproductive age being anemic.

The 2030 Agenda of the United Nations Development Programme (UNDP) states that good health is essential to sustainable development and stresses the interconnectedness and complexity of the two. Widening economic and social inequalities, rapid urbanization, threats to climate and the environment, the continuing burden of HIV and other infectious diseases, and emerging challenges such as NCDs are contributory factors to achievement of the sustainable development goals (SDGs). The UNDP reports that progress regarding the health related SDG's 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. Multi-sectoral, 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 anemia 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 2022 Progress Monitor from the WHO reports that: ‘Return on investment analysis of the WHO “best buys” for NCDs shows that with the right strategic investments, countries facing the greatest burden of premature NCD deaths can change their disease trajectory. They can deliver significant health and economic gains for their citizens by focusing on a few key policies in areas including tobacco and alcohol control, reducing salt intake, increasing physical activity, management of diabetes, and vaccination against human papillomavirus.’

Mauritius Nutrition Surveys have provided much valuable information concerning nutritional status of population sub-groups, eating habits, dietary trends and consumption patterns of Mauritians.

Over the years, health problems related to under-nutrition and deficiencies have decreased in Mauritius while those associated with over-nutrition and more sedentary lifestyles have become a major concern as shown by the successive Mauritius Nutrition Surveys from 1995 to 2012, including the Salt intake study 2012.

Several trends were noted in the Mauritius Nutrition Surveys that suggest health problems associated with poor diet and consumption patterns will grow steadily worse and include: 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.

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, and more recently the pandemic as well.

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 Mauritian context as indicated by our past Mauritius Nutrition Surveys, for instance: Iron, Folate, Vitamin B12 and Vitamin D.

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.

The findings of the successive Mauritius 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.

NCDs remain a major public health issue in Mauritius, as has been shown by consecutive risk factor surveys from 1987 to 2021. A rising prevalence of several risk factors has been documented across the past seven Mauritius Non-Communicable Diseases Surveys, including overweight, obesity and sedentary habits.

Besides diabetes prevalence, the findings of successive NCD surveys from 1987 to 2021 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.

Significant policies to address NCDs have been developed, including legislation regulating the level of saturated fatty acids in most imported food products, ban of soft drinks in schools, legislation for the sale of healthy foods in school canteens, 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.

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. The findings of the Mauritius Nutrition Survey 2022 will help in the formulation of the next NPAN.

## **4. OBJECTIVES OF THE MAURITIUS NUTRITION SURVEY 2022**

### **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 of the population aged 5 to 74 years.
- To determine the trends in prevalence of malnutrition (over and under-nutrition) in the target population (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 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 has been 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, 15 clusters have been randomly selected in Mauritius. A 16th cluster was purposely included into the sample to cater for some 100 households of Chinese origin. The 15 clusters were well-demarcated geographical areas within the 9 districts of Mauritius. The population size by urban and rural regions has been considered during this exercise.

**2<sup>nd</sup> Stage:** Some 4,500 households were enumerated in Mauritius, that is, 325–350 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 2,700 subjects were randomly selected from 16 clusters representative of the demographics in Mauritius. 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	16	600
12-19 years	16	600
20-49 years	16	800
50-74 years	16	700
<b>Total</b>		<b>2,700</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 Mauritian 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 two-day comprehensive training program on 21-22 August 2022 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 Mauritius Nutrition Survey 2022 was conducted from 23 August to 16 September 2022 at 16 sites. Two teams worked simultaneously at 2 survey sites 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 centimeter, 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 centimeter. Measurements were repeated following both initial recordings.

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

- **Bioelectrical Impedance:** 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, Hemoglobin, 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 12-19 years
- (iii) Questionnaire C: adults 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 behavior/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>
5 – 11 years	384	64
12 – 19 years	520	87
20 – 49 years	795	99
50 – 74 years	699	100
<b>Total</b>	<b>2398</b>	<b>89</b>

A total of 2398 out of 2700 invited respondents attended the survey, that is, a response rate of 89%. The response rate varied with the different 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 Google Forms. Data analysis was undertaken on Excel and SPSS Version 21. The findings were validated.

## 6. RESULTS

The findings of the Mauritius Nutrition Survey 2022 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 behavior 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.

#### 6.1.1 Age and Sex distribution

A total of 2,398 persons participated in this survey. Table 3 gives the age and sex distribution of the participants.

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

AGE GROUP	Male	Female	Total
5 – 11 years	206	178	384
12 – 19 years	258	262	520
20 – 49 years	318	477	795
50 – 74 years	335	364	699
<b>Total</b>	<b>1117</b>	<b>1281</b>	<b>2398</b>

### 6.1.2 Educational level

**Table 4: Distribution of participants by educational level**

Education Level	Percentage (%)
None/Pre-primary	3.2
Primary	32.5
Secondary (Form I – IV)	25.1
Secondary SC	21.9
Secondary HSC	9.2
Tertiary/Diploma	7.8

Among the 2,398 participants, it was found that 32.5% of the participants had studied up to primary level, 25.1% had been at school up to from Form IV, 21.9% had completed Secondary School Certificate (SC), 9.2% had completed Secondary Higher School Certificate (HSC) and 7.8% reached up to tertiary level (Table 4).

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

Education Level	Father	Mother
None/Pre-primary	0.1	0.2
Primary	25.5	22.2
Secondary (Grade 7-10)	20.7	22.4
Secondary SC	24.6	29.0
Secondary HSC	8.6	9.4
Tertiary/Diploma	8.2	10.1
Don't Know/ N/A	12.3	6.8
<b>TOTAL</b>	<b>100.0</b>	<b>100.0</b>

24.4%, 20.7% and 24.6% of fathers whose children attended the survey completed lower secondary, secondary and higher secondary levels of education respectively. Amongst mothers, it was 21.1%, 22.4% and 29.0% respectively for same educational levels (Table 5).

### 6.1.3 Occupational status

**Table 6: Distribution of participants by occupational status**

Occupation	Percentage (%)
Managers and Administrators	1.2
Professionals	4.9
Associate Professionals	4.3
Tradespersons and related workers	4.5
Clerical and Service workers I	1.4
Clerical, Sales and Service workers II	4.5
Clerical, Sales and Service workers III	3.4
Intermediate Production and Transport Workers	3.3
Laborers and Related Workers	10.8
Student	38.0
Unemployed	2.6
Housewife	11.0
Retired	10.2

38.0% of the participants were students, 11.0% were housewives, and 38.2% were economically active and 10.2% were retired participants and 2.6% were unemployed (Table 6).

### 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	10.3
Rs 10,001 –Rs 20,000	34.2
Rs 20,001 – Rs 35,000	28.8
Rs 35,001 – Rs 50,000	13.1
Above Rs 50,000	9.8

It was found that 34.2% of households had an average monthly income between Rs 10,001 to Rs 20,000, 28.8% had a monthly income between Rs 20,001 to Rs 35,000, 13.1% had a monthly income between Rs35,001 to Rs 50,000 and 9.8% were earning an average monthly income above Rs 50, 000 or more (Table 7).

## 6.1.5 Household Facilities

**Table 8: Percentage of household facilities**

Household Items	Percentage (%)
Refrigerator	98.4
Microwave	82.7
Oven	66.3
TV	96.7
Radio	84.2
Internet	80.8

Overall, 98.4% of the households had a refrigerator, 82.7% had a microwave, 66.3% had an oven, 96.7% had a television and 84.2% had a radio. Moreover, 80.8% had internet facilities at home (Table 8).

### *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	47.9	52.0
12-19	55.8	44.3
20-49	54.3	45.6
50-74	60.7	39.4

Concerning regular household expenses for food, rent and bills in the preceding 12 months, 60.7% of respondents aged 50-74 years reported having no difficulty in managing these expenses compared with other age groups. Most difficulty in managing household expenses (once or more than once) was reported by 52.0% of parents /caregivers accompanying children aged 5-11 years and 45.6% of adults aged 20-49 years (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 5-11 years, by age and gender**

Age	ALL				MALE				FEMALE			
	UW	NW	OW	O	UW	NW	OW	O	UW	NW	OW	O
5-11	14.6	57.0	14.6	13.8	16.5	54.4	14.6	14.6	12.4	60.1	14.6	12.9
12-19	16.7	60.0	14.2	9.0	20.5	57.0	12.0	10.5	13.0	63.0	16.4	7.6
20-49	5.4	27.9	35.5	31.2	5.0	31.8	37.4	25.8	5.7	25.4	34.2	34.8
50-74	4.6	26.5	40.3	28.6	5.1	29.9	44.5	20.6	4.1	23.4	36.5	36.0

Key: UW- Underweight

NW- Normal Weight

OW- Overweight

O- Obese

As shown in (Table 10a), 14.6% of the children aged 5-11 years were underweight, 14.6% were overweight, 13.8% were obese, and 57.0% were found to have normal weight. 16.7% of the adolescents aged 12-19 years were underweight, 14.2% were overweight, 9.0% were obese and 60.0% were of normal weight. In children aged 5-11 years and adolescents aged 12-19 years, underweight was more prevalent amongst boys: 16.5% and 20.5% in the respective age bands compared with 12.4% and 13.0% amongst girls in the same age bands. Amongst adolescents 12-19 years: 16.4% girls were overweight compared with 12% boys, and 10.5% adolescent boys were obese compared with 7.6% girls.

Less prevalence of underweight is noted amongst adults: 5.4% amongst those aged 20-49 years and 4.6% in the age group 50-74 years. More overweight and obesity is noted amongst adults aged 20-49 years: 35.5% were overweight, and 31.2% were obese, with 27.9% being of normal weight.



Highest prevalence of overweight is noted amongst older adults aged 50-74 years at 40.3% and highest obesity was found in adults aged 20-49 years at 31.2% (Table 10a). 44.5% men compared with 36.5% women were overweight and 36.0% women compared with 20.6% men were obese in this age group. Similar pattern was found with older adults 50-74 years: 44.5% males were overweight compared to 36.5% females; whilst 36.0% females were obese compared with 20.6% males.

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

	Percentage (%)
Underweight	7.4
Normal weight	35.5
Overweight	29.2
Obese	27.9

In women aged 15-49 years, it was found that 7.4% were underweight compared with 29.2% that were overweight and 27.2% that were obese (Table 10b).

### 6.2.2 Waist circumference

Waist circumference is an indicator of central obesity and elevated waist circumference is 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	48.2	54.6
Female	54.4	70.9
Both sexes	56.1	43.9

Using ethnic based reference cut-off points (Annex 2D) it was found that 48.2% of men and 54.4% of women aged 18-49 years had an elevated waist circumference. In the age group 50-74 years, 54.6% of men and 70.9% of women had a waist circumference above normal level (Table 11).

### 6.2.3 Body Fat Mass

Body fat mass cut-points 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	29.3	24.3
12-19	5.1	35.2
20-49	63.9	64.5
50-74	51.0	58.1

The prevalence of body fat mass above normal was found to be highest amongst adults aged 20-49 years with 63.9% of men and 64.5% of women showing elevated levels. In adults aged 50-74 years elevated body fat mass was found to be 51.0% amongst men and 55.1% amongst women. The lowest prevalence was noted in adolescent boys aged 12-19 years at 5.1%. Elevated body fat mass above normal was noted more in female participants from 12-74 years than in male participants of the same age groups, in the survey (Table 12).

### 6.2.4 Blood pressure

Blood pressure reference cut-points used by age group are found in Annex 2F.

**Table 10: 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	6.6	17.3	39.7	<b>22.5</b>
Female	8.0	11.9	34.3	<b>18.4</b>
Total	7.3	14.1	36.9	<b>20.3</b>

The prevalence of hypertension was 7.3% in the age group 12-19 years. The prevalence of hypertension was 14.1% and 36.9% in the age groups 20-49 years and 50-74 years, respectively. It is to be noted that the prevalence in those two age groups was higher among males than females (Table 13). Blood pressure was not measured in the age group 5-11 years.

## 6.2.5 Results of blood tests

### 6.2.5.1 Prevalence of anemia

Serum hemoglobin was used as indicator of iron deficiency anemia and reference cut-points by age are found in Annex 2G.

**Table 14: Percentage prevalence of anemia 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	4.0	6.0	5.4	21.2	4.1	17.7	12.3	15.5
Moderate	5.0	5.4	0.8	15.1	0.9	18.8	1.5	5.3
Severe	0.0	0.0	0.0	0.8	0.3	1.9	0.3	0.3
Overall	<b>9.0</b>	<b>11.4</b>	<b>6.2</b>	<b>37.1</b>	<b>5.4</b>	<b>38.4</b>	<b>14.1</b>	<b>21.1</b>

The prevalence of iron deficiency anemia was found to be higher amongst females than in males across all age groups. The highest prevalence was found amongst women aged 20-49 years at 38.4% and in girls aged 12-19 years at 37.1%. The prevalence of mild and moderate anemia in these 2 groups was noted as follows: 17.7% and 18.8% amongst women, and 21.2% and 15.1% amongst girls respectively. Prevalence of severe anemia was very low overall, at a maximum of 1.9% amongst women aged 20 -49 years (Table 14).

Prevalence of anemia in the population above 30% may be indicative of a public health problem and requiring public health intervention programs such as fortification of common foods and 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 anemia 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 11a: 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	1.1	29.8	14.1	8.2	13.8
Normal	97.5	68.0	76.6	65.9	74.8
Above normal	1.4	2.1	9.4	25.9	11.4

Overall prevalence of low serum ferritin in participants aged 5-74 years was 13.8%. Results found highest prevalence of below normal levels of serum ferritin amongst adolescents aged 12-19 years at 29.8% followed by 14.1% amongst younger adults aged 20-49 years. (Table 15a). Above normal levels of serum ferritin were also noted with highest prevalence at 25.9% 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	1.0	40.8	12.5	14.1
Female	1.2	19.2	15.1	2.8

Below normal level of serum ferritin was more prevalent in adolescents and higher in males compared to females in the age groups 12-19 years at 40.8% and in females. Amongst older adults aged 50-74 years more males showed low level of serum ferritin at 14.1% compared with females at 2.8% (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	1.0	0.0	2.9	3.6
Female	1.8	0.8	13.7	46.4

Highest prevalence of above normal levels of serum ferritin were noted amongst females aged 50-74 years at 46.4%. This population sub-group has lower requirements of dietary iron compared with younger women of reproductive age, but due to a perception of poor health/weakness, may be consuming more iron as OTC supplementation as well as increased dietary intake (Table 15c). Above normal levels of serum ferritin may be indicative of other health conditions or lifestyle habits.

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

Serum B12 is most commonly used to assess cobalamin deficiency that may be suggestive of pernicious anemia, 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	20.9	5.1	5.4	6.4	8.0
Normal	78.2	92.4	93.1	89.2	89.5
Above normal	0.8	2.5	1.5	4.4	2.5

Overall, 8.0% of participants aged 5-74 years were found with low level of serum vitamin B12. Children aged 5-11 years show the highest level of low status of serum vitamin B12 at 20.9% (Table 16a). Children's diets may be low in animal foods and dairy products that are good contributors of this micro-nutrient or low status may be associated with parasite infestations.

**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	20.0	5.6	7.7	7.6
Female	22.0	4.6	3.8	5.3

The highest prevalence of below normal serum vitamin B12 was noted amongst girls aged 5-11 years at 22.0% and boys in this age group at 20.0% compared with other age groups. Lowest prevalence was found in women aged 20-49 years at 3.8% (Table 16b).

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

Serum folate, also known as vitamin B9, is often used to detect megaloblastic anemia. 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 17: 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	17.3	14.7	12.4	6.0	11.7
Normal	82.4	85.3	87.0	92.8	87.7
Above normal	0.3	0.0	0.0	1.2	0.6

Overall, low level of serum folate was found in 11.7% of participants aged 5-74 years. Prevalence of below normal levels of serum folate was found to be inversely proportional with age: 17.3% in children aged 5-11 years, 14.7% in adolescents, 12.4% in adults aged 20-49 years, and 6.0% in adults aged 50-74 years (Table 17).

#### 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 physicians in the public health sector cardio-vascular disease, diabetes, bone fractures, cancer, cognitive decline and depression. A growing perception of increasing trend of rickets amongst the Mauritian population has been noted by physicians in the public health 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	78.8	94.1	88.6	82.3	86.5
Normal	21.2	5.5	9.7	14.2	11.8
Above normal	0.0	0.4	1.7	3.5	1.6

The results showed that the prevalence of below normal levels of serum vitamin D was more amongst adolescents 12-19 years at 94.1% followed by 88.6% in younger adults aged 20-49 years, 82.3% in older adults above 50 -74 years and 78.8% in children 5-11years (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	74.2	92.8	87.8	78.7
Female	84.3	95.4	89.2	85.7

More females than males showed below normal levels of serum vitamin D: 95.4%, 89.2%, 85.7% and 84.3% of females aged 12-19 years, 20-49 years and 50-74 years and 5-11 years respectively compared with males in the same age groups (Table 18b).

### 6.2.4.6 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>	
	12-74 years %		12-74 years %
Male	23.7	Male	45.3
Female	21.1	Female	46.0
Total	22.3	Total	45.7

Overall, prevalence of diabetes (HbA1c  $\geq 6.5\%$ ) in participants aged 12-74 years, was found to be 22.3%, 23.7% in males and 21.1% in females. Overall, the prevalence of pre-diabetes (HbA1c 5.7-6.4%) in the same age group, was found to be 45.7%, with 46% in females and 45.3% in males.

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

	Male	Female	Total
Pre-diabetes (5.7-6.4%)	43.8	44.3	44.0
Diabetes ( $\geq 6.5\%$ )	1.6	0.4	1.0

In the age group 12-19 years, the prevalence of elevated HbA1c in the diabetes range (equal to or more than 6.5% was low at 1.0%, and noted more amongst boys at 1.6% than girls at 0.4%. Prevalence of pre-diabetes (range between 5.7 to 6.4%) in adolescents was found to be 44.0%, with some difference noted for boys and girls at 43.8% and 44.3% (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>	49.4	49.5	49.4
<b>Diabetes (≥6.5%)</b>	19.2	14.0	16.1

In the age group 20 to 49 years, the prevalence of elevated HbA1c in the diabetes range (equal to or more than 6.5%) was 16.1% and more amongst men at 19.2% whilst 14.0% was noted amongst the women. Prevalence of pre-diabetes (range between 5.7 to 6.4%) in this group was found to be 49.4% with negligible difference noted between men and women (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>	42.7	42.6	42.6
<b>Diabetes (≥6.5%)</b>	45.1	45.6	45.4

In the age group 50 to 74 years, the prevalence of elevated HbA1c in the diabetes range (equal to or more than 6.5%) was 45.4% and comparable for both male and female participants. Prevalence of pre-diabetes (range between 5.7 to 6.4%) in this group was found to be 42.6% and comparable for both male and female participants (Table 19d).

On average, 45.7% of the respondents aged 12-74 years were found to have elevated HbA1c categorized as pre-diabetes or are at higher risk of progressing to diabetes. These individuals may prevent development of diabetes by following dietary and lifestyle advice to achieve normoglycemia.

#### 6.2.4.7 Serum Lipids

Reference cut-points used to assess blood lipids (cholesterol and triglycerides) status are found in Annex 2J.

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

**Table 12: 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
Male	7.5	42.1	35.7	30.1
Female	7.3	26.0	48.6	29.0
Total	7.4	32.5	42.5	29.5

Overall prevalence of elevated blood cholesterol was 29.5%, and found to be more in male participants at 30.1%. The prevalence of elevated total cholesterol was found to be age related: highest amongst older participants aged 50-74 years at 42.5%, which represents 35.7% of male and 48.6% of female participants. In the age group 20 to 49 years, 32.5% of participants had elevated cholesterol, which represents 42.1% of male and 26.0% of female participants. In the age group of 12 to 19 years, 7.4% of participants had elevated cholesterol; that is similar for both male and female participants (Table 20).

##### (ii) Elevated Triglycerides

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

Years	12-19	20-49	50-74	12-74
Male	1.2	26.4	15.5	12.4
Female	0.4	7.1	10.4	5.7
Total	<b>0.8</b>	<b>14.8</b>	<b>12.9</b>	<b>8.8</b>

Overall prevalence of elevated triglycerides was 8.8%, and found to be more in male participants at 12.4%. Prevalence of elevated triglycerides was highest amongst adults aged 20-49 years at 14.8% (26.4% amongst males and 7.1% amongst females); followed by adults aged 50-74 years at 12.9% (15.5% amongst males and 10.4% amongst females). In the age group of 12 to 19 years, 0.8% of participants had elevated triglycerides, with 1.2% of male and 0.4% of female (Table 21).

Hypercholesterolemia and hypertriglyceridemia are risk factors for cardiac disease and mortality and persons at risk must adhere to diet and lifestyle disease to achieve healthy lipid profile.

### **6.3 Dietary Habits**

This section focuses on key dietary habits and patterns, including the type of dietary preference, consumption of meals and snacks, key foods such as vegetables and fruits, water intake, salt 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)	1.7	1.2	1.5
Lacto-vegetarian (allow milk products+ plant based)	1.9	2.9	2.4
Lacto-ovo vegetarian (allow eggs and milk products)	0.6	0.7	0.7
Semi vegetarian (allow one flesh food)	0.9	1.7	1.3
Non vegetarian	94.9	93.4	94.1

Vegetarianism in the popular perception includes consumption of plant-based foods as well as milk products and was found to be the dietary habits of 3.9% of survey population. It was found that 1.5% of the participants reported being vegan (do not consume any animal products), out of which 1.7% were men and 1.2% were women. Lacto-vegetarianism (that includes consumption of milk and milk products, in addition to plant-based foods) was reported by 2.4% participants, of whom, 2.9% were women and 1.9% were men. It was found that 0.7% of participants reported as lacto-ovo vegetarian with little difference between men and women. Semi vegetarianism was more prevalent in women: 1.7% compared with 0.9% amongst men, whilst 93.4% women were found to be non-vegetarian compared with 94.9% men. The majority of the survey population reported eating a wide variety of animal foods: 94.1% across all age groups (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)	0.8	1.5	1.4	1.9
Lacto-vegetarian (allow milk products)	1.6	0.4	2.5	3.4
Lacto-ovo vegetarian (allow eggs and milk products)	0.5	1.5	0.6	1.0
Semi vegetarian	0.8	0.6	0.8	2.9
Non vegetarian	96.4	96.0	94.7	90.8

Amongst respondents aged 50-74 years, non-vegetarianism declined slightly at 90.8%. Vegetarianism (including vegans and lacto-vegetarians), was highest at 5.3% amongst those aged 50-74 years of age (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	79.7	68.5	79.2	88.1
Skip breakfast on all 7 days/week	4.2	5.2	5.5	5.7

On average, the habit of skipping breakfast on all days of the week increased with age: from 4.2% amongst children aged 5-11 years to 5.2% of adolescents, 5.5% adults aged 20-49 years and 5.7% in adults aged 50-74 years (Table 23). More older adults aged 50-74 years ate breakfast on all 7 days at 88.1% followed by 79.7% children, 79.2% younger adults aged 20-49 years and 68.5% adolescents that had breakfast.

### 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	90.6	88.1	79.0	84.0
Skip lunch on all 7 days/week	3.1	2.9	3.5	4.9

On average, 4.9% of older adults aged 50-74 years and 3.5% adults aged 20-49 years skipped lunch on all 7 days, compared with 2.9% adolescents and 3.1% children that skipped lunch (Table 24). It was also found that 90.6% children, 88.1% adolescents, and 84.0% older adults had lunch on all 7 days compared with 79.0% younger adults that ate lunch daily.

### 6.3.2.3 Skipping dinner

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

	5-11 years	12-19 years	20-49 years	50-74 years
Never skip dinner	93.5	92.3	92.7	93.3
Skip dinner on all 7 days/week	3.1	2.7	3.4	4.6

In the age group of 50 to 74 years, 4.6% skipped dinner daily compared with 2.7% adolescents that did so, as well as 3.1% of children and 3.4% younger adults that skipped dinner. The majority of participants reported having dinner daily: at least 92% (Table 25).

### 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 (%)**

	5-11 years	12-19 years	20-49 years	50-74 years
Bread	87.5	85.2	87.0	88.6
Cereal/cereal bar, specify usual type: plain, salt/sweet/high fiber/variety	72.9	54.8	45.9	46.9
Margarine/butter	84.4	78.7	78.2	78.5
Cheese	85.4	76.3	73.5	66.8
Plain milk	63.3	53.7	42.4	39.3
Chocolate milk or other flavors	49.2	33.8	14.6	8.4
Yoghurt/yoghurt products	37.2	29.2	26.7	21.2
Banana	70.3	59.8	70.6	77.4
Other fruits	35.9	36.7	33.5	36.3
Jam	45.3	34.0	29.2	27.2
Peanut butter	49.0	42.9	33.8	27.3
Chocolate spread	52.3	33.5	13.6	8.2
Egg	49.5	46.7	44.9	39.6
Tea	75.5	76.0	79.0	83.3
Juice	41.7	38.3	32.8	26.8
Add sugar in milk/cereal/juice	50.5	47.7	40.1	29.2

Bread, butter, cheese, and tea are the most commonly consumed breakfast foods across all age groups, as shown by Table 26 with at least 85.2% having bread, at least 78.2% had butter, at least 66.8% had cheese, and 75.5% drank tea. 59.8% of adolescents had banana for breakfast and higher consumption of at least 70.3% reported by of children (5-11 years), and adults (20-74 years). Amongst children 5-11 years, cereal/cereal bar consumption was 72.9%, plain milk by 63.3% and chocolate spread by 52.3% were also most reported items for breakfast.

### 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 (%)**

	5-11 years	12-19 years	20-49 years	50-74 years
Bread	95.6	96.6	82.1	71.7
Cereal/Energy Bar	2.9	5.4	2.8	2.3
Rice	40.4	39.3	61.3	61.2
Pasta/Noodles	60.9	46.0	64.0	54.2
Roti/Faratas	45.6	47.0	66.2	61.9
Chips	75.8	63.1	52.7	46.8
Pulses/Soya	43.0	42.5	66.4	70.2
Egg	83.9	82.3	80.3	75.0
Chicken	90.4	93.1	86.2	78.8
Fish/seafoods	77.1	75.2	80.1	77.0
Processed meat/products	81.8	82.7	68.4	50.4
Vegetables/Salad	80.5	84.3	89.2	87.0
Fruit	85.7	71.8	73.6	79.0
Cheese	67.2	61.7	144.0	33.3
Yoghurt/yoghurt products	58.3	34.3	43.5	44.5

Amongst all age groups the most commonly consumed foods at lunch were bread with chicken and vegetables/salad and a fruit for lunch. Participants aged 5 to 11 years reported having bread with chicken/egg/processed meat products and a vegetable/salad: 95.6% ate bread, 90.4% ate chicken, 83.9% had egg, 85.7% ate fruit, 81.8% included processed meat products, and 80.5% ate vegetables/salad. Adolescents aged 12 to 19 years also show the same pattern: 96.6% ate bread, 93.1% had chicken, 82.3% had eggs, 84.3% included vegetables/salad, 82.7% ate processed meat/products, and 71.8% had fruits (Table 27).

Older participants ate bread and also show increasing preference for rice and roti/farata at lunch. It was found that 82.1% participants aged 20-49 years and 71.7% participants aged 50-74 years ate bread while at least 61.0% in each group reported having rice and 'roti/farata' at lunchtime. It was also found that 86.2% of adults 20-49 years ate chicken, 80.3% ate egg, 89.2% included vegetables, and 73.6% ate fruits. Amongst older adults, 78.8% ate chicken, 77.0% ate fish/seafoods, 75.0% ate eggs and 70.2% ate pulses, with 87.0% reporting vegetables consumption and 79.0% had fruits at lunchtime. At least 75% of all participants report fish consumption at least once weekly at lunchtime (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	18.5	7.3	6.1	6.8
4-6 Glasses	53.1	37.7	26.0	29.7
>6 glasses	28.4	54.9	67.8	63.4

Daily water intake was higher amongst older participants: 67.8% participants aged 20-49 years and 63.4% of those aged 50 -74 years reported more than 6 glasses of water intake daily. 53.1% children aged 5-11 years drank around 4- 6 glasses of water and met recommendations. 54.9% adolescents are met daily target of more than 6 glasses of water. 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	65.8	62.9	54.9
3-4 days per week	12.9	11.8	4.0
5 or more days per week	7.1	3.8	2.7
Never	14.2	21.5	38.4

Highest consumption of foods not prepared at home or that were bought from outside once or twice weekly was found to be: 65.8% in adolescents, followed by 62.9% in younger adults and less being reported by older adults at 54.9%. 38.4% 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**

	5-11 years
Never	27.1
1-2 days	59.9
3-4 days	10.9
≥5 days	2.1

59.9% children 5-11 years reported eating food (other than snacks) prepared outside 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	51.3	50.2	57.5	42.7
‘Mine bouillie’	41.9	46.5	55.1	38.5
Fried noodles	49.7	49.8	58.0	38.8
Fried Chicken/Grillade	46.9	44.2	51.3	33.0
Burger/Rounder/Pain Kebab/Pain Fourré	54.2	58.5	56.6	33.9
Dhollpuris/Roti/Farathas	66.1	68.5	69.7	61.0
Halim	31.0	35.4	38.9	25.4
‘Boulette’	41.1	42.5	44.3	27.9

Most popular meals/fast foods bought from outside by at least 61% of all the age groups was ‘dhollpuri/roti/farata’. 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	51.8	49.4	54.1	48.5
Sweets	70.3	60.8	42.0	28.4
Pastry/“gateau patisserie”	65.4	64	66.6	51.0
Yogurt drinks/yogurt/flavored milk	47.7	37.3	56.3	41.5
Sugary drinks	39.3	44.8	47.3	32.4

Consumption of pastry was widely noted across all age groups with at least 51.0% of participants consuming these foods regularly. At least 48.5% participants reported consuming fried foods bought from outside. Comparatively lower consumption of snacks/drinks bought outside was noted amongst older adults aged 50-74 years in each category of foods listed (Table 32).

**Table 33: Percentage of children and adolescents consuming other snacks/foods regularly bought from outside the house**

FOOD ITEM	5-11 years	12-19 years
Boiled Arouille/Maize/Manioc/PatateDouce	17.2	11.3
Peanuts, ‘gramme’, nuts	42.7	32.9
Pudding: Maize/Vermicelli/Manioc	34.9	22.3
Pancakes: sweet or savoury	49.5	36.0
Idli, poutou, ounde	31.0	20.2
Fruits (fresh)	68.2	41.7
Fruits (dried or canned)	34.4	23.7
Biscuits	86.2	67.5
Flavoured milks, Ice cream, Piksidou (with milk)	40.6	44.0
Confit, Salades des fruits/legumes	32.6	37.9
Yogurt , ‘special canteen’	26.0	21.3
Packeted Snacks (sweet/savoury)	70.8	62.7

Concerning other snack items consumed by children and adolescents, it was found that 86.2% children and 67.5% adolescents consumed biscuits, 70.8% children and 62.7% adolescents consumed packeted snacks, and 68.2% children and 41.7% adolescent ate fruits as snacks (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	28.2	41.6
Nearby school	15.2	N/A
Work canteen	N/A	15.0
Restaurants /food courts	N/A	66.5

It was found that 41.6% adolescents reported buying foods from the school canteen compared with 28.2% of younger children. 66.5% 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	16.1
Bread	10.2
Pasta, noodles	71.4
Faratha, dhollpuri	68.2
Pulses/pulse products	46.6
Eggs	62.2
Fish	68.2
Meat	65.6
Processed meat products	60.7
Milk and dairy products	21.6
Other	43.5

On a daily basis, 71.4% children aged 5-11 years reported consuming pasta and noodles, 68.2% ate ‘farata/dhollpuri’, 16.1% reported eating rice and only 10.2% consumed bread. Only 46.6% children consumed pulses daily compared with flesh foods, with at least 60% who reported eating eggs/fish/processed meat products. Only 21.6% reported daily milk/dairy product consumption. (Table 35).

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

Consumption of hot meal	% children
Yes	50.3
No	49.7

Almost equal numbers of children reported eating a hot meal at school: 50.3% compared with 49.7% that did not consume hot meals (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
Hot meal from school	42.5
Home-made hot meal	57.5

57.5% brought their own hot meal from home compared with 42.5% obtained their hot meal for lunch at school (Table 37).

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

Age Group	% positive response
12-19	96.9
20-49	79.3
50-74	55.0

96.9% of participants aged 12-19 years, 79.3% of those aged 20-49 years and 55.0% of those aged 50-74 years brought lunch to school/work (Table 38).

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

Daily fruit consumption	% Children
None	8.1
Half fruit	11.7
One fruit	42.7
Two fruit	30.5
≥ Three fruit	7.0

42.7% children aged 5-11 years ate one fruit daily and 30.5% reported eating 2 fruits daily (Table 39)

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

Daily vegetables consumption	% Children 5-11 years
None	9.6
One vegetable	37.2
Two vegetables	45.6
≥Three vegetables	7.6

45.6% of children aged 5-11 years reported consuming 2 vegetables daily (at lunch and dinner) while 37.2% reported consuming only one vegetable daily, and 9.6% did not consume any vegetables daily (Table 40).

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

Daily milk consumption	Percentage of Children 5-11 years
1 time	42.4
2 times	28.6
3 times	8.9
4 times	7.8
Does not drink milk	12.2

12.2% children aged 5-11 years report they did not consume any milk compared with 42.4% children who consumed milk once daily and 28.6% that consumed milk twice daily (Table 41).

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

	Yes
Plain milk, no added sugar	43.5
Sweetened milk	55.7
Chocolate-flavored milk	57.3
Commercial flavored milk/milkshake/alouda	37.2
Yoghurt/yoghurt drinks	74.2
Soy milk	4.4
Nut-based milk	8.3
Milk-based dessert (la mousse, flan, custard)	56.5
Yoghurt or any milk based smoothies	38.5

74.2% children aged 5-11 years report consuming yoghurt /yoghurt drinks ( $\geq 3$ times per week), 57.3% report consuming chocolate flavored milk, 56.5% report milk-based desserts, such as ‘la mousse’, flan, custard (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	69.8
3-4 days	12.0
5-6 days	1.8
7 days	1.6
Never	14.8

69.8% children aged 5-11 years reported consuming soft drinks/sweetened drinks once or twice weekly (Table 43).

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

This section examined the knowledge and perceptions on nutrition, diet and health, as well as food preparation and cooking practices, and included all 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.

##### **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)	0.0	5.0	9.7	7.9
Weight gain	2.6	2.3	2.0	2.0
Anemia	0.3	0.6	1.1	1.3
Diabetes	0.0	0.8	3.1	16.0
Constipation	0.0	0.6	0.9	3.3

Special diets for diabetes were followed and reported more by those aged 50-74 years (16.0%). Participants also reported following diet for weight reduction: 9.7% of those aged 20-49 years and 7.9% 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>	26.7	36.8	37.3	61.6	48.2
<b>Nutritionist</b>	3.3	2.6	5.9	20.1	12.3
<b>Internet</b>	20.0	26.3	18.6	3.0	12.0
<b>Social Media</b>	16.7	7.9	4.9	4.3	6.0
<b>Paper media</b>	6.7	0.0	2.0	1.8	2.1
<b>Friends/Relatives</b>	6.7	10.5	10.8	4.9	7.5
<b>School</b>	0.0	2.6	1.0	0.0	0.6
<b>Others</b>	20.0	13.2	19.6	4.3	11.4

Health professional were identified as the major source of dietary advice by the participants: 48.2% overall in all age groups and highest in older adults aged 50-74 years at 61.6%. The Internet was a common source of dietary advice in the younger sub-groups: 20.0%, 26.3% and 18.6% in the age groups 5-11 years, 12-19 years and 20-49 years respectively compared with 3.0% in the age group 50-74 years. A higher percentage of 50-74 years (20.1%) received dietary advice from a nutritionist concerning their special diets, compared with 3.3%, 2.6% and 5.9% in the age groups 5-11 years, 12-19 years and 20-49 years respectively (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	62.9	60.3	55.5
Cereal, plain, high fiber ( e.g. oatmeal)	22.1	19.9	22.9
Bread, brown	49.0	45.2	36.3
Whole wheat preparations (e.g. roti/faratha/crepe'/other)	39.8	36.2	34
Yoghurt, plain, non-fat	29.2	27	30.3
Unsalted nuts	36.5	36	39.8
Seeds (chia, flaxseed, sunflower, pumpkin)	56.9	50.2	52.5
Quinoa	82.1	81.0	78.7
Brown rice	86.5	87.9	84.1
Brown pasta	91.5	92.8	93.0
Brown noodles	91.5	94.1	93.8
Local fruits (Papaya, litchi, watermelon, mango, etc.)	1.9	0.5	1.1
Local vegetables (lalo, margoz, bringelle, brede, etc.)	2.3	0.9	0.7

Among healthy foods, brown noodles and pasta, brown rice, quinoa, skimmed milk, brown bread, and seeds were the least popular as reported by participants (Table 46). The main reasons noted were firstly that these foods were not liked by the whole family, secondly that the taste of such foods was not enjoyable, and thirdly due to the cost of these items.

## 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	75.8	80.9	80.5
Braise/roast	23.7	29.7	21.5
Bake/grill/ microwave	48.7	46.2	41.9
Frying/shallow frying	82.7	82.6	77.7
Saute/Stir-fry/'fricassee'	94.2	98.1	97.0



The most common cooking methods used by the participants reported across all age groups was ‘saute/stir/fricassee’: 94.2% in those aged 12-19 years, 98.1% in those aged 20-49 years and 97.0% in those aged 50-74 years; frying/shallow frying: 82.7% in those aged 12-19 years, 82.6% in those aged 20-49 years and 77.7% in those aged 50-74 years; and steam/pressure cook/boil: 75.8% in those aged 12-19 years, 80.9% in those aged 20-49 years and 80.5% in 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	17.1	21.7	23.7
2 ½ - 4	25.8	34.4	28.5

The majority of participants aged 12-74 years reported using an average of 2 ¼ - 4 liters of cooking oil in food preparation by the household on a monthly basis: 25.8% in those aged 12-19 years, 34.4% in 20-49 years and 28.5% in those aged 50-74 years (Table 48a).

##### 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)	69.6
Polyunsaturated Oil (PUFA)	25.4
Monounsaturated oils (MUFA)	18.2

Blended oil was found to be most commonly used by 69.6% of the population. Following legislation regulating the composition of blended oil available on the local market, products in this category 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 (%)**

	12-19	20-49	50-74
≤ ½ pkt	17.9	34.3	41.5
1 pkt	33.3	36.5	33.6
1 ½ - 2 pkt	11.9	13.2	9.8
> 2pkts	3.1	2.9	0.9
Other	0.6	0.5	0.7
Don't know	33.3	12.6	13.6

At least 33% of participants aged 12-74 years reported using 1 packet (500grams) of salt in cooking for the household on a monthly basis, whereas older adults aged 50-74 years reported using ½ packet (250 grams) or less of salt that may reflect their health concerns /status (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	During COVID-19 Lock down	After COVID-19 Lock down
12-19	91.4	43.7
20-49	84.8	43.7
50-74	90.0	33.8

More participants reported changes in eating habits during the COVID-19 lockdowns compared with changes after lockdown: 91.4% participants aged 12 to 19 years, 84.8% participants aged 20 to 49 years and 90.0% of those aged 50 to 74 years. Changes in eating habits after the COVID-19 lockdown were noted more by participants aged 12-49 years: 43.7% compared with 33.8% of those aged 50-74 years (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	27.7	11.7	60.6
20-49	23.3	23.0	53.6
50-74	10.1	18.5	71.4

The total amount of food consumed by the participants because of the pandemic lockdowns appears to have been influenced by age: 27.7% of participants aged 12-19 years reported that they ate more, while 23.0% of participants aged 20-49 years reported eating less and 71.4% of older adults aged 50-74 years reported no change in food consumption. Overall, at least 53.6% reported no change in food consumption (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	20.0	24.4	25.5
Fruits	24.6	32.7	31.3
Pulses and legumes	13.7	17.4	15.9
Fish	26.9	32.3	28.3
Seafoods	32.9	37.5	33.3
Chicken	15.4	24.9	23.9
Meat	20.6	30.6	27.2
Eggs	13.7	21.6	20.2
Rice	7.5	12.8	13.6
Bread	15.4	21.0	21.2
Pasta	15.2	21.3	23.6
Roti	29.8	32.5	29.8
Dhollpuri	47.1	50.2	48.5
Milk	16.5	18.0	18.0
Milk products e.g. Cheese, yogurt	21.3	23.0	23.9
Fast foods/Takeaways	57.9	61.5	57.5
Desserts/Sweets	34.6	42.8	43.6
Salty snacks/Baked products	35.6	41.0	41.1
Water	4.4	6.4	4.3
Soft/sweetened drinks	30.4	42.3	40.8
Fresh juice, 100%, unsweetened	25.4	36.5	36.5
Coffee/tea	9.6	9.4	9.4

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: 57.9% participants aged 12-19

years, 61.5% aged 20-49 years and 57.5% of those aged 50-74 years reported reduced consumption of fast foods. It was also noted that 47.1% participants aged 12-19 years, 50.2% of those aged 20-49 years and 48.5% of those aged 50-74 years reported eating less ‘dhollpuri’, a popular flatbread that is widely available on the island in normal times. Reduced consumption of desserts/sweets was reported by 34.6%, 42.8% and 43.6% of participants aged 12-19 years, 20-49 years and 50-74 years respectively and less of salty snacks and baked products by these age groups: 35.6%, 41.0% and 41.1% respectively. Reduced consumption of soft drink/sweetened drinks was also reported:30.4%, 42.3% and 40.8% by the same age groups. Reductions in consumption of staple foods such as rice, bread, pulses were reported by less than 25.0% of the survey population, and less than one third of the participants noted reduction of foods such as eggs, chicken, fish, meat as well as 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	22.1	24.0	19.7
Fruits	22.7	18.9	15.9
Pulses and legumes	23.3	24.5	20.7
Fish	14.4	15.0	10.7
Seafoods	10.0	11.2	7.2
Chicken	25.0	19.2	12.6
Meat	18.7	14.8	10.0
Eggs	24.4	20.3	14.2
Rice	28.1	23.0	16.3
Bread	26.0	21.9	14.4
Pasta	24.8	20.0	11.6
Roti	24.6	21.3	15.0
Dhollpuri	12.5	10.1	6.6
Milk	21.5	16.9	11.6
Milk products e.g.cheese, yogurt	18.7	15.8	11.2
Fast foods/Takeaways	5.8	4.2	2.3
Desserts/Sweets	18.7	15.0	8.9
Salty snacks/Baked products	20.2	16.2	10.4
Water	41.5	40.9	35.9
Soft/sweetened drinks	20.4	15.7	8.7
Fresh juice, 100%, unsweetened	19.6	16.5	8.0
Coffee/tea	29.4	29.1	20.9

Notably, water consumption was reported to have increased in all the age groups: 41.5% in those aged 12-19 years, 40.9% in those aged 20-49 years, and 35.9% in those aged 50-74 years. Increased consumption of coffee was also noted by 29.4% and 29.1% of those aged 12-19 years and 20-49 years respectively (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 sedentarity, now termed as ‘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	47.6	34.1	38.1	48.1
Female	36.5	16.4	34.4	37.1
Both Sexes	42.4	25.2	35.8	42.3

Survey findings showed that 42.4% of the younger participants aged 5-11 years and 42.3% of the older participants aged 50 -74 years met the standards of physical activity as recommended for health and wellness with 25.2% adolescents and 35.8% younger adults lagging behind (Table 54a) in all age groups lower percentage of girls and women were less active.

## 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	1.8	2.3	2.2	2.0
Female	1.7	2.2	1.9	2.0
Both Sexes	1.8	2.3	2.0	2.0

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: 2.3 hours by adolescents, 2 hours by adults and 1.8 hours by children. 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 self-reported levels of occupational physical activity**

	18-49 years	50-74 years	All ages (18-74 years)
Sedentary	23.3	20.2	22.3
Lightly active	36.3	40.8	37.7
Moderately active	28.8	29.2	28.9
Vigorously active	11.6	9.7	11.0

Participants who attended work reported on their occupational physical activity: 37.7% of respondents 18 years and older described their work as lightly active, 28.9% said they were moderately active and only 11.0% describing their work as vigorously active. Sedentary occupational activity was found to be almost similar across both age groups: 23.3% amongst 18- 49 years old participants and 20.2% amongst those aged 50 -74 years (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 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
<b>Grains (inclusive white roots and tubers, and starchy vegetables) of which</b>				
<i>Rice, plain, cooked</i>	97.1	76.4	23.1	0.4
<i>Bread white</i>	93.1	84.5	15.2	0.3
<i>Bread, brown</i>	22.1	47.0	44.2	8.8
<i>Oats</i>	32.2	42.5	41.2	16.4
<i>'weetabix'</i>	31.6	24.1	63.3	12.5
<i>Pasta</i>	74.7	0.4	36.9	62.7
<i>Roti / farata , white</i>	74.4	5.2	57.1	37.7
<i>Dhollpuri</i>	61.9	1.3	45.6	53.0
<i>Potatoes</i>	98.0	5.3	83.3	11.4
<i>Other white tubers</i>	39.9	0.0	20.6	79.4
<i>Corn</i>	43.5	1.2	30.6	68.2



Rice is most commonly consumed on a daily basis by 97.1% of the population, followed by white bread consumed by 93.1% of the population. Farata/roti and pasta are popular with at least 74% of the population aged 12-74 years. While roti/farata are consumed on a weekly basis by 57.1% of the population, and pasta is consumed more on a monthly basis by 62.7% of the population. Amongst starchy vegetables potatoes are most popular with 98% reporting consumption, of which 83.3% consumed this item on a weekly basis and daily mean capita was found to be 36.9 grams. Oats are consumed by at least 30.0% of the population on a daily and weekly basis, whereas wheat biscuits ('weetabix') is consumed by 31.6% of the participants with 63.3% consuming this food on a weekly basis. (Table 56a).

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

		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)
<b>Grains and products, white roots and tubers and starchy vegetables (cooked), of which</b>	..	954.1	988.8	806.8	917.8
<i>Grains and products only (excluding starchy vegetables)</i>	..	882.8	915.4	756.5	852.7
<i>Rice, plain, cooked</i>	97.1	444.5	480.4	429	452.4
<i>Bread, white</i>	93.1	126.6	127.5	113.5	122.8
<i>Farata/roti, white</i>	74.4	41.2	36.6	28.4	35.8
<i>Pasta</i>	74.7	41.7	34.2	21.7	33.1
<i>Noodles, fried</i>	78.3	12	11.9	8.7	11.1
<i>Noodles, boiled</i>	71.5	18.1	13.2	11.9	14.6
<i>Dhollpuri</i>	61.9	45.9	43.7	28.8	40
<i>Potatoes</i>	98	42.1	38.7	30.1	36.9
<i>Oats</i>	32.2	33.8	44.9	52.6	46
<i>Weetabix</i>	31.6	11.8	9.7	12.8	11.4

Daily mean capita of overall of all starchy foods was 917.8 grams compared with 852.7 grams for grains and grain products only, that is, excluding potatoes and other starchy vegetables. Daily mean per capita of plain cooked rice was 452.4 grams, and white bread had a daily mean per capita of 122.8 grams. Daily mean per capita of 'farata /roti' was 35.8grams and that of pasta was 33.1grams. Amongst starchy vegetables, daily mean capita for potato consumption was found to be 36.9 grams. The daily mean capita for oats and wheat biscuits was reported as 46 grams and 11.4 grams respectively (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 fiber 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>	97.0	16.4	79.8	3.9
<i>Soya beans ('soya')</i>	51.2	0.6	60.1	39.3
<i>Tofu /teokon</i>	35.7	0.00	47.0	53.0
<i>Preserved /processed soya products</i>	13.3	3.1	58.0	38.9

Pulses and legumes (such as lentils, white/red beans and other varieties) were consumed by 97% of the population of which 79.8% consumed these items on a weekly basis. Soya and tofu consumption was reported by 51.2% and 35.7% of the survey participants. While soya was consumed on a weekly basis by 60.1% of the population, 53.0% consumed teokon/tofu on a monthly basis. Only 13.3% consumed preserved/processed products, of which 58% consumed these items on a weekly basis (Tables 57a)

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

Food items	% Respondents consuming	12-19 years	20-49 years	50-74 years	12-74 years
		Mean per capita (g)	Mean per capita (g)	Mean per capita (g)	Mean per capita (g)
<b>Pulses, including soya, teokon &amp; products, of which</b>	..	132	124	87.8	114.5
<i>Pulses</i>	97	120	113.7	82.5	105.2
<i>Soya</i>	51.2	7.3	5.6	5.6	6.1
<i>Tofu/teokon</i>	35.7	6.5	5.6	5.7	5.9

Pulses and pulse products (such as soya, tofu/teokon, and preserved /processed products) were consumed at a daily mean per capita of 114.5 grams (Tables 57b), with pulses being the most consumed at 105.2grams per capita.

**6.7.3 Nuts and seeds** are a valuable source of plant protein as well healthy fats and dietary fiber in the diet, especially for those whose dietary habits are vegan and vegetarian.

**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>	48.0	17.2	53.4	29.4
<i>Peanuts, salted/unsalted</i>	62.2	3.3	49.2	47.5
<i>Seeds</i>	19.9	23.5	42.9	33.7
<i>Quinoa</i>	2.8	3.6	32.1	64.3

Nuts (all varieties) were consumed by 48% with a weekly consumption noted by 53.4% of participants. Peanuts, especially were popular in this category, and were consumed by 62.2% participants. Peanuts were consumed more on a weekly and monthly basis by at least 47.5% of the population. Seeds such as pumpkin/sunflower / others were consumed by 19.9%, with 42.9% reporting weekly consumption (Table 58a)

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

Food items	% Respondents consuming	Mean per capita (g)	Mean per capita (g)	Mean per capita (g)	Mean per capita (g)
<i>Nuts &amp; seeds, of which</i>	..	7.9	10.1	8.8	9
<i>Nuts</i>	48	6.8	9.2	7.5	7.9
<i>Peanuts</i>	62.2	2.3	2.4	2.6	2.4
<i>Seeds</i>	19.9	3.6	7	6.2	6

Nuts (all varieties) are consumed at a daily mean per capita of 7.9 grams with peanut consumption at a daily mean per capita of 2.4 grams. Seeds such as pumpkin/sunflower / others consumption was at a daily mean per capita of 6.0 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).

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

Food items	% Respondent consuming	% Frequency of consumption (among respondents who consumed)		
		Daily	Weekly	Monthly
<b>Milk and Dairy, of which</b>				
<i>Cow's milk liquid</i>	22.7	49.3	37.7	13
<i>Cow's milk powder</i>	74.1	82.3	15.8	1.9
<i>Other milk</i>	4.4	31.4	34.3	34.3
<i>Cheese</i>	83.6	29	61.7	9.2
<i>Yoghurt, plain</i>	16.8	10.3	69.1	20.6

Cow's milk powder was more commonly reported by 74.1% of the survey population of which 82.3% consumed it on a daily basis compared with liquid milk. Among milk products, cheese was also widely consumed by 83.6% of the population, of which 61.7% consumed this item on a weekly basis. Although only consumed by 16.8% of the survey population, plain yoghurt was reported by 69.1% of the population on a weekly 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>	74.1	15.9	16.3	17.3	16.5
<i>Cheese</i>	83.6	16.3	15.5	10.5	14.3
<i>Cow's Milk, liquid*</i>	22.7	220.3	199.6	171.1	199.3
<i>Yoghurt, plain</i>	16.8	37.8	39.3	44.3	41.7

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

Cow's milk powder consumption was reported at a daily mean per capita of 16.5 grams compared with liquid cow's milk at 220.3 milliliters. Cheese was found to be consumed at a daily mean capita of 14.3 grams. Plain yoghurt consumption was found to have a daily mean capita of 41.7 grams (Table 59b).

**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
<b>Meat, fish &amp; seafood, poultry, organs meats, preserved meat &amp; products, of which</b>				
<i>Fish, fresh/frozen</i>	87.2	1.5	66.7	31.8
<i>Fish, salted/smoked</i>	59.1	0.2	45.9	54
<i>Fish, canned</i>	57.5	1.1	53.5	45.4
<i>Seafood, fresh/frozen</i>	53.3	0.8	26	73.3
<i>Lamb/mutton</i>	40.8	0.0	28.4	71.6
<i>Venison</i>	13.9	0.0	11.7	88.3
<i>Poultry or white meat</i>	91.6	3.9	87.0	9.1
<i>Preserved/processed meat/chicken products</i>	55.2	2.4	72.0	25.6
<i>Offal</i>	31.2	0.0	32.2	67.8

Poultry consumption was reported by 91.6% of the survey population aged 12-74 years, of which 87% consumed this white meat on a weekly basis. Fresh/frozen fish consumption was reported by 87.2% of the population aged 12- 74 years, of which 66.7% consumed this food on a weekly basis. Preserved /processed meat/poultry products was consumed by 55.2% of the population, of which 72% reported consuming these foods on a weekly basis. Red meats such as lamb/mutton and fresh/frozen seafood were reported as being consumed by at least 40.8% of the population, of which at least 71.6% reported consuming these on a monthly basis (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>	..	100.2	97.1	67.4	88.4
<i>Fish fresh frozen</i>	87.2	23	33.7	30.6	29.6
<i>Fish salted /smoked</i>	59.1	4.9	4.8	4	4.6
<i>Fish, canned</i>	57.5	5.7	5.3	3.8	5
<i>Seafood fresh/frozen</i>	53.3	5	4.8	4.2	4.7
<i>Lamb/mutton</i>	40.8	3.2	3.6	2.2	3.1
<i>Goat/Venison</i>	13.9	6.7	4.7	4.7	5.3
<i>Poultry or white meat</i>	91.6	35.2	32	24.7	30.8
<i>Beef</i>	47.1	8.2	7.5	5.5	7.1
<i>Pork</i>	15.7	5.6	3.3	3.7	4
<i>Preserved/processed meat/chicken products</i>	55.2	23.6	15.5	7.8	18.1
<i>Offal</i>	31.2	12.6	9	8.3	9.9
<i>Fish preserved /processed products</i>	23.9	9.9	6.9	4.2	7.8
<i>Seafood, processed</i>	17.1	7	4.1	2	5

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 88.4 grams as reported by the survey population aged 12-74 years. The highest consumption of 100.2 grams was noted amongst adolescents aged 12-19 years. The daily mean per capita of poultry or white meat consumed was 30.8 grams, of fresh /frozen fish was 29.6 grams and of preserved meat/chicken products to be 18.1 grams (Table 60b).

**6.7.6 Egg** is a valuable source of high biological value protein as well as various micro-nutrients such as Vitamin A 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>	75.8	1.5	80.7	17.8
<i>Egg boiled</i>	56.8	1.4	67.3	31.3
<i>Egg omelet</i>	50.5	1.6	78.9	19.5

Of those participants who reported egg consumption, 80.7% enjoyed fried eggs and 78.9% reported eating egg ‘omelet’ on a weekly basis (Table 61a).

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

Food items	% Respondents consuming	12-19 years	20-49 years	50-74 years	12-74 years
		Mean per capita (g)	Mean per capita (g)	Mean per capita (g)	Mean per capita (g)
<i>Eggs, of which</i>	..	32.8	30.1	21.1	28.2
<i>Eggs, fried</i>	75.8	18.2	15.7	12.4	15.6
<i>Egg, boiled</i>	56.8	12.5	13	9.2	11.8
<i>Egg, omelet</i>	50.5	14.7	12.6	12.3	13.3

Daily mean per capita was found to be 28.2 grams (Table 61b). Due to high cholesterol content of egg, healthy populations are advised to limit egg consumption to around 3 units per week.

**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>	96.1	21	74.3	4.7
<i>Red/ orange/yellow vegetables</i>	90.8	7.4	78.9	13.7
<i>Salads, raw</i>	94.7	28.4	67.2	4.4
<i>Other vegetables, cooked</i>	95.7	53.4	44.4	2.2

At least 90.8% of the survey population reported consuming various varieties of vegetables overall, with ‘other vegetables’ (such as gourds/aubergines /okra etc.) being consumed on a daily basis by 53.4% of respondents. At least 90.8% reported consuming all categories of vegetables. Survey respondents reported consuming red/orange and yellow vegetables, dark green leafy vegetables and raw salads more often on a weekly basis: 78.9%, 74.3%, and 67.2% respectively (Table 62a).

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

Food items	% Respondents consuming	12-19 years	20-49 years	50-74 years	12-74 years
		Mean per capita (g)	Mean per capita (g)	Mean per capita (g)	Mean per capita (g)
<i>Vegetables, total of which</i>	..	72.9	82.4	75.6	77.2
<i>Dark green leafy vegetables</i>	96.1	21.8	20.4	20.2	20.8
<i>Red/ Yellow /orange vegetables</i>	90.8	25.3	24.1	19.7	23
<i>Other vegetables, cooked</i>	95.7	20.7	24.1	23.8	23
<i>Salads, raw</i>	94.7	12.7	16.4	14.7	14.7



The daily mean per capita of all varieties of vegetable was found to be 77.2 grams, with an average of around 20 grams for different categories of cooked vegetables compared with 14.7 grams noted for raw salad vegetables (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, and both soluble/insoluble dietary fibers 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>	71.3	22.6	55.4	21.9
<i>Other fresh fruit</i>	94.5	45.4	48.7	5.9
<i>Dried fruit</i>	43.5	13.1	55.8	31.1

94.5% of survey population reported consumption of ‘other fruit’, of which at least 45% enjoyed apples/oranges/pears/nectarines/ similar fruits on a daily and weekly basis and 71.3% reported consuming yellow /orange fruit such as mango/papaya/apricot of which 55.4% consumed these fruit more on a weekly basis (Table 63a).

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

Food items	% Respondents consuming	12-19 years	20-49 years	50-74 years	12-74 years
		Mean per capita (g)	Mean per capita (g)	Mean per capita (g)	Mean per capita (g)
<i>Fruits, of which</i>	..	106.8	129.7	142.8	127.2
<i>Fruits (fresh+yellow/orange/red)</i>		105.4	128.4	140.8	125.7
<i>Other fruit, fresh</i>	94.5	66.5	72.9	83.5	74.5
<i>Yellow/orange/red fruit</i>	71.3	57.8	77.1	76.3	71.3
<i>Dried fruit</i>	43.5	3.5	5	5.1	4.6
<i>Fruits, canned</i>	13.1	9.2	4.4	6.6	6.9

Daily mean per capita of fruit intake was found to be 127.2 grams which may be the equivalent of a large unit of fruit or portion of fruit. The daily 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)
Vegetables and fruits	172.9	205.2	214.2	198.2

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 198.2 grams, that represents approximately 50% of the recommended daily intake (Table 63c).

**6.7.10 Fats and Oils** are found in foods as well as added during food preparation. 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 quality and quantity of total daily intake of fats and oils 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>	75.4	68.2	29	2.8
<i>Butter</i>	11.1	60.6	35.8	3.7
<i>Spread</i>	2.9	62.1	27.6	10.3
<i>Ghee</i>	19.9	0.5	16.8	82.7
<i>Cream</i>	8	1.3	25.3	73.4
<i>Oil, palm blend</i>	69.6	96.8	2.5	0.7
<i>Oil, PUFA</i>	25.4	95.6	3.6	0.8
<i>Oil, MUFA</i>	18.2	54.7	43.6	1.7

Margarine and blended oil were most commonly used by the survey population on a daily basis: 75.4% of the survey population consumed margarine of which 68.2% used it on daily basis.

Blended oil was consumed by 69.6% of the population of which 96.8% reported using same on daily basis; while 25.4% reported using polyunsaturated oils (PUFA) with 95.6% using same on a daily basis (Table 64a).

**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)
<b>Fats and Oils, of which</b>	..	<b>19.2</b>	<b>18.2</b>	<b>17.5</b>	<b>18.3</b>
<i>Margarine</i>	75.4	7.3	5.5	5.6	6.1
<i>Oil, palm blend</i>	69.6	11.1	12.3	12.6	12
<i>Oil, PUFA</i>	25.4	13	12.5	9.6	11.6
<i>Oil, MUFA</i>	18.2	6.2	6.6	4.8	5.8
<i>Oil, (all types)</i>	..	12.4	13.1	12.6	12.7

The daily mean per capita of total consumption of fats and oils added in food preparation was found to be 18.3grams, that is approximately 1½-2tablespoons. Daily mean capita of margarine was found to be 6.1 grams or about a teaspoon, whilst blended oil had a daily per capita of 12.0 grams and polyunsaturated oils (PUFA) was found to be almost similar at 11.6grams 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 and trans fats, sugars and/or sodium increasing risks for overweight/hypertension/dyslipidemias/hyperglycemia. Consumption frequency of diverse 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
<b>Snacks &amp; Fast Food, of which</b>				
<i>Snacks /Fried foods, salty</i>	66.5	3.1	61.0	35.9
<i>Snacks /Fried foods, sweet</i>	36.1	1.7	43.7	54.6
<i>Pastry, sweets</i>	59.5	1.7	49.7	48.5
<i>Pizza</i>	60.8	0.3	15.7	83.9
<i>Shawarma</i>	32.6	0.3	21.8	77.9
<i>Burger</i>	46.4	0.9	50.1	49.0
<i>Ice cream, scoop</i>	41.9	1.0	27.9	71.1
<i>Soft drinks</i>	71.6	7.1	63.4	29.5
<i>Sugar in Tea/coffee/cereal/juice</i>	59.8	85	12.8	2.2
<i>Pastry, savory</i>	28.5	0.4	46.1	53.6
<i>Sweetened drinks</i>	27.2	11.9	56.3	31.7
<i>Sports drink/energy drinks</i>	19.5	3.6	50.0	46.4
<i>Chocolate</i>	50.9	6.2	55.7	38.1

Soft drink consumption was reported by 71.6% of the population, with 63.4% consuming these on a weekly basis; 66.5% of the population aged 12- 74 years consumed fried snacks, of which 61% reported weekly consumption; 60.8% consumed pizza, of which 83.9% enjoyed these on a monthly basis; and 59.5% reported enjoying sweet pastry, of which at least 48.5% consumed these items on weekly or monthly 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>	70.2	12.7	10.4	8.2	10.4
<i>Snacks/fried foods, salty</i>	66.5	20.8	15.9	11.8	16.3
<i>Pizza</i>	60.8	17.4	10.9	8.8	13.1
<i>Pastries, sweet</i>	59.5	15.2	13.5	10.5	13.4
<i>Boulette</i>	51.8	10.2	11.9	8.8	10.6
<i>Biscuits, sweet</i>	51.2	11.3	9.5	5.5	9.6
<i>Soft drinks*</i>	71.6	100.8	163.2	69	115.9
<i>Yoghurt, sweetened</i>	55.4	38	41.7	39.6	39.7
<i>Flavored milk*</i>	38	57.6	51.1	43.2	52.7
<i>Sweetened drinks*</i>	27.2	115.3	121.2	61	107.8

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

The daily mean per capita was found to be 213.1 grams for fast foods, snacks and beverages related to increased risk of NCD's. Soft drinks were consumed at daily mean capita of 115.9 grams by 71.6% of participants. 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, depending on the preparation style and added ingredients, or may contain alcohol detrimental to health.

**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>	17.8	58.9	35.4	5.7
<i>Tea/coffee with milk</i>	82.4	84.5	13.3	2.2
<i>Tea/coffee, with creamer</i>	2.2	59.1	27.3	13.6
<i>Juice, fresh/ 100%, no sugar added</i>	47.5	9.6	66.8	23.6

Fresh juice, 100% and without added sugar was consumed by 47.5%, of which 66.8% reported having these drinks on a weekly basis. Plain tea/coffee was consumed by 17.8% of those surveyed of which 58.9% reported daily consumption and 35.4% had these drinks on a weekly basis (Table 66a).

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

		12-19 years	20-49 years	50-74 years	12-74 years
Food items	% respondents consuming	Mean per capita (ml)	Mean per capita (ml)	Mean per capita (ml)	Mean per capita (ml)
Beverages, other	..	392.2	503.5	491.8	465
<i>Of which</i>					
<i>Juice, fresh/ 100%/ no sugar</i>	47.5	95.4	101.2	61.1	89
<i>Tea/coffee , plain</i>	17.8	232.2	281.8	368.5	301.9
<i>Other milks, (soya, almond..)</i>	4.4	98.9	184.6	358.9	212.5

Daily mean per capita for plain tea/coffee was found to be 301.9mls or more than a cup, and other milks such as soya milk was also reported at a daily mean per capita of 212.5mls (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 to 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 years	3393.5	459.1	93.4	112.0	113.9	39.8	34.4	21.7
20-49 years	3321.7	455.4	91.5	109.9	108.1	37.2	32.3	21.5
50-74 years	2562.0	358.0	66.8	83.8	81.9	28.9	24.3	16.1
12-74 years	<b>3092.1</b>	<b>424.3</b>	<b>83.9</b>	<b>101.9</b>	<b>101.2</b>	<b>35.2</b>	<b>30.3</b>	<b>19.8</b>
Dietary Contribution		55% of total E (3092.1kcal)	11%* of total E <i>*see also Table 69c</i>	13.2% of total E	29.5% of total E	10% of total E	8.8% of total E	5.76% 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%	By difference	6-10%

The findings showed that the average daily dietary energy per capita by the Mauritian population aged 12-74 years was 3092.1 kilocalories. Adolescents aged 12-19 years showed highest mean per capita of energy at 3393.5 kcals compared with older adults aged 50-74 years at 2562 kcals (Table 67a).

The average energy consumption showed positive or negative variation from the recommended intakes within categorized age groups. As for example, the energy requirements of older adolescents aged 16-19 years who are engaged in moderate to high level of physical activity are greater than those aged 12-15 years; whereas requirements are reduced with increasing age for participants aged 50-74 years and for females in all age groups (see Annex L).

Where an excess energy consumption results in weight gain and is associated with health problems, the converse is also true: inadequate energy consumption leads to underweight and health problems over time. It is useful to consider the significant contribution of fast foods and snacks with respect to energy intakes as noted later (see 6.7.13.9) in this report.

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 China (3206 kcals), New Zealand (3191kcals), Sweden (3184 kcals), Iran (3087 kcals), and India (2533 kcals).

**6.7.13.2 Carbohydrates** average daily consumption per capita of carbohydrates was found to be 424 grams for participants aged 12-74 years. Adolescents and younger adults consumed more carbohydrates than older participants. Overall, carbohydrate consumption appears to meet the WHO recommended intake of 55 -75% of total energy from complex carbohydrates at this level of energy consumption (Table 67a). It must also be noted that energy is supplied by dietary proteins and fats consumed by individuals. It is evident that intake of individual nutrients is also raised where energy consumption is in excess of requirements. In the case of carbohydrates, excess intakes may be reflected in increased blood sugar levels in the long term especially in elevated HbA1c. Both carbohydrate quality and quantity influence blood glycaemia.

Dietary sugars are classified as simple carbohydrates and findings in (Table 67a) reflect total intakes of present naturally in food and drinks as well as sugar added in food/drink preparations.

**6.7.13.3 Protein** the average daily consumption per capita of protein was noted to be 101.9 grams or 13.2% of total energy intake. Adolescents consumed the maximum amount of protein at 112.0 grams and the least amount consumed was 83.8 grams in older adults 50-74 years. Protein consumption is found to be in the recommended 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 101.2 grams or 29.5% 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 81.9 grams compared with 113.9 grams consumed by the adolescents in the survey (Table 67a). The WHO recommends 15-30% of total energy from dietary fat. Daily per capita of saturated fats was 35.2 grams (10%), of polyunsaturated fats was 19.8 grams (5.76%) and of monounsaturated fats 30.3 grams (8.8%) as noted in (Table 67a).



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

Age years	Dietary Fiber (g)	Dietary Cholesterol (mg)	Dietary Sodium (mg)
12-19	25.4	362.9	3288.6
20-49	25.4	373.3	3202.3
50-74	20.7	238.6	2373.8
12-74	<b>23.8</b>	<b>325.5</b>	<b>2954.4</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 23.8 grams, slightly lower than the WHO recommended amounts. Participants aged 12-49 years were consuming 25.4 grams compared with lower intake of 20.7 grams noted amongst older adults aged 50 years and above, which reflects the dietary quality in terms of dietary fiber (Table 67b).

**6.7.13.6 Dietary cholesterol** the average daily consumption per capita was found to be 325.5 mg, higher intake amongst participants aged 12-49 years at 362.9–373.3 mg which is above the recommended limit. Amongst those aged 50-74 years consumption was at 238.6 mg conforming to recommendations (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 2954.4 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 3288.6 mg of sodium among adolescents, 3202.3 mgs in younger adults at and 2373.8 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	48.3
20-49	44.4
50-74	23.8
12-74	<b>38.8</b>
Dietary contribution	<b>5.02%</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. Adolescents showed highest consumption of added sugars at 48.3 grams and older adults above 50 years showed least consumption at 23.8 grams. Consumption of added sugar across all age groups was found to be 5%, and within WHO recommended limits (Table 67c).

**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 fiber (g)	Cholesterol (mg)	Sodium (g)	Alcohol (g)
12-19	473.4	9.3	18.1	7.4	68.4	2.3	83.9	498.7	0.3
20-49	393.6	7.5	13.8	5.5	56.4	1.6	113.0	479.1	2.3
50-74	197.9	3.8	7.4	2.9	27.7	0.9	65.5	250.4	0.9
12-74	353.4	6.8	13.0	5.2	50.6	1.6	88.3	409.3	1.6

**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 350 kilocalories were consumed by all survey participants aged 12-74 years, through the intake of such foods, snacks and drinks, with highest intake noted amongst adolescents, and by adults aged 20-49 years and less notable amongst older adults aged 50 years and above.

Average daily consumption per capita of fat intake from these foods was also found to be higher: that is the equivalent of at least 1 tablespoon of fat for all age groups and at least half of these

were saturated fats adverse to health. 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.

Also, to be noted are the significant contributions of dietary cholesterol and sodium from consumption of these foods. It is clear that 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 and inadequacies of micro-nutrients in the diet, especially in vulnerable population sub-groups: children, adolescent girls and women, and older adults (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	19.3
≥5	80.7

The findings show that 80.7% 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: Percentage of food groups consumption score by Women**

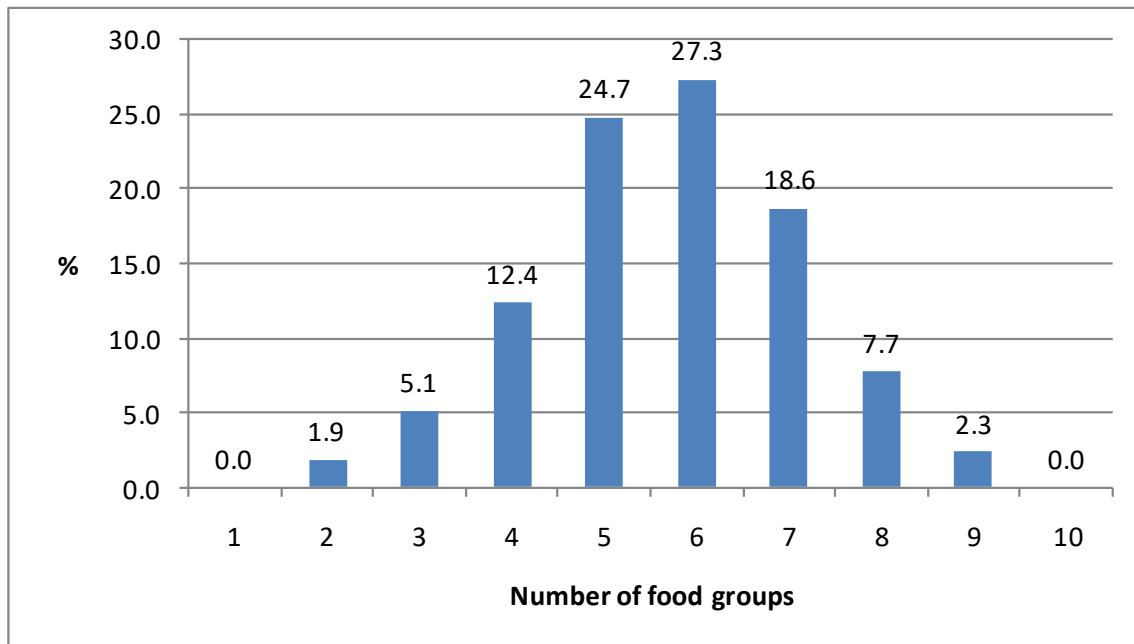
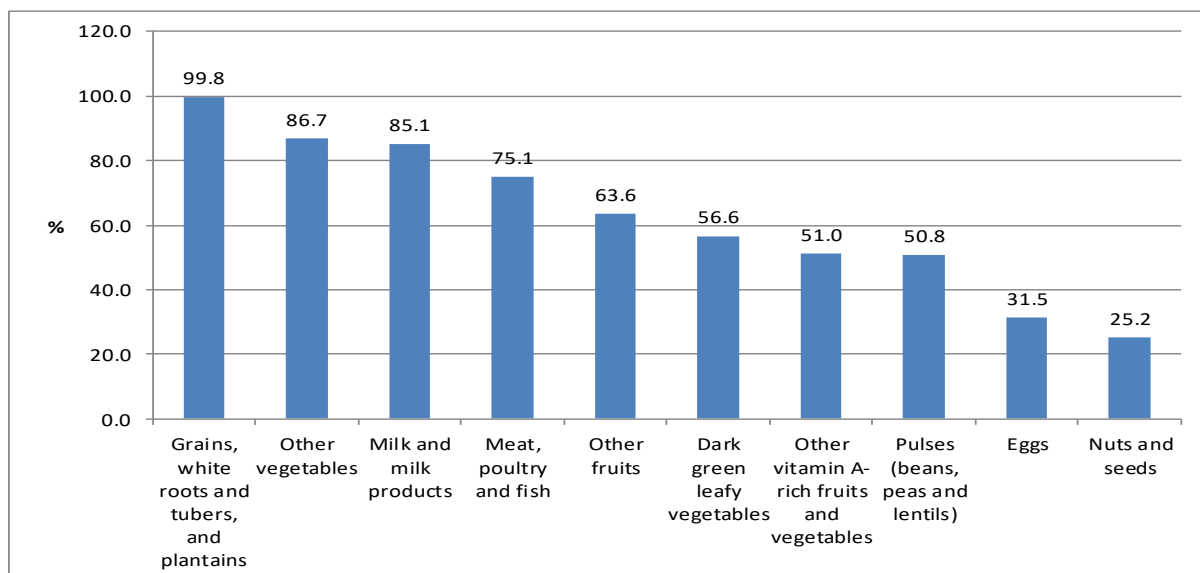


Figure 1 shows that while 24.7% WRA reported consuming the minimum 5 food groups out of ten as recommended for achieving dietary adequacy, 27.3% of women reported consuming 6 food groups, 18.6% consumed 7 food groups, 7.7% consumed 8 food groups, and 2.3% consumed 9 food groups over the preceding 24 hours.

**Figure 2: Percentage consumption by food groups**



The findings also show the most consumed food groups reported by these respondents included: 99.8% selected foods from the group ‘grains, white roots and tubers’, 86.7% had consumed ‘other vegetables’, and 85.1% had consumed ‘milk and milk products’ (Figure 2).

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

Food Items	%
<i>Rice, couscous, pasta, noodles</i>	84.1
<i>Beetroot, cabbage, tomato, cucumbers, onion, radish</i>	81.1
<i>Milk (Dairy)</i>	75.8
<i>Oats, Weetabix, Nestum, Branflakes, Muesli, Granola, Cococrunch, Honey stars</i>	65.5
<i>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</i>	63.6
<i>Spinach, kale, brede, watercress, broccoli, dark green lettuce</i>	56.6
<i>Dairy products such as cheese, unsweetened yoghurt/yoghurt drink, paneer, laitcaillé</i>	51.7
<i>Haricot rouge/blanc, Gros pois, Dholl, lentils, teokon, soya</i>	50.8
<i>Cauliflower, courgette, eggplant, mushroom, green beans, chouchou, green pepper, okra (lalo)</i>	47.1
<i>Potatoes, arouille, manioc, patate, green bananas, 'Fruit a pain', Jackfruit (green)</i>	46.4
<i>Chicken, Duck</i>	46.2
<i>Pumpkin, carrots, red pepper, patisson</i>	44.1
<i>Eggs (chicken or any bird)</i>	31.5
<i>Sausage, bacon, macon, salami, jambon, corned mutton/poule/beef, luncheon meat, burger, nuggets</i>	25.4
<i>Octopus, fish, shrimp, crab, prawn, calamari</i>	23.1
<i>Peanut, almond, cashew nut, walnut, pistachio</i>	20.3
<i>Beef, lamb, pork, cerf, bouc, lapin/lièvre</i>	20.3
<i>Food made from any wheat flour: Bread, Roti, DhollPuri, Puri, Wraps, Pizza, Pita, Panini, Crepes, Pancakes</i>	20.0
<i>Ripe papaya, apricot, ripe passion fruit, ripe mango</i>	13.3
<i>Melon seeds, pumpkin seeds, chia seeds, sunflower seeds, flaxseeds</i>	8.6
<i>Liver, kidney (zézé)</i>	7.5

The most popular foods consumed by the women were starchy foods such as rice, pasta, noodles at 84.1%. Consumption of other vegetables such as beetroot, cabbage, tomatoes, cucumber, radish, onion was reported by 81.1%. 75.8% consumed milk, 63.6% ate other fruits such as apple, avocado, banana, pineapple, 56.6% ate dark green leafy vegetables, 51.7% had milk products such as cheese and yoghurt and 50.8% consumed pulses. Concerning vitamin A rich vegetables and fruit, 44.1% women consumed vegetables such as pumpkin/carrots compared to 13.3% that consumed fruit such as papaya/mango. Only 20.0% reported foods made from any wheat flour such as bread, 'roti, dhollpuri, puri', wraps, pizza, pita, panini, crepes, pancakes. Organ meats such as liver were least consumed with 7.5% reporting same (Table 69).

## 7. CONCLUSION

The National Nutrition Survey 2022 has provided a clearer understanding of the typical dietary practices, food choices and eating habits of the Mauritian population and their impacts on the nutritional and health status of the average child, adolescent and adult aged 5-74 years.

The population at large is consuming an adequate diet. However, in line with global trends, the nutrition paradigm has continued with consumption of imbalanced and poor quality diets based on energy dense and nutrient poor foods. Consequently, different forms of malnutrition are observed such as underweight, overweight, obesity, and micro-nutrient imbalances reflected by anemia, low levels of serum ferritin, vitamin B12, folate and vitamin D in some sub-groups of the survey population. This is known as 'hidden hunger'.

It is highly imperative that the gap between nutrition knowledge, dietary behavior and practices be addressed by effective policy, and intervention programs that encourage consumption of high quality nutritious diets by the Mauritian population.

## 8. RECOMMENDATIONS

The findings of the Mauritius Nutrition Survey 2022, as well as those of other surveys that have been recently conducted, such as the Mauritius NCD SURVEY 2021, will be used to update and formulate the National Plan of Action for Nutrition 2023-2028. The forthcoming NPAN will propose strategies targeting eating habits and diet related behaviors of the Mauritian population to promote good nutritional status and well-being of the different population sub-groups. Additionally, Action plans on obesity and physical activity must also be produced or updated that reinforce health policy and programs.

For instance strategies may include inter alia the development of food based dietary guidelines using a life cycle approach, population awareness campaigns to increase vegetable and fruit consumption, enforcement of the Food Regulations, expanded food fortification program, introduction of the school based Weekly Iron and Folic acid Supplementation (WIFS) program for adolescent girls, encourage reformulation of products by the food industry with respect to salt/sugar/ trans-fat and total fat content as well as fortification with micro-nutrients, strengthening the School Canteen Program with increased enforcement, increase access to School Meal Program with a view to addressing micro-nutrient deficiency, intensify nutrition education and health promotion with targeted activities for population sub-groups including vulnerable groups, update nutrition education and information materials, produce preparedness plans on nutrition to respond to emergencies such as cyclones and pandemics, strengthen nutrition components of the adolescent health program, development of user friendly nutrition signaling /labelling, maximize use of digital technologies to motivate behavior change practices on nutrition matters in target groups with IT literacy, strengthen counselling skills of health professionals on nutrition matters, and so on.

Supportive environments that facilitate lifestyle behavior choices everywhere include strategies such as work place and institutional health breaks, healthy canteens, and physical activity facilities. It is well recognized that diet and physical activity together form the basis of prevention overweight, obesity, and of a raft of NCD's and related co-morbidities. Physical activity practices amongst the population have continued to improve from previous surveys and must be strengthened further by improved infrastructures, urban planning, increased access and facilities such as health tracks and structured exercise programs.

Effective interventions may be scaled up/re-engineered and program delivery enhanced to prevent / manage the problem of non-communicable diseases, their risk factors and other diet related health conditions such as weight management, hyperlipidemias and anemia amongst others. A coordinated approach using multi-disciplinary and multi-sectoral expertise at national level may strengthen these efforts.

Studies and surveys such as the Salt Intake Study may be undertaken to improve and sustain focus and delivery of on-going public health measures. Further research to study micro-nutrient deficiency and the factors influencing population status, including dietary behavior, is essential for appropriate response with policy and public health interventions. Capacity building and training are essential to achieve effective efficient program delivery meeting global targets on diet, nutrition and health.



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25. A Brief Note on Nutrient Requirements for Indians, the Recommended Dietary Allowances (RDA) and the Estimated Average Requirements (EAR), ICMR - NIN, 2020

## **10. ANNEXES**

Annex 1: Consent Form

Annex 2: Cutoff 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

### MAURITIUS NUTRITION SURVEY 2022

### 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 Mauritius Nutrition Survey 2022 which is being undertaken by the Ministry of Health & Wellness in collaboration with Monash University, Melbourne, Australia; University of Helsinki, Finland; Umea University Hospital, Sweden; Baker Heart and Diabetes Institute, Australia; 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 unauthorized 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 authorized 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**

**MAURITIUS NUTRITION SURVEY 2022**

**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 Mauritius Nutrition Survey 2022 which is being undertaken by the Ministry of Health and Wellness in collaboration with Monash University, Melbourne, Australia; University of Helsinki, Finland; Umea University Hospital, Sweden; Baker Heart and Diabetes Institute, Australia; 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 unauthorized 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 authorized 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
Underweight	<18.5	<18.5
Normal	18.5 – 24.9	18.5 – 22.9
Overweight	25 – 29.9	23 – 27.4
Obese	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	
European	>94	>80	Increased
South Asian	>90	>80	Increased
Chinese	>90	>80	Increased
Sub Saharan Africa	>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. Monnard, 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



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

Age (Years)	Height in cms	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 cms	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):**

$100 + (\text{Age in years} \times 2)$

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

$60 + (\text{Age in years} \times 2)$

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

$70 + \text{Age in years}$

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

## 2G. Hemoglobin (g/dL)

	Mild Anemia	Moderate Anemia	Severe Anemia	No Anemia
Children (5-11 years)	11 - 11.4	8 - 10.9	< 8	≥ 11.5
Adolescents (12-14 years)	11 - 11.9	8 - 10.9	< 8	≥ 12
Women (> 15 years)	11 - 11.9	8 - 10.9	< 8	≥ 12
Men (> 15 years)	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
Ferritin	7 – 140 ng/mL	Male: 38 – 457 ng/mL Female: 7 – 73 ng/mL	Male: 38 – 457 ng/mL Female: 7 – 73 ng/mL
Vitamin B12	260 – 1200 pmol	138 – 652 pmol	138 – 652 pmol
Folate*	11 – 47 nmol/L	7 – 46.4 nmol/L	7 – 46.4 nmol/L
Vitamin D	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*

<b>Dietary factor</b>	<b>Goal (% of total energy, unless otherwise stated)</b>
<b><i>Energy</i></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
12-13	2548	2276
13-14	2770	2379
14-15	2990	2449
15-16	3178	2491
16-17	3322	2503
17-18	3410	2503
18-30 <sup>a</sup>	3050	2550
30-60 <sup>a</sup>	2950	2400
≥ 60 <sup>a</sup>	2450	2200

Note:

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

\* the energy requirements for sedentary/less active and highly active populations varies 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. Participants perception of current weight (%)

	12-19	20-49	50-74
<b>A little too high</b>	25.4	34.3	24.0
<b>About right</b>	51.5	45.0	58.4
<b>Don't Know</b>	3.1	2.9	3.7
<b>Much too high</b>	5.0	9.2	5.9
<b>Too low</b>	15.0	8.6	8.0

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

	12-19	20-49	50-74
<b>Eat by myself</b>	2.3	1.8	9.3
<b>2 persons</b>	2.1	8.7	29.7
<b>3 persons</b>	14.8	18.4	20.1
<b>4 persons</b>	38.8	39.2	22.5
<b>Other</b>	41.9	31.9	18.4

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

	12-19	20-49	50-74
<b>About right</b>	80.0	84.9	81.1
<b>Don't know</b>	6.7	2.8	2.6
<b>Too high</b>	5.0	4.0	4.1
<b>Too low</b>	8.3	8.3	12.2

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

	12-19	20-49	50-74
<b>Yes</b>	7.1	5.9	6.2
<b>No</b>	92.9	94.1	93.8

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

	12-19	20-49	50-74
<b>About right</b>	58.8	71.9	74.7
<b>Don't know</b>	30.8	10.6	10.9
<b>Not enough</b>	5.2	5.3	6.3
<b>Too much</b>	5.2	12.2	8.2

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

	12-19	20-49	50-74
contain more polyunsaturated fats	7.3%	7.0%	6.0%
contain more saturated fats	26.9%	29.8%	29.8%
Don't know	63.8%	60.0%	62.9%
Are similar to other oil used in cooking	1.9%	3.1%	1.3%

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
Don't know	53.3%	46.4%	48.9%
Healthier	29.0%	31.2%	30.8%
Less healthy	14.6%	19.7%	17.6%
The same	3.1%	2.6%	2.7%

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

	12-19	20-49	50-74
Don't Know	17.7	9.2	8.0
No	29.2	27.8	29.9
Yes	53.1	63.0	62.1

9. Knowledge about cholesterol is (%)

	12-19	20-49	50-74
A hormone	0.6	0.3	0.0
A mineral	0.4	0.0	0.6
A type of fat	84.6	94.7	94.6
A brand of margarine	1.5	1.0	0.4
Don't know	12.9	4.0	4.4

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
Seafood	41.3	46.0	54.1
Butter	80.8	90.3	88.1
Rice	30.0	50.8	48.6
Eggs	55.6	65.7	71.5
Fatty meat	77.9	86.2	85.6
Soft drink	43.1	52.5	52.1
Offal (organ meats)	64.2	77.7	80.0

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

	12-19	20-49	50-74
<b>Sugar</b>	8.7	6.7	7.0
<b>Fruits</b>	70.4	76.6	72.1
<b>Meat</b>	22.9	24.2	15.7
<b>Vegetables</b>	70.8	78.6	73.4
<b>Margarine</b>	11.7	9.3	7.9
<b>Brown bread</b>	53.1	64.8	62.5

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

	12-19	20-49	50-74
<b>Bad for health</b>	5.6	5.4	6.4
<b>Don't know</b>	28.3	20.5	24.6
<b>Good for health</b>	64.2	72.1	66.2
<b>Make no difference</b>	1.9	2.0	2.7

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

	12-19	20-49	50-74
<b>Eating too much food</b>	91.9	90.4	92.4
<b>Not doing enough exercise</b>	92.5	95.5	94.8
<b>Eating between meals</b>	89.0	92.8	94.6
<b>Eating a lot of fatty foods</b>	94.2	96.9	96.1
<b>Eating lots of sweets/ drinking sugary drinks</b>	91.2	94.3	95.1

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

	12-19	20-49	50-74
<b>Decrease fat in the diet</b>	81.7	90.4	92.3
<b>Decrease oil in the diet</b>	82.7	90.7	92.3
<b>Decrease sugar in the diet</b>	96.9	98.5	98.3
<b>Do exercise</b>	95.0	97.4	97.7
<b>Reduce stress</b>	84.6	95.5	95.9
<b>Maintain healthy weight</b>	89.2	94.0	95.1

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

	12-19	20-49	50-74
<b>Decrease fat in the diet</b>	90.0	97.1	97.3
<b>Decrease oil in the diet</b>	90.8	97.7	98.0
<b>Decrease weight if overweight/ obese</b>	90.4	98.0	97.4
<b>Do exercise</b>	93.7	98.1	98.6
<b>Reduce stress</b>	90.4	98.1	97.4
<b>Stop smoking</b>	90.2	94.5	96.0



**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>	30.4	13.2	16.2
<b>Healthier</b>	12.3	13.5	14.9
<b>Less healthy</b>	49.4	65.5	61.9
<b>The same</b>	7.9	7.8	7.0

**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>	62.1	72.3	75.5
<b>2-3 times per week</b>	31.0	23.8	18.0
<b>Once a week</b>	2.7	1.9	2.7
<b>1-2 times per month</b>	0.0	0.5	0.6
<b>Don't know</b>	4.2	1.5	3.1

**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>	78.1	82.3	80.1
<b>No</b>	9.2	10.3	10.7
<b>Don't know</b>	12.7	7.4	9.2

**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>	4.6	5.5	6.7
<b>Increases chances</b>	0.6	1.4	1.4
<b>Decreases chances</b>	87.9	90.4	87.6
<b>Don't know</b>	6.9	2.6	4.3

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

	<b>12-19</b>	<b>20-49</b>	<b>50-74</b>
<b>No effect</b>	4.2	5.7	6.0
<b>Increases chances</b>	0.0	1.1	2.0
<b>Decreases chances</b>	89.0	90.4	88.0
<b>Don't know</b>	6.7	2.8	4.0

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

	Yes	No
<b>12-19</b>	39.4	60.6
<b>20-49</b>	46.4	53.6
<b>50-74</b>	28.6	71.4
<b>12 -74</b>	38.4	61.6

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

Years		12-19*	20-49	50-74	12-74
Food items	<b>% respondents consuming</b>	<b>Mean per capita (ml)</b>	<b>Mean per capita (ml)</b>	<b>Mean per capita (ml)</b>	<b>Mean per capita (ml)</b>
<i>Beer</i>	22.3	45.7	110.2	80	92.5
<i>Spirits</i>	16.5	3	17	24.8	19.8
<i>Wine</i>	13.2	25.3	41.1	16.5	32

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

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Dr Y. Ozeer	Diabetologist Officer-in-Charge
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**List of Clusters**

1. Central Flacq
2. Lallmatie
3. Rivere du Rempart
4. Pamplemousses
5. Triolet
6. Roche Bois
7. PlaineVerte
8. Souillac
9. Mahebourg
10. Curepipe
11. La Caverne, Vacoas
12. Ollier, QuatreBornes
13. Beau Bassin
14. Petite Riviere
15. Quartier Militaire
16. China Town

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