THE REVOLUTIONARY GOVERNMENT OF ZANZIBAR

ZANZIBAR
SCHOOL
HEALTH and
NUTRITION

Survey 2022
Main Report

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LIST OF ABBREVIATIONS

AFHS	adolescent-friendly health service
BMI	body mass index
CAPI	computer-assisted personal interviews
HB	haemoglobin
IPAQ	International Physical Activity Questionnaire
LMICs	low- and middle-income countries
MoEVT	Ministry of Education and Vocation Training
MoH	Ministry of Health
OCGS	Office of Chief Government Statistician
PDQS	Prime Diet Quality Score
RDT	rapid diagnostic test
RLT	regional laboratory technologist
SAC	school-age children
SDGs	Sustainable Development Goals
SNP	School Nutrition Programme
SSA	sub-Saharan Africa
SHNS	School Health and Nutrition Survey
TFNC	Tanzania Food and Nutrition Centre
UNICEF	United Nations Children's Fund
UHC	universal health coverage
WASH	water, sanitation and hygiene
WHO	World Health Organization

FOREWORD

This report presents the findings of the 2022 School Health and Nutrition Survey (SHNS). The survey was implemented through a multi-sectoral collaboration involving the Office of the Chief Government Statistician (OCGS), the Ministry of Health and the Ministry of Education and Vocational Training under the technical assistance of the Tanzania Food and Nutrition Centre (TFNC).

The 2022 Zanzibar School Health and Nutrition Survey is the first comprehensive representative survey of primary and secondary schools in Zanzibar designed to provide information on the demographic characteristics, socioeconomic, physical activities, water, sanitation and hygiene (WASH) and female menstrual attributes. It also covers dietary characteristics (food preference and eating habits) and health/nutrition supplement in Zanzibar. Results from this assessment help to validate and complement administrative data that the ministries collect from schools on the health and nutrition status of pupils. The main objective of the SHNS was to provide up-to-date Zanzibar data and information on nutrition and health status of school-age children and adolescents in Zanzibar primary and secondary schools. This assessment also provides baseline data for reporting, monitoring and tracking the progress of Zanzibar, for example, Zanzibar Development Vision 2050 and international indicators, including Sustainable Development Goals (SDGs).

I, therefore, take this opportunity to encourage policymakers, planners and other stakeholders in nutrition and health sectors to include these findings in the planning, implementation, monitoring and evaluation of programmes for improving the nutrition and health status of school-age children and adolescents. This information can inform various processes in education programme in Zanzibar to ensure that children enjoy a conducive learning environment that could make them healthier and more attentive learners in a bid to improve the school attendance of pupils/students and their cognitive learning abilities instrumental in fulfilling their future dreams.

I also would like to call upon all policymakers, planners and other stakeholders in education and health sectors to adopt and devise integrated and sustainable planning to enhance and achieve goals that would reduce the triple burden of malnutrition and enhance levels of physical activities among school-age children (5–9 years), early adolescents (10–14 years) and late adolescents (15–19 years) in both primary and secondary schools. Also plans were set and interventions implemented not only to improve dietary intake but also enhance the quality and practices to reduce the burden of anaemia among school-age children (5–9 years), early adolescents (10–14 years) and late adolescents (15–19 years) in both primary and secondary schools in Zanzibar. It is also important to evaluate school health and nutrition environment including infrastructures, nutrition education in school curricula and health and nutrition interventions to make sure these interventions are scaled up throughout the country sustainably.

The scaling up of such initiatives could further ensure that children in schools learn in a dignified and healthy environment through the ready availability of requisite food and health services.
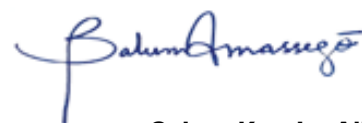
Honourable Nassor Ahmed Mazrui
Minister of Health, Zanzibar

ACKNOWLEDGEMENTS

The Office of the Chief Government Statistician (OCGS), Zanzibar would like to express its gratitude and appreciation to all individuals, institutions and partners who contributed to the implementation of this School Health and Nutrition Survey (SHNS) conducted in Zanzibar. In particular, the OCGS acknowledges the contribution of partners from governmental agencies, the Ministry of Health (MoH), Ministry of Education and Vocational Training (MoEVT) together with the Tanzania Food and Nutrition Centre for their active participation and technical inputs towards this survey.

The OCGS would also like to thank all the field supervisors, who oversaw the data collection exercise, and field data collectors who interviewed students. Moreover, the OCGS would like to extend its appreciation to data entry clerks, regional and district teams (e.g., laboratory technologists/technicians, School Health Programme Coordinator, Nutrition Officers, and drivers) for their participation during the survey. Furthermore, the OCGS would like to thank all the students and schoolteachers for their readiness to participate in the survey.

Salum Kassim Ali
Chief Government Statistician
Office of the Chief Government Statistician, Zanzibar

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EXECUTIVE SUMMARY

Malnutrition poses numerous challenges to the health status and socioeconomic well-being of the population, particularly in low- and middle-income countries, including Zanzibar. To understand the nutrition status of school-age children and adolescents, the Ministry of Health (MoH) Zanzibar, in collaboration with the Office of the Chief Government Statistician (OCGS) and with the technical support of Tanzania Food and Nutrition Centre (TFNC) Zanzibar, conducted the first school health and nutrition survey. The Zanzibar School Health and Nutrition Survey (ZSHNS) complements other national surveys that have already been conducted in Tanzania.

Methods

In this cross-sectional survey, information was collected on school-age children and adolescents aged 5–19 years from 93 schools comprising primary and secondary schools in Zanzibar. A multi-stage sampling was used to select a representative sample. Height was measured using a height-measuring board, weight of the pupil using Seca electronic scale and haemoglobin level using a HemoCue machine. Descriptive statistics in terms of percentages, mean, minimum and maximum values were calculated using STATA version 17 software.

Key findings

Demographic characteristics: ZSHNS was conducted in all the 11 districts of Zanzibar, involving 2,556 children and adolescents aged 5–19 years, and the majority of the participants (41.4 per cent) were aged between 10 and 14 years. A slightly higher proportion (51.7 per cent; 1,322) of the study participants were girls. Most of them (69.1 per cent) were from primary schools. The majority of the urban residents reported belonging to the highest wealthy quintile (28.6 per cent) than residents from rural areas (7.7 per cent).

Prevalence of malnutrition

Overall, 45.7 per cent were anaemic, 15.6 per cent were stunted, 13.9 per cent were underweight and 8.4 per cent were overweight/obese.

» Overall, over 1 in 5 boys (21.0 per cent) are stunted in Zanzibar compared to 1 in 10 girls (10.6 per cent).

» Over 1 in 10 (13.9 per cent) children and adolescents aged 5–19 years in Zanzibar are underweight.

» Overall, the prevalence of thinness in Zanzibar was 9.0 per cent.

» 8.4 per cent of school-age children and adolescents aged 5–19 years were overweight.

» Prevalence of obesity was 2.2 per cent.

Overall prevalence of malnutrition

» Overall, the prevalence of malnutrition defined as malnutrition of any kind (stunting, underweight, thinness, overweight or anaemia) in Zanzibar was 58.4 per cent.

➤ At least 44.6 per cent of school-age children and adolescents aged 5–19 years had at least one form of malnutrition.

Prevalence of multiple forms of malnutrition

➤ The overall prevalence of the double burden of malnutrition (DBM) as defined by the coexistence of both undernutrition and malnutrition in Zanzibar was 12.0 per cent.

➤ Similarly, the overall prevalence of triple burden of malnutrition, defined as the coexistence of undernutrition, micronutrient deficiencies and overnutrition, in Zanzibar was 1.8 per cent.

Anaemia

➤ Of the 45.7 per cent anaemic school-age children and adolescents aged 5–19 years in Zanzibar, 24.2 per cent had mild, 21.1 per cent moderate and 0.4 per cent had severe anaemia.

➤ Among the girls aged 10–19 years, the prevalence of anaemia was 46.6 per cent.

Dietary habit

➤ Overall, school-age children and adolescents aged 5–19 years in Zanzibar had the mean Prime Dietary Quality Scores (PDQS) of 16.4±3.7, with the score ranging from a minimum of 7 to a maximum of 34 out of a maximum possible score of 42.

➤ 50.4 per cent of the children and adolescents aged 5–19 years in Zanzibar never had breakfast in the past 7 days prior to the survey.

Physical activities

Overall, 61.9 per cent of the school children and adolescents aged 5–19 years are engaged in some form of physical activity.

School nutrition programmes (SNP) in primary and secondary schools in Zanzibar

➤ Only 22 per cent of the schools visited reported to have some sort of a school nutrition programme.

➤ All the schools that offer meals in schools are located in two out of 11 districts. These two districts are Kaskazini A and Kusini.

➤ Among the schools with a SNP, the majority have deworming services (83.9 per cent), sports and entertainment (60.2 per cent) and lowest micronutrient supplementation (1.1 per cent).

➤ Most of the schools (93.3 per cent) reported having clean water, handwashing facilities (75.3 per cent) and clean and safe drinking water treated using water guard tablets and chlorination by Zanzibar Water Authority (69.9 per cent). On the other hand, only a very small number (4.3 per cent) reported having dining halls, a few other schools (9.7 per cent) had food stores and a significant minority (30.1 per cent) featured a school kitchen.

➤ Half of the surveyed schools had handwashing facilities (50 per cent).

Types of food available from different food vendors around schools

➤ Overall, ice creams, fruit juice with added sugar and sweet snacks, respectively, were reported to be available in 94.6 , 89.3 and 83.9 per cent of the schools visited.

➤ Fried foods, crips and salted nuts were available in 83.9, 71.0 and 71.0 per cent of the schools, respectively.

➤ Vegetables were available in less than 20 per cent of the schools.

Food beneficiaries

➤ The survey found that school food is not universally available for the students and all classes since 90 per cent of the schools reported that only some classes benefited from the food, with 10 per cent indicating that only students with special needs accessed the food.

Prevalence of disease burden among school children and adolescents

➤ Overall, incidences of diarrhoea, coughing and fever accounted for 22.0, 37.8 and 32.4 per cent, respectively.

Conclusion

The study presents data supporting the existence of overweight/obesity, stunting and anaemic cases among school-age children and adolescents in Zanzibar. Likewise, the prevalence of double and triple burden of malnutrition is alarming, which requires urgent attention considering that adolescence is a critical period that accounts for significant physical and cognitive growth with broad implications for health throughout a person's lifetime.

Recommendations

These findings call for multi-sector programmatic interventions involving all the relevant ministries and other development partners. The survey results highlight the need to improve the nutritional status of school-age children and adolescents in Zanzibar. Such concerted efforts could be done through a variety of interventions, such as the following:

➤ Improving the school nutrition programme: The school nutrition programme should provide children with nutritious meals that meet their dietary needs. The programme should also be expanded to reach more schools and pupils.

➤ Promoting healthy dietary habits: Schools should provide education on healthy eating habits, and such education tailored to meet the needs of adolescents who are at a critical stage in their growth development.

➤ Enhancing hygiene practices: Schools should promote good hygiene practices, such as washing hands and proper sanitation to help reduce the incidence of diarrheal diseases and other infections.

➤ Providing iron and folic acid supplementation: Iron and folic acid supplementation is important for preventing anaemia, which has emerged as a major public health concern in Zanzibar. In this regard, the school health programme should provide iron and folic acid supplements to adolescents, especially girls.

In addition to these interventions, there is a need to develop and endorse policies that support the nutritional health of children and adolescents, including the following:

➤ A Zanzibar food and nutrition policy outlining the government's commitment to improving the nutritional status of its citizens.

➤ A policy that mandates the provision of iron and folic acid supplementation for all adolescents, especially girls.

➤ A policy that promotes healthy dietary habits in schools and other settings.

Consequently, developing and implementing these policies would enable the government to create a more supportive environment for fostering the nutritional health of children and adolescents in Zanzibar.
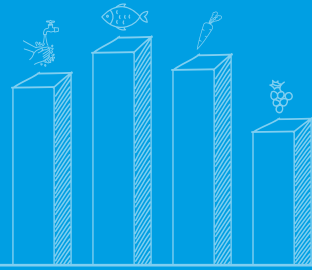
INTRODUCTION AND OBJECTIVES

1.0 Overview

The Ministry of Health (MoH) Zanzibar conducted the 2022 National School Health and Nutrition Survey (SHNS). To the best of our knowledge, this is the first survey whose aim was primarily to gather representative data on the nutritional status and associated factors for this target age group (5–19 years), which has often been overlooked in previous studies [1,2]. The aim of the survey is to guide interventions seeking to improve the health and nutritional status of children and adolescents in Zanzibar.

This joint effort survey involved the Ministry of Health, the Office of the Chief Government Statistician (OCGS) Zanzibar and UNICEF Tanzania. The Tanzania Food and Nutrition Centre (TFNC) provided technical support based on their experience from the latest Tanzania National Nutrition Survey of 2018 and the National Malaria and Nutrition Survey 2019 [2].

This report presents both the methods and findings of the 2022 National School Health and Nutrition Survey. It covers the background information pertaining to the global, regional and national prevalence of malnutrition in children and adolescents aged 5–19 years, the rationale and the objectives of the survey. The report has 10 chapters.

1.1 Nutrition profile

Malnutrition status: Good nutrition is essential for the well-being and development of children and adolescents. It plays a crucial role in the growth and physical development phase of more than 1.2 billion people or about 14.2 per cent of the world's population [3]. The landscape of malnutrition among adolescents is complex and multifaceted, with studies indicating a triple burden of malnutrition (TBM) – the coexistence of undernutrition (stunting and wasting), micronutrient deficiencies (often termed as hidden hunger) and overnutrition (overweight and obesity). This triple burden of malnutrition is increasing in low-income and middle-income countries (LMICs) [4,5].

Despite progress made in improving child nutrition status over the past two decades, challenges

> Good nutrition is essential for child and adolescent well-being and development. It plays a crucial role in the growth and physical development phase of more than 1.2 billion people or about 14.2 % of the world's population [3].

persist, especially in LMICs [6] where undernutrition continues to be a major public health concern [4,7]. Globally, at least one in three under-five children suffers from one or more forms of malnutrition: stunting, wasting and overweight [3]. By 2020, 7.2 million people faced the risk of starvation and another 26.5 million contended with acute food insecurity. At least 12.8 million children in the region were acutely malnourished in 2020 [8]. Nearly half of all the under-five children's deaths are attributable to undernutrition characterized by wasting, stunting, underweight and micronutrient deficiencies (anaemia) [9,10]. Even though stunting has declined steadily, faster progress is necessary to reach the 2030 target [11–13]. The persistence of wasting and underweight at alarming rates requires a reversal in trajectory for the 2030 target to be achieved [14]. Since 2000, a significant reduction in the prevalence of anaemia in under-five children has been observed in many LMICs [15]. In fact, children are more vulnerable to inadequate prenatal, infant and young child nutrition, particularly in resource-constrained settings [16,17]. Endorsing early childhood feeding best practices, therefore, is crucial in improving the health of children [18]. In this regard, the Tanzania Demographic and Health Survey (TDHS) 2022 data indicates some notable changes in the nutritional status of under-five children in Zanzibar. The prevalence of stunting has decreased to 17.6 per cent, a further drop from the 2015 prevalence of 23.5 per cent. Meanwhile, the prevalence of wasting in the same age group has also declined to 8 per cent. On the other hand, the prevalence of overweight children has slightly decreased to 2.3 per cent [19].

Similarly, World Health Organization (WHO) characterizes overnutrition (obesity and overweight) as a pandemic of a major public health concern [20] ranked as the sixth leading cause of disability-adjusted life-years, which also accounts for about 4 million deaths each year globally [21–23]. The burden of overnutrition is also increasing more rapidly in LMICs than in higher-income countries [24,25]. Studies indicate that childhood obesity usually positively correlates with obesity in adulthood and constitutes a major risk factor for hypertension, diabetes and dyslipidaemia [1,2].

Anaemia: This ailment is a significant public health issue in Zanzibar, affecting a substantial portion of the population, particularly children and pregnant women. Studies show that the prevalence of anaemia among children aged 6–59 months in Zanzibar decreased from 75.1 per cent in 2005 to 65.9 per cent in 2022. This decline notwithstanding, the overall prevalence rate remains a significant public health concern.

Factors associated with childhood anaemia in this region include lack of proper dietary intake, diseases such as malaria, younger age and underweight status [26]. Furthermore, anaemia is currently prevalent in 59.6 per cent of women aged 15–49 years in Zanzibar. This prevalence is higher among women aged 15–19 years than those aged 20–34 years.

Water, sanitation and hygiene: The 2022 Zanzibar School Health and Nutrition Survey incorporated an evaluation of water, sanitation and hygiene (WASH) in schools, recognizing its critical role in health, survival and development. Inadequate WASH services can lead to diseases that disproportionately affect children and contribute to a poor learning environment while impacting their school attendance and performance. The global COVID-19 pandemic has underscored the

> The 2022 Zanzibar School Health and Nutrition Survey incorporated an evaluation of Water, Sanitation, and Hygiene (WASH) in schools, recognising its critical role in health, survival, and development. Inadequate WASH services can lead to diseases that disproportionately affect children and contribute to a poor learning environment while impacting on their school attendance and performance.

importance of WASH in schools, particularly in LMICs where infrastructure is often insufficient. The inability to implement key strategies, such as washing hands to contain the spread of SARS-CoV-2 in the school environment is a major concern [27]. Safe WASH in schools offers numerous health and educational benefits, including reducing school absenteeism, boosting cognitive skills, providing a safe environment for menstrual hygiene management and promoting WASH education. Pupils also serve as agents of change, who influence hygienic practices in their respective families and communities [27]. Even though the United Nations has recognized access to safe drinking water and sanitation as a human right, many schools worldwide, particularly in LMICs including Zanzibar, lack the necessary WASH infrastructure. The findings from the 2022 Zanzibar School Health and Nutrition Survey indicate the interventions carried out to inform policies aimed at improving WASH in schools in Zanzibar.

Menstrual hygiene: The 2022 Zanzibar School Health and Nutrition Survey incorporated an evaluation of menstrual hygiene management (MHM) among adolescent girls in schools. MHM is a critical health and sanitation factor that significantly impacts the well-being of girls and women. Inadequate menstrual hygiene has been associated with physical health risks, including reproductive and urinary tract infections, and psychosocial issues such as stigma, shame, stress and increased school absenteeism and dropout rates [28,29]. Incorporating MNH findings in this survey, therefore, is anticipated to inform the development of interventions aimed at enhancing menstrual hygiene management in Zanzibar schools. Such an intervention is crucial because studies have affirmed that education and health programmes can significantly improve knowledge and practices related to menstruation [29].

School environment assessment and food security: The school environment plays a significant role in the health and well-being of students. After all, a healthy school environment can promote students' academic performance and well-being. Conversely, an unhealthy environment can contribute to health problems such as asthma, food poisoning and poor nutrition. The 2022 Zanzibar School Health and Nutrition Survey included an assessment of the school environment to provide a comprehensive picture of the health and nutrition status of school-age children and adolescents. The findings from this assessment are predicated on informing interventions aiming to improve the school environment in Zanzibar. The importance of school meals in promoting pupils' well-being, improving learning ability, academic performance and social interaction and equalization by sharing the same healthy school meal has been well-documented [30] and recommended by WHO [31]. As such, the assessment of school food programme in Zanzibar is instrumental in shaping interventions aiming to improve the health and well-being of students.

> The importance of school meals in promoting pupils' wellbeing, improving learning ability, academic performance, and social interaction and equalisation by sharing the same healthy school meal has been well-documented[31], and recommended by WHO[32].

Nutrition profile

Globally
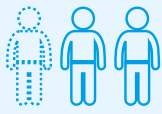
At least **1** in **3** under-five children suffers from one or more forms of malnutrition: **Stunting**, **wasting** and **overweight**
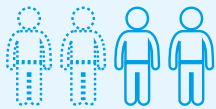
Nearly **50%** deaths of under-five children's are attributable to undernutrition: **Wasting**, **stunting**, **underweight** and **micronutrient deficiencies**

East African region

7.2 million people faced the **starvation risk**

26.5 million contended with **acute food insecurity**

At least **12.8 million** children in the region were **acutely malnourished**

Prevalence of stunting, wasting and overweight in under-five children in Zanzibar

17.6%	**8%**	**2.3%**
Stunting	Wasting	Overweight
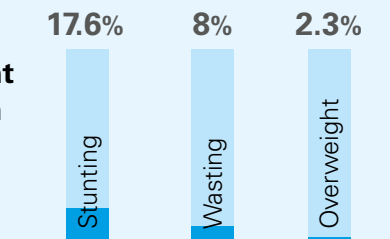
Anaemia in Zanzibar

Among children aged 6–59 months

75.1% 2005

65.9% 2022

Among women aged 15–49 years

62.8% 2005

59.6% 2022

Factors associated with childhood anaemia

Lack of proper **dietary** intake

Underweight

Diseases such as **malaria**
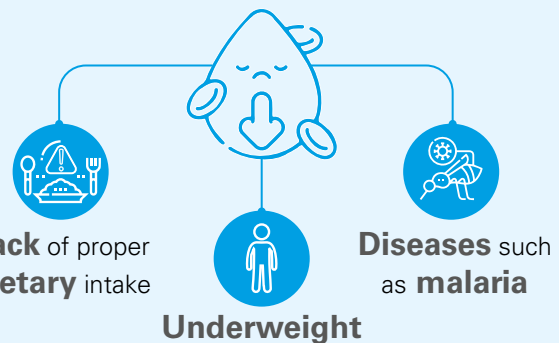
Health and educational benefits of WASH in schools

Reducing school **absenteeism**

Boosting cognitive **skills**

Providing **safe environment** for **menstrual hygiene** management
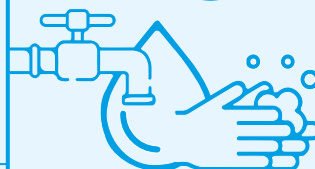
Promoting **WASH education**

Effects of inadequate menstrual hygiene

- Stigma
- Shame
- Stress
- School absenteeism
- School dropouts
- Reproductive infections
- Urinary tract infections
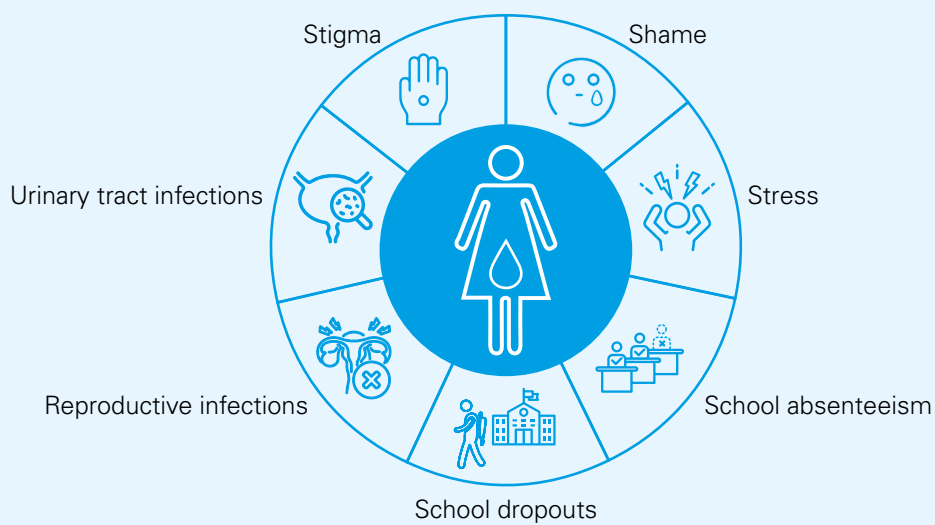
Effects of unhealthy school environment

- Asthma
- Poor nutrition
- Food poisoning
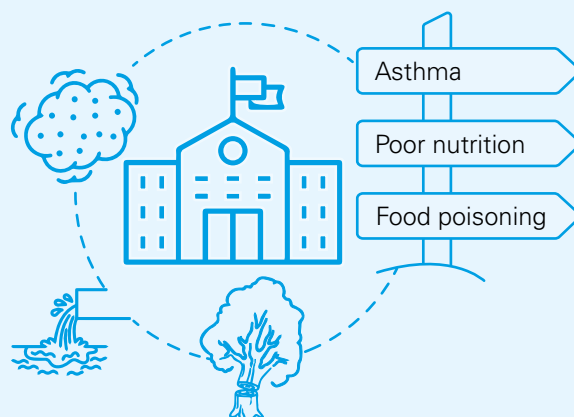
1.2 Overview of strategies to reduce malnutrition and its challenges

Limited evidence still exists from developing countries on how school health programmes can also impact adolescents' health. In addition, early experiences from school health programmes in resource-limited settings have also revealed many challenges such as limited resources, inadequate facilities, limited parental and teachers' involvement, unregulated food environment and weak policies. Additional challenges widely presented include weak service integration and linkage leading to low coverage, weak planning and monitoring and evaluation, lack of meaningful participation by adolescents and teachers in the planning and decision-making process of the full programme cycle, low involvement of other sectors aimed to improve school health programme, and low coordination between the ministries, especially the MoH and the Ministry of Education (MoE).

A recent study by Chandra-Mouli et al. [32] in Tanzania reported that health services 2are not friendly to adolescents. In fact, health care providers are unaware of adolescent-friendly health services (AFHS). The quality of AFHS being provided by some organizations is also reportedly poor and benefits only a limited proportion of the adolescents. Thus, it is important to explore other sectors such as schools where adolescent can be reached easily for them to benefit from health knowledge and preventive services. Although adolescents constitute 27 per cent of the population in LMICs, our understanding on the existing strategic challenges remains largely limited. Furthermore, lack of disaggregated data by age and gender on individual risk factors, the school environment and other drivers at the population level tends to affect the promotion of school health programmes in Africa.

Strategies aimed at reducing malnutrition include reinforcing legislation and food safety standards using fiscal measures to incentivize healthy food choices and integrating essential nutrition actions on health service delivery platforms. Implementing nutrition-sensitive programmes, drawing upon complementary sectors including education and health sectors, is important to affect the underlying determinants of nutrition and child development. Some of discrete interventions with a reported positive impact on malnutrition among in-school children and adolescents include school-based nutrition interventions such as nutrition education, physical activity and micronutrients through fortification and targeted supplementation, school meal, school gardens and access to a safe environment and hygiene [33–37].

Similarly, strengthening the health care system to ensure it provides immunization, oral rehydration, periodic deworming, early diagnosis and proper treatment of common illnesses can further help to prevent malnutrition in the society. Furthermore, boosting the girls' participation in schooling can help reduce adolescent pregnancy – a well-documented risk factor for small birth size [38] and a fuel for malnutrition. Additionally, the use of the school as a platform for nutrition education and other nutrition-related services such as healthy eating and exercising to prevent obesity [39], WASH and on the effect of early pregnancy [40] has proven to bring about positive impacts. Schools can also serve as a platform for fostering iron supplementation [41] and deworming [42].

> The use of the school as a platform for nutrition education and other nutrition-related services such as healthy eating and exercising to prevent obesity[40], WASH and on the effect of early pregnancy [41] has proven to bring about positive impacts. Schools can also serve as a platform for fostering iron supplementation[42], and deworming[43].

Ways to prevent malnutrition in society

Periodic deworming

Oral rehydration

Early diagnosis

Immunisation

Appropriate treatment of common illnesses
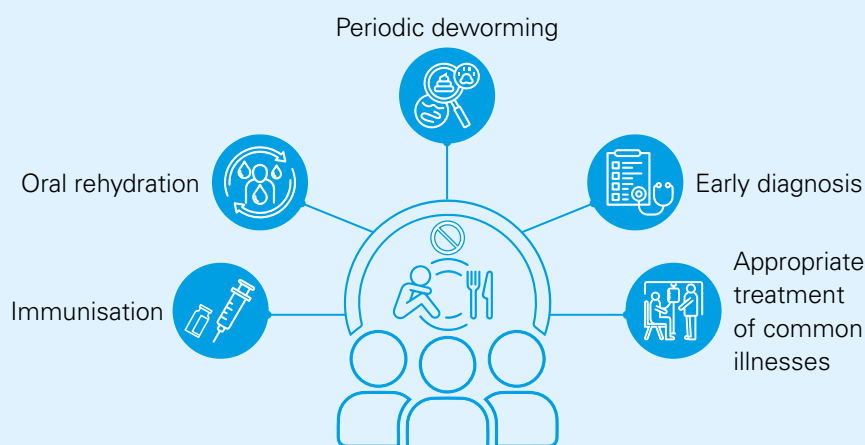
1.3 Rationale for the School Health and Nutrition Survey

To date, there is limited high-quality summative evidence to link the existing policies and school environments to related nutrition and health outcomes among adolescents in sub-Saharan Africa in general and Zanzibar in particular. This assessment would broaden our understanding of how current policies and the school environment influences the state of child and adolescent health, which is necessary for the successful implementation and scaling up of school health programmes in developing countries.

Based on the information gaps identified, the ZSHNS is designed to provide nationally representative data on health and nutrition indices to inform programmes and policies that can tackle the most critical nutritional challenges in the country. This survey, therefore, can provide data to inform our understanding on the rate of malnutrition among school-age children and adolescents to engender a successful redesigning of interventions, their implementation and their scaling up across schools in Zanzibar.

1.4 Objectives

1.4.1 Main objective

The main objective of the Zanzibar School Health and Nutrition Survey (ZSHNS) was to collect nationally representative data on the health and nutritional status of school-age children/early adolescents (5–14 years) and late adolescents (15–19 years) to gain new insight into and enhance our understanding of adolescent health and well-being in the social context of Zanzibar.

1.4.2 Specific objectives

The specific primary objectives of the ZSHNS were to:

1. Estimate the prevalence of the triple burden of malnutrition, including (a) stunting, (b) underweight and (c) overweight/obesity.

2. Assess the (a) prevalence and (b) characterization of anaemia among school-age children (5–9 years), early adolescents (10–14 years) and late adolescents (15–19 years) in primary and secondary schools in Zanzibar.

3. Assess the dietary (a) intake (b) quality and (c) practices among school-age children (5–9), early adolescents (10–14 years) and late adolescents (15–19 years) in primary and secondary schools in Zanzibar.

4. Determine the levels of physical activities among school-age children (5–9), early adolescents (10–14 years), and late adolescents (15–19 years) in primary and secondary schools in Zanzibar.

The specific secondary objectives of the ZSHNS were to:

1. Assess the school health and nutrition environment including (a) infrastructure – playgrounds, school garden, school kitchen, canteen, WASH facilities and (b) existing health and nutrition interventions such as school meal.

2. Determine the prevalence of diseases burden among school-age children (5–9 years), early adolescents (10–14 years) and late adolescents (15–19 years) in primary and secondary schools in Zanzibar.

3. Assess the status of menstrual hygiene management among school-age early adolescents (10–14 years) and late adolescents (15–19 years) girls in primary and secondary schools in Zanzibar

4. Determine the prevalence of disability and child labour among school-age children (5–9), early adolescents (10–14 years) and late adolescents (15–19 years) in primary and secondary schools in Zanzibar.
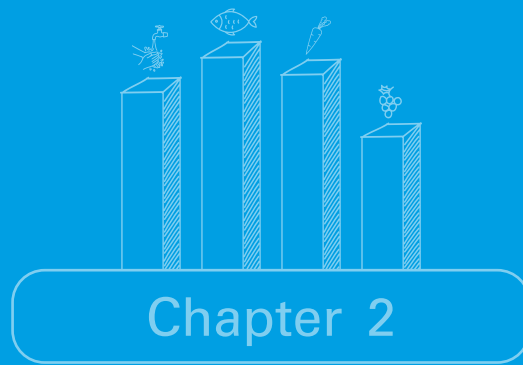
METHODOLOGY

The general questionnaire helped to collect information from all the eligible school-age children and adolescents aged 5–19 years. They were asked questions on the following topics: demographic characteristics, socioeconomic status, physical activities, WASH and female menstrual attributes. Dietary diversity alongside dietary quality scores questions were adapted from a validated and modified individual dietary diversity questionnaire as recommended by Food and Agriculture Organization's (FAO) individual and household dietary diversity guidelines, other related literature and the Prime Diet Quality Score (PDQS), which is a 21-unit food-based score developed using a modified Prime Screen questionnaire.

The biomarker questionnaire recorded anthropometric measurements (heights and weight) for all the eligible children. Further, results for anaemia using HemoCue (g/dl), ferritin level, C-reactive protein (CRP) and alpha-1 glycoprotein (AGP) levels for inflammatory responses, and red blood cell (RBC) count and serum folate for folic acid status were recorded. Besides the anaemia status, all other samples were managed on-site and at the central lab, and later transferred to TFNC laboratory for analysis. The questionnaires administered were uploaded on a daily basis onto the local servers for management and aggregation.

2.0 Translation and pretesting of survey questionnaires

These data collection tools were initially prepared in English, later translated into Kiswahili and then programmed for the electronic tablet.

2.1 Recruitment, training and standardization of field data collectors

2.1.1 National facilitators and supervisors

National facilitators and supervisors came from participating institutions, namely the Office of the Chief Government Statistician (OCGS) Zanzibar, the Ministry of Health and the Ministry of Education, Zanzibar. National supervisors were selected based on their professional backgrounds and expertise. They were responsible for overseeing the day-to-day activities and coordinating with the teams.

2.1.2 Regional supervisors

A regional team composed of quality control team, regional laboratory technologist (RLT) and regional supervisors. These were responsible for overseeing and performing daily quality control checks during field visits and acted as a bridge between the national and regional teams. In addition, RLTs were responsible for collecting blood samples.

2.2 Response rates

A total of 2,604 primary and secondary school-age children and adolescents were targeted and 2,556 (98.2 per cent) were successfully interviewed. Table 1 shows ZSHNS response rates for individual interviews for Zanzibar and individual districts. Overall, the response rate was high in all the 11 districts with Kaskazini 'B', Kati and Kusini districts having the highest rate of 100 per cent and Kaskazini 'A' the lowest at 93.9 per cent due to a larger number of refusals to participate in the survey.

Table 1   Sample size by districts, Zanzibar ZSHNS 2022

Districts	Sampled children/ adolescent	Interviewed children/ adolescent	Response rate
Kaskazini A	196	184	93.9
Kaskazini B	196	196	100
Kati	196	196	100
Kusini	196	196	100
Mjini	280	264	94.3
Magharibi A	308	305	99
Magharibi B	336	332	98.8
Wete	252	251	99.6
Micheweni	196	195	99.5
Chake Chake	224	219	97.8
Mkoani	224	218	97.3
Total	**2,604**	**2,556**	**98.2**

Table 2 describes social demographic characteristics of the schoolteachers participated in the study. The majority were from government-run schools, with almost equal distribution between primary and secondary school teachers. Mjini Magharibi B and A had the highest number of teachers participated in the study.

Table 2	Social demographic characteristics of schoolteacher respondents (N=2,556)	
	Number of teachers	**Percentage**
Ownership		
Government	88	93.6
Private	5	5.3
Level		
Primary	50	53.2
Secondary	43	45.7
District		
Chake Chake	8	8.5
Kaskazini A	7	7.4
Kaskazini B	7	7.4
Kati	7	7.4
Kusini	7	7.4
Magharibi A	11	11.7
Magharibi B	12	12.8
Micheweni	7	7.4
Mjini	10	10.6
Mkoani	8	8.5
Wete	9	9.6
Region		
Kaskazini Unguja	14	14.9
Kusini Unguja	14	14.9
Mjini Magharibi	33	35.1
Kaskazini Pemba	16	17
Kusini Pemba	16	17

The remaining sections on the findings are structured in accordance with research objectives. In this regard, the findings are shared according to the data collection methodologies used and results obtained for each objective.

2.3 **Study area**

This survey was implemented in all the five regions of Zanzibar archipelago covering 11 districts (survey domains).

2.4 **Study design**

This cross-sectional survey collected information on school-age children and adolescents aged 5–19 years from 93 primary and secondary schools located in the Zanzibar Isles. The study employed multi-stage sampling to select a representative sample of school-age children and adolescents aged 5–19 years attending either primary or secondary schools in Zanzibar. The survey collected data at the national, regional and district levels and weighting of the cluster sampling strategy from the target population was employed for identifying the samples for the study.

> The study employed multi-stage sampling to select a representative sample of school-age children and adolescents aged 5 – 19 years old attending either primary or secondary schools in Zanzibar.

2.5 **Sample size determination and sampling**

2.5.1 Sample size determination

The ZSHNS sample was designed to estimate the prevalence of anthropometric and biochemical indicators among pupils across the following domains:

(i)   National level

(ii)   Regional level

(iii)   District level

(iv)   Urban/rural area within a state

(v)   Sex ratio

The sample size was estimated at the district level (domains) to provide a plausible estimate of the indicators for each district and aggregated to obtain the regional and national samples. The prevalence of anaemia was the preferred indicator, whereby an indicative value of 50 per cent was used. A margin of error of 0.5, significance level of 5 per cent and design effect of 1.5 was assumed for the estimation of the district's sample size. The design effect helped to account for the clustering effect at the district level. The estimate settled at a total of 2,556 primary and secondary school-age children and adolescents drawn from 93 schools across the 11 districts based on the stated criteria (see Annex 1). Among the selected pupils, 1,768 (69.1 per cent) were from primary schools and 788 (30.8 per cent) were from secondary schools.

2.5.2 Sampling

The ZSHNS stratified the study samples to ensure representation by geographical location and school type. The survey was implemented in two stages utilizing a stratified multi-stage sample design. The first stage was the selection of a sample of schools as the primary sampling unit (PSU) using probability proportional to size (PPS). The second stage involved the selection of only one class level

(say, standard I, II, form I, II…) using simple random sampling (SRS). From each selected class and all consenting school-age children and adolescents, only 28 school-age children and adolescents were selected. To achieve a systematic way of selecting individuals, random start numbers ranging from 1 to 9 were prepared for each school for boys and girls, respectively, before the visits. These boys and girls were selected independently. Efforts were made to get an equal number of 14 boys and 14 girls by selecting the boys and girls separately. The Office of the Chief Government Statistician provided sampling guidance notes as part of the standardized sampling report providing comprehensive information on the strategy employed. This information is part of the metadata attached to each region's data file.

The ZSHNS sample size and school distribution

Total number of schools **93,** across **11** districts

Total number of students **2556**

Primary school students **1768 (69.1%)**

Secondary school students **788 (30.8%)**
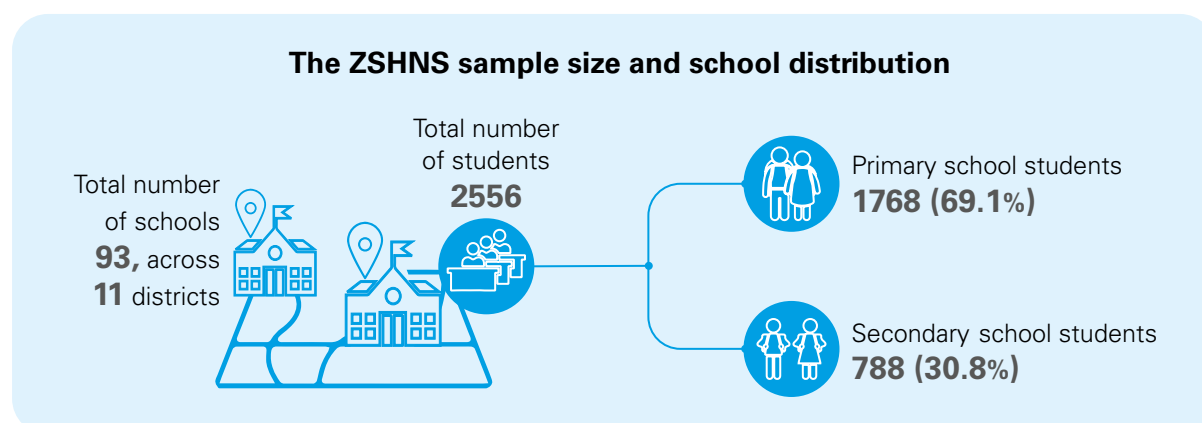
2.5.3 Sampling frame

As in all probability sample surveys, each sampling unit in the target population has a known, non-zero probability of being drafted into the sample. To attain this requirement, the 2021 list of all schools disaggregated up to the district level served as the sampling frame. The MoE maintains it as a complete list of all registered schools together with their respective number of school-age children and adolescents. Schools with less than 100 school-age children and adolescents were excluded from the sampling frame. Table 3 depicts the number of sampled schools and the number of schools selected across districts.

Table 3 — Number of schools in the frame and number of selected schools by district

District name	Number of schools in frame			Number of selected schools		
	Rural	**Urban**	**Total**	**Rural**	**Urban**	**Total**
Unguja						
Kaskazini A	41	9	50	4	3	7
Kaskazini B	24	4	28	5	2	7
Kati	41	11	52	5	2	7
Kusini	15	10	25	5	2	7
Mjini	0	49	49	0	10	10
Magharibi A	2	47	49	2	9	11
Magharibi B	3	68	71	2	10	12

District name	Number of schools in frame			Number of selected schools		
	Rural	**Urban**	**Total**	**Rural**	**Urban**	**Total**
Pemba						
Wete	43	13	56	5	4	9
Micheweni	27	6	33	5	2	7
ChakeChake	30	20	50	5	3	8
Mkoani	43	10	53	5	3	8
Total	**269**	**247**	**516**	**43**	**50**	**93**

Each district in the sampling frame was treated as an independent domain. To take advantage of possible gains in precision and reliability of the survey estimates from stratification, the schools were first stratified according to the 11 administrative districts and then into urban and rural locations. However, urban and rural domains only function at the national level.

2.6 Study population, unit of analysis and eligibility

The target population was school children from both primary and secondary schools in Zanzibar. The unit of analysis are school-age children and adolescents aged 5–19 years.

2.7 Survey implementation

The Social Statistics Department of the Office of the Chief Government Statistician Zanzibar (OCGS), in collaboration with the Nutrition Unit of the Ministry of Health and with technical support from the Tanzania Food and Nutrition Centre (TFNC), was responsible for planning, administration of survey resources, survey design, questionnaire design, fieldwork, analysis and report writing.

2.8 Data collection tools and materials

The survey data were collected using tablet-based questionnaires programmed with Survey Solutions, with paper forms serving as a backup. Quantitative data were collected using both individual and school questionnaires (Annex 2: Survey Questionnaire). Structured questionnaires served as an interview guide during the collection of data from all the school-age children (SAC) and schoolteachers selected. Two different questionnaires were designed to capture survey data:

1. SAC individuals' questionnaire

2. Schoolteachers' questionnaire

The survey instruments were translated from English to Kiswahili for accessibility purposes, and translated back to English (by someone not involved in the initial translation to Kiswahili) and revised accordingly for clarity to ensure that the instrument was accurately and clearly translated.

Prior to the initiation of the survey, screening questions helped to determine the eligibility of the potential respondents. The number of eligible respondents in each school was noted on the questionnaire. After the random selection of respondents and obtaining their informed consent, a unique identification number was included on the survey form to identify the respective respondents for all the subsequent study tools and information collection. The questionnaires were developed to reflect health and nutrition issues among children and adolescents aged 5–19 years.

2.8.1 Data collectors

There were five data collection teams. Each team had an enumerator, a nutritionist, a schoolteacher (mainly school health programme coordinator) and a laboratory technician.

2.8.2 Training and standardization of field data collectors

Before the survey kicked off, several training sessions were conducted: The master training, which basically involved the survey core team to familiarize themselves with survey tools and methodological aspects, was followed by the training of trainers and the main training. The second stage of training involved staff from the OCGS, MoH and TFNC who then participated in the pilot test. The main training was conducted at the OCGS' head office comprising five supervisors, 15 enumerators, 10 blood sample collectors, 5 blood sample processors, 3 quality assurance team members and one lab coordinator. An intensive training programme on survey methodology, questionnaire, concepts and definitions and the use of data capturing application was carried out. Few more enumerators were trained as a reserve team in case any enumerator could not continue with the exercise.

2.8.3 Pretesting

Testing the methodology of data collection and assessing the flow of questions in the questionnaire are two important aspects of pre-test, which must be carried out before the actual fieldwork. A major concern during the development of the questionnaire was that it should present a clear understanding of the questions, ease the burden on the respondents in terms of clarity particularly for children aged below 10 years and minimize field problems. To achieve this goal, the questionnaire was pre-tested among the survey core teams' just weeks before the main training. The pre-test yielded invaluable information on the extent of respondent burden, flow of the questions, interviewer workload and was particularly valuable in providing in-depth responses for all the questions in the questionnaire, and the instructions or interviewing procedures that might affect the quality of the data. In addition, the pre-test served as practical training and guide for the members of the Project Implementation Team, especially on the use of the Computer-Assisted Personal Interview (CAPI) system.

2.8.4 Pilot testing

The pilot mainly tests whether the survey tool of CAPI applications and the questionnaire were adequate enough to provide the required data within a specified time. The pilot did not involve testing the adequacy of logistics and administrative arrangements on the ground; rather it focused the clarity of the questions to trigger the correct responses. The pilot test helped to review and improve the flow of the survey questions and iron out the ambiguous questions. The data collected from pilot survey was used to generate a snapshot of statistical tables.

The pilot test was conducted in both primary and secondary schools and involved an equal number of school-age children and adolescents. The pilot test managed to estimate the time used to complete an interview for one respondent across age range and sex. A general review session was held after the pilot test to discuss the findings from the field and address any challenges or deficiencies in the questionnaires. The process helped to finalize the survey instruments.

2.8.5 Survey publicity and advocacy

The most convenient method used for publicity and advocacy was awareness creation through meetings held with several stakeholders of the survey starting with higher hierarchy of directorates from Ministry of Health and Ministry of Education and Vocational Training, school headmasters and parents or guardians of the selected schools and students, respectively. Through school courtesy call meetings,

the parents and/or guardians were informed about the upcoming survey, hence their consent was central for the success of the survey. Moreover, the targeted school-age children and adolescents were given consent forms so that their parents and/or guardians could sign them as approval for student participation in the study. This approach proved to be effective in informing responding parents and/or guardians about the survey to minimize the non-response rate.

2.9 Data collection

The questionnaires were developed to reflect health and nutrition issues among children and adolescents aged 5–19 years. The same questionnaires were used to collect information on the biomarker. Moreover, school-age children and adolescents were asked questions on the following topics: demographic characteristics, socioeconomic status, physical activities, WASH and female menstrual attributes. Dietary characteristics (food preference, eating habits, food frequency and food security), socio-emotional development and health/supplementation were also included. The Prime Diet Quality Score (PDQS), which is a 21-unit food-based score developed using a modified Prime Screening questionnaire, was calculated for each participant.

2.9.1 Individual questionnaire

Individual questionnaires were completed for all the eligible children and adolescents aged 5–19 years, who were enrolled at the sampled schools. Some questions were specific for different age groups: children aged 5–9 years, adolescents aged 10–14 years and adolescents aged 15–19 years. The individual questionnaires included the modules listed in Table 4.

Table 4 Modules for individual questionnaire

S. No.	Questionnaire modules	Information collected
1	Demographic information	Date of birth, sex, birth order, parents' education, employment status and wealth
2	Household resources information	Detailed information on wealth index
3	Physical activity	Light, vigorous, walking and seating physical activities
4	Water, sanitation and hygiene (WASH) practices	Sources of drinking water and water treatment methods, household sanitation and WASH facilities
5	Female menstruation, 10–19 years	Awareness, experience, materials used during periods, missing school due to periods and its reasons
6	Eating habits	Food consumption (breakfast, eating fast food from restaurant) and hunger due to shortage of food
7	Dietary quality	Consumption of 21 food groups categorized as healthy or unhealthy food groups
8	Overall health	Health information (indicators and symptoms of communicable diseases like diarrhoea)
9	Disability	Washington Group Disability questionnaire that assessed those who have long-term physical, mental, intellectual or sensory impairments, which may hinder their full and effective participation

2.9.2 Malaria and anaemia testing

Blood samples were collected from selected school-age children and adolescents to determine the presence of malarial parasites and haemoglobin (Hb) level. Sterile needles were used to make a prick on the finger of each pupil to collect the blood samples. Less than 300 μl of blood was drawn using a loop for a rapid diagnostic test (RDT) for malaria investigation as recommended by the National Guidelines for Diagnosis and Treatment of Malaria (26) to detect Plasmodium falciparum and other plasmodia. Haemoglobin concentration was measured using a drop of blood obtained via finger prick and then stored in microcuvettes, which were inserted into the hemoglobinometer to determine the Hb concentration.

2.9.3 Anthropometric measurements

The height and weight of each participant were measured/taken (school-age children and adolescents aged 5–19 years) during the survey.

> The study used the following instruments:
>
> **Height-measuring board:** Height (cm) was measured without shoes using a height-measuring board (Shorr Productions, Maryland, USA) with a precision of 0.1cm.
>
> **SECA electronic scale:** The weight of each pupil was measured using Seca electronic scale (Seca GmbH and Co.kg 22061, Hamburg, Germany) with a precision of 100 g. School-age children and adolescents were measured lightly dressed without shoes during the measurement.

2.10 Data management

Data for this survey was collected using a tablet-based questionnaire programmed with the survey solution (CAPI system). The survey instrument was translated from English to Kiswahili for clarity, accessibility and easy comprehension during the interviews. The software was programmed with inbuilt checks on consistency to ensure out of range values are not entered. Samsung tablets (Galaxy Tab A SM-T585) with pre-installed questionnaires were used to collect data from study participants and capture geolocation parameters (place, latitude, longitude and altitude). The information obtained was transmitted on a daily basis to the server located at the headquarters (OCGS Zanzibar).

Prior to initiation of the survey, screening questions were asked to determine the eligibility of the potential respondents. After a random selection of the respondents and obtaining their informed consent, a unique identification number was provided on the survey form to identify the respondent for all subsequent study tools and information collection.

Data transmission involved uploading of data onto to the cloud server after every session of data entry. Before being downloaded, the data had to go through a chain of supervisors for verification and approval. Only valid responses were approved and sent to the server ready for cleaning and data analysis. The same data was downloaded daily from the cloud server encrypted to the local server located at the TFNC headquarters.

Internet connectivity was provided through data bundles to enable transmission of data to the cloud servers. Data backup was done using external hard disks and local servers at the headquarters. Data security was achieved through several methods including data encryption, secure file transfer and passwords.

2.10.1 Quality control

Extensive field supervision took place throughout the fieldwork. The quality control team paired with the survey team visiting schools on some occasions to observe the student selection protocol and standard operating procedures. Data submitted by interviewers were checked for completeness and consistency by the field supervisors. Supervisors ensured that call-backs were made to maximize the response rate. The completion of data collection in a school was followed by the data being sent to the chain of supervisors for validation and approval by the data processing team. Logic checks were installed in the CAPI system to trigger the correct responses against respondents.

In addition, there was a periodic monitoring of fieldwork. Such monitoring from the headquarters ensured that the questions were asked correctly to elicit the correct responses. Since the survey involved blood sample collection, the field monitors ensured that the teams had adequate logistics support to undertake their assigned work without interruption. Occasionally, the monitors had meetings with teams in the field to check the quality/quantity of work the teams undertook and advised them accordingly when there were any apparent lapses.

2.10.2 Data cleaning

Data cleaning was done by a well-trained team through screening for duplicates, incompleteness, misspelling, irrelevance and inconsistent values, which were identified and corrected. The task was accomplished using Microsoft Excel and analysed using STATA version 15 (STATA Corporation, College Station, TX, USA).

2.10.3 Data analysis

Simple descriptive analyses were assumed in Microsoft Excel for routine reporting on the schools, districts, regional level authorities and OCGS. The geo-located school summary data was used to develop maps and the distribution of various indicators. Descriptive results are expressed as means for continuous variables and proportions for categorical variables.

The prevalence of anaemia was presented by showing the proportion of Hb level based on the cut-off points by age categories and the levels of anaemia (presence of anaemia, severe, moderate and mild). Maps, bar charts and tables help to illustrate the nutrition status of school children and adolescents with the interpretation made following the anthropometric measurements using the specific cut-off points for a specific age group category. Following the anthropometric measures, the proportion of severe, moderate and obesity/overweight malnutrition children across background characteristics was presented based on the specific age group. PDQS was computed and presented on bar charts base on food groups consumed by school children and adolescents in the past one week after grouping the food groups as healthy and unhealthy classes based on scores allocated.

The data were analysed by using STATA 15 statistical package. Bivariate analysis using chi-square test for categorical variables and t-test and ANOVA for continuous variables were conducted to assess the association between individual overall PDQS scores and socioeconomic and demographic factors. We also conducted linear regression analysis to assess the predictors of PDQS scores and reported unadjusted beta coefficients and associated 95% confidence interval (CI).

2.11 **Ethical considerations**

Ethical clearance was obtained from the Zanzibar Medical Research and Ethics Committee before the survey. This study involved vulnerable population (individuals aged below 18 years) and collection of the blood sample. As such, strict measures were taken to ensure their protection and safety. In this regard, the Principal Investigator, other co-investigators and field staff were trained on how to ensure human subject protection. School committees consented for the involvement of schools in the study through various school sensitization meetings. Parents/guardians of the selected school children and adolescents were informed and provided with consent forms, which they signed to allow their children's participation on the study.

2.11.1 Informed consent and assent procedures

As the ZSHNS targeted children and adolescents aged 5–19 years, consent/assent was requested before conducting the interviews. For the ZSHNS, consent/assent was obtained as follows:

I.   Both informed consent from parents/caregivers for children and adolescents 5–19 years of age and assent from children and adolescents 5–17 years of age.

II. Only informed consent from adolescents aged 18–19 years.
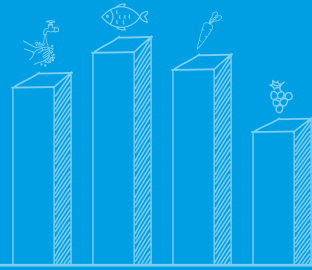
The participant information sheet and consent/assent form described the purpose of the study, the survey procedures including interviews, anthropometry and biological sample collection, the potential risks and benefits of participation, the right to refuse participation or answer any question, measures to ensure confidentiality and included the contact details for the study coordinators. The forms included consent/assent for the collection of survey interview data, anthropometric measurements, and blood, urine and stool samples. The consent/assent forms were translated into Kiswahili language. A copy of the consent/assent form was given to the children and adolescents aged 5–19 years if the participant was literate or was read out if the participant was illiterate. Only after all the questions had been answered did the children and adolescents aged 5–19 years sign the consent/assent form.

2.11.2 Risks and benefits

There were no significant risks from participating in the survey or from the collection of anthropometric data. Interviewer training focused on providing assurance to the participants about their confidentiality and alleviating possible discomfort when answering potentially sensitive questions (e.g., past illness, socioeconomic status, household sanitation facilities). Interviewers were trained to elicit information in a non-judgmental way. Efforts were also made to minimize discomfort during the anthropometric measurements. The risk of adverse events during the collection of biological samples was related to phlebotomy. The phlebotomists explained the procedure in detail prior to starting and comforted the child during the procedure. Younger children sat on their parents' lap during the blood draw. A juice drink and biscuits were provided to all the survey participants immediately after the blood collection and participants were monitored for a few minutes after the blood was drawn to ensure there was no bleeding, serious bruising or fainting.

2.11.3 Compensation/incentives

No compensation was provided for participating in the survey. However, participants were notified that their laboratory results and anthropometric measurements were shared with them immediately after data collection.

BACKGROUND INFORMATION OF THE STUDY PARTICIPANTS

3.0 **Introduction**

This chapter presents background characteristics of the study participants.

3.1 **Demographic characteristics**

The ZSHNS was implemented in all 11 districts of Zanzibar. The demographic and socioeconomic characteristics of the survey population including age, sex, place of residence, caregiver's schooling and household wealth status is presented in Table 5. A Slightly higher proportion (51.7 per cent; 1,322) of the study participants were girls. Almost 2 in 5 were individuals from 10–14 years, and most of them were from primary school. Slightly over 5 in 10 were residing in urban areas.

Table 5 Social demographic characteristics of the study participants (5–19 years; N=2,556)

Background characteristics	Number	Percentage (%)
Sex		
Male	1,234	48.3
Female	1,322	51.7
Age		
5 – 9	784	30.7
10 – 14	1,058	41.4
15 – 19	714	27.9
Level of education		
Primary	1,768	69.1
Secondary	788	30.8
Area		
Rural	1,194	46.7
Urban	1,362	53.3
Total	**2,556**	**100**

3.2 **Socioeconomic characteristics (Wealthy Index)**

To assess the wealth index, household wealth was assessed as an indicator of socioeconomic status according to a standard approach in equity analysis [20]. Durable household assets indicative of wealth (i.e., telephone, radio, TV, refrigerator, lantern, cupboard, houses with electricity, motorcycle, bicycle, cart etc.) were recorded as (1) "available and in working condition" or (0) "not available and/or not in working condition." These assets were analysed using principal components analysis (PCA). The component resulting from this analysis was used to categorize households into two approximate quintiles with the following categories: Lowest, Second, Middle, Fourth and Highest quintile.

The percentage distribution of wealthy quintile among the participants surveyed was assessed and results showed that the majority of the urban residences reported belonging to the highest wealthy quintile (28.6 per cent) than residences from rural areas (7.7 per cent) and vice versa. Furthermore, Mjini Magharibi (Zanzibar Urban West) reported to have majority of its residences belonging to high wealthy

quintile compared to residences of Kaskazini Unguja (Zanzibar Unguja North) where majority were from the lowest quintile (see Table 6).

Table 6	Wealth quintile: Percentage distribution of the de jure population by wealth quintiles, according to residence and region (N=2,556)					
Variable	**Number of persons**	**Wealth quintile**				
		Lowest	**Second**	**Middle**	**Fourth**	**Highest**
Residence						
Rural	1194	31.2	25.1	19.9	16.2	7.7
Urban	1362	11.6	14.2	10.3	25.3	28.6
District						
Kaskazini A	184	41.3	21.7	18.5	12.5	6.0
Kaskazini B	196	29.1	25.5	24.0	12.8	8.7
Kati	196	12.2	22.5	21.4	27.6	16.3
Kusini	196	11.7	26.5	20.9	28.1	12.8
Mjini	264	2.7	5.3	19.7	29.9	42.4
Magharibi A	305	16.4	15.1	22.6	23.9	22.0
Magharibi B	332	5.1	8.7	17.8	26.2	42.2
Wete	251	31.9	24.7	20.3	14.3	8.8
Micheweni	195	35.9	30.3	16.9	10.3	6.7
Chakechake	219	24.7	18.7	24.2	18.3	14.2
Mkoani	218	33.0	25.7	14.7	21.1	5.5
Region						
Kaskazini Unguja	380	35	23.7	21.3	12.6	7.4
Kusini Unguja	392	12	24.5	21.7	27.8	14.5
Mjini Magharibi	901	8.2	10	20	26.5	35.4
Kaskazini Pemba	446	33.6	27.1	18.8	12.6	7.8
Kusini Pemba	437	28.8	22.2	19.5	19.7	9.8
Total	**2556**	**20.7**	**19.2**	**20.1**	**21.1**	**18.9**
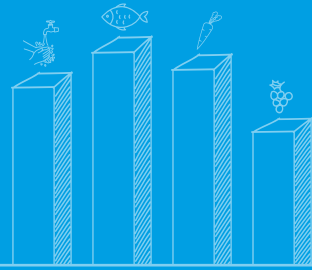
PREVALENCE OF MALNUTRITION

4.0 Determinants of underweight and overweight/obesity among children and adolescents aged 5–19 years

The results of the Poisson regression model in Table 7 showed that the overall rates of obese increased significantly with increasing age. Compared to 5- to 9-year-old children, the proportion of children and adolescents who are obese increased by 3.7-fold among children aged 10–14 years and was higher by 3.8-fold among adolescents aged 15–19 years. The proportion of children and adolescents aged 5–19 years with overnutrition was 70 per cent higher among males as compared to females. Likewise, males were 30 per cent less likely to be overweight/obese. Compared to government school students, the proportion of children and adolescents who are obese increased by 3.8-fold among private school students. Underweight was 80 per cent higher among students in primary schools compared to those in secondary schools. Prevalence of obesity was 50 per cent lower among primary school children compared to secondary school children. Compared to Kaskazini Unguja, the proportion of children and adolescents who are obese increased by 2.2-fold among those living in Kusini Unguja. Compared to Kaskazini Unguja, those living in Kusini Unguja had 2.2-fold higher prevalence of being overweight/obese. Additionally, the prevalence of overweight/obesity varies with wealth, with 50 per cent reduced probability of being overweight/obese if children were from poor households.

Table 7 Determinants of underweight and overweight/obesity using CDC percentile calculator stratified by socioeconomic and demographic characteristics

Variable	Underweight vs normal, UPR 95% CI	p-value	Overweight/obese vs normal, UPR 95% CI	p-value
Age in years				
5–9	1		1	
10–14	0.6 (0.5–0.8)	<0.001	3.7 (2.2–6.3)	<0.001
15–19	0.6 (0.5–0.8)	<0.001	3.8 (2.2–6.6)	<0.001
Gender				
Male	1.7 (1.4–2.1)	<0.001	0.3 (0.2–0.5)	<0.001
Female	1		1	
Ownership				
Private	1.1 (0.6–1.9)	0.875	3.8 (2.2–6.5)	<0.001
Government	1		1	
Level				
Primary	1.8 (1.4–2.3)	<0.001	0.5 (0.4–0.7)	<0.001
Secondary	1		1	
Residence				
Rural	1.1 (0.9–1.4)	0.231	0.8 (0.6–1.1)	0.109
Urban	1		1	
Region				
Kaskazini Unguja	1		1	
Kusini Unguja	1.1 (0.7–1.5)	0.767	2.2 (1.3–3.8)	0.005

Variable	Underweight vs normal, UPR 95% CI	p-value	Overweight/obese vs normal, UPR 95% CI	p-value
Mjini Magharibi	1.0 (0.7–1.4)	0.953	1.3 (0.8–2.2)	0.308
Kaskazini Pemba	1.1 (0.8–1.6)	0.614	0.7 (0.4–1.4)	0.345
Kusini Pemba	1.1 (0.8–1.6)	0.547	0.8 (0.4–1.6)	0.583
Wealth quintile				
Lowest	1.2 (0.8–1.7)	0.328	0.5 (0.3–0.8)	0.004
Second	1.3 (0.9–1.8)	0.135	0.5 (0.3–0.8)	0.008
Middle	1.6 (1.2–2.3)	0.003	0.7 (0.4–1.2)	0.214
Fourth	1.3 (0.9–1.8)	0.208	1.4 (0.9–2.2)	0.111
Highest	1		1	

4.1 Overall prevalence of malnutrition

Overall, the prevalence of malnutrition defined as malnutrition of any kind (stunting, underweight, thinness, overweight or anaemia) in Zanzibar was 58.4 per cent (Figure 1). At least 41.6 per cent of children had one form of malnutrition (Figure 1).

Figure 1: Proportion of children and adolescents aged 5–19 years with and without malnutrition in Zanzibar (N=2,556)
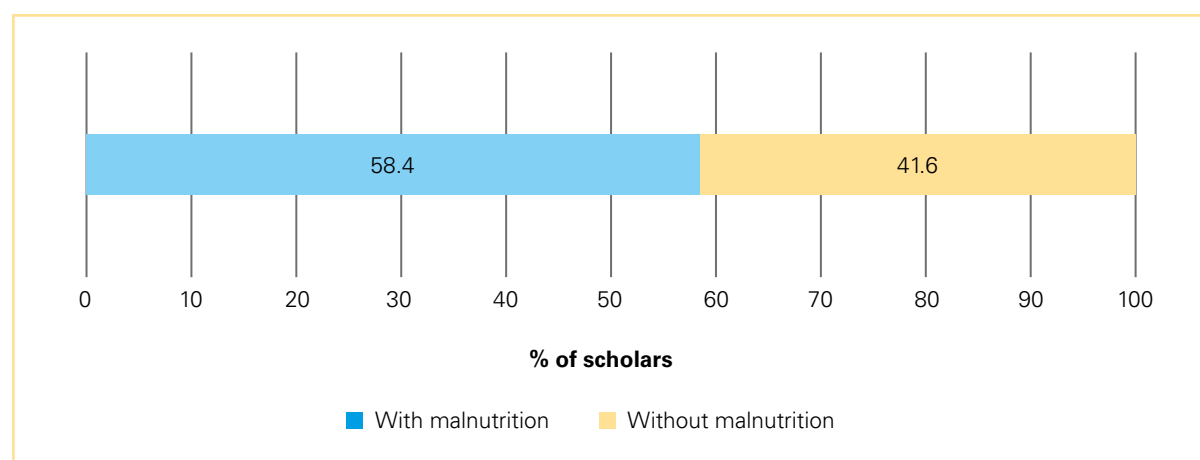
4.2 Prevalence of multiple forms of malnutrition

The overall prevalence of the double burden of malnutrition (DBM), characterized by the coexistence of both undernutrition and overnutrition, was observed to be 12.0 per cent in Zanzibar. Similarly, the overall prevalence of the triple burden of malnutrition, defined as simultaneous presence of undernutrition, micronutrient deficiencies and overnutrition, in Zanzibar was 1.8 per cent (refer to Figure 2 for a graphical representation).

Figure 2: Proportion of children and adolescents aged 5–19 years stratified by single and multiple malnutrition (N=2,556)
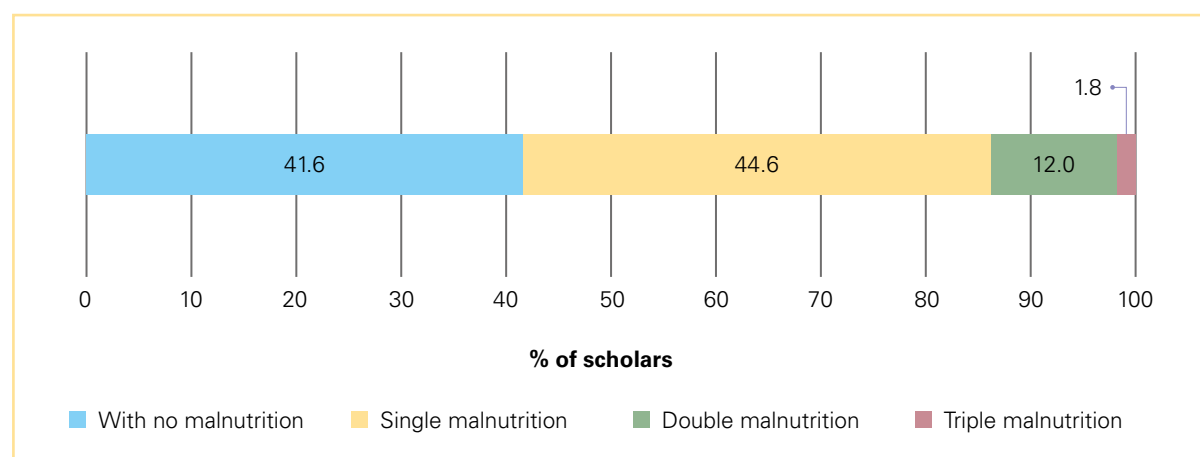
4.3 Nutrition status by socioeconomic and demographic characteristics

Table 8 describes distribution of nutrition by socioeconomic and demographic characteristics. Overall, while the prevalence of single malnutrition was evenly distributed according to age, the burden of triple malnutrition was higher among 5–9 years children. There was no gender variation in the proportion of individuals with triple burden of malnutrition. Government and primary school students and those residing in Magharibi A had the highest prevalence of triple malnutrition.

Table 8 Distribution of nutrition status by socioeconomic and demographic characteristics

Variable	N	Good nutrition (%)	Single malnutrition (%)	Double malnutrition (%)	Triple malnutrition (%)
Age in years					
5–9	784	40.0	46.2	8.6	5.2
10–14	1,058	42.6	44.2	13.2	0.0
15–19	714	41.7	43.6	14.0	0.7
Gender					
Male	1,234	44.4	40.4	13.3	1.9
Female	1,322	39.0	48.5	10.8	1.7
School					
Government	2,463	41.3	44.9	12.0	1.8
Private	93	50.5	36.6	11.8	1.1
Level					
Primary	1,763	41.5	44.7	11.5	2.3
Secondary	788	41.8	44.4	13.2	0.6

Variable	N	Good nutrition (%)	Single malnutrition (%)	Double malnutrition (%)	Triple malnutrition (%)
Settings					
Rural	1,194	40.9	45.2	12.1	1.8
Urban	1,362	42.2	44.1	11.9	1.8
District					
Kaskazini A	184	35.9	48.9	13.0	2.2
Kaskazini B	196	43.9	48.0	6.6	1.5
Kati	196	36.7	46.4	16.4	0.5
Kusini	196	39.3	47.5	10.7	2.5
Mjini	264	47.7	40.5	10.6	1.2
Magharibi A	305	42.6	44.6	9.8	3.0
Magharibi B	332	44.3	45.2	9.0	1.5
Wete	251	36.7	46.2	14.7	2.4
Micheweni	195	47.7	40.0	11.8	0.5
Chake Chake	219	41.6	42.0	14.6	1.8
Mkoani	218	38.0	42.7	17.0	2.3
Region					
Kaskazini Unguja	380	40.0	48.4	9.7	1.9
Kusini Unguja	392	38.0	46.9	13.5	1.6
Mjini Magharibi	901	44.7	43.6	9.8	1.9
Kaskazini Pemba	446	41.5	43.5	13.4	1.6
Kusini Pemba	437	39.8	42.3	15.8	2.1
Wealth quintile					
Lowest	530	39.2	44.5	13.8	2.5
Second	493	42.8	43.8	11.6	1.8
Middle	513	39.4	47.0	11.3	2.3
Fourth	538	41.3	45.5	12.3	0.9
Highest	482	45.6	41.9	11.0	1.5
Total	**2,556**	**45.6**	**41.9**	**11.0**	**1.5**

4.4 **Introduction**

A comprehensive set of anthropometric measures were collected in the ZSHNS by measuring the height and weight of all children and adolescents involved in the study. This survey mainly set out to estimate the prevalence of triple burden of malnutrition comprising (a) stunting, (b) underweight, (c) overweight/ obesity among school-age children (5–9 years), early adolescents (10–14 years) and late adolescents (15– 19 years) in primary and secondary schools in in Zanzibar. The key question to achieve this objective was: What is the nutritional status of children and adolescents in Zanzibar? Data were collected to calculate three indices – weight-for-age, height-for-age and weight-for-height. These measures of the nutritional status of children and adolescents in Zanzibar serve as a means to estimate undernutrition, overweight and obesity. Malnourished children and adolescents are at a higher risk of impaired growth, low immunity, poor mental development and mortality. As Zanzibar is undergoing dramatic transitions in economy, demography and nutrition, conditions of overweight and obesity are on the rise, thereby posing greater risks of non-communicable diseases such as diabetes, cardiovascular disease and hypertension in the population.

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Consequences of malnourishment in children and adolescents

Low immunity

Impaired growth

Poor mental development

Mortality
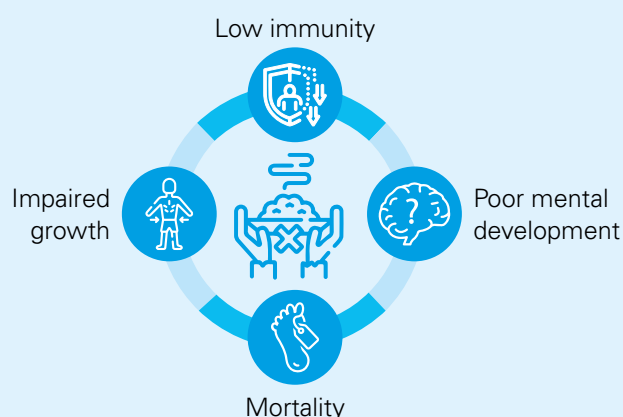
For this report, indicators of the nutritional status of children were calculated using the 2007 World Health Organization (WHO) standards [43]. WHO Child Growth Standards can facilitate the assessment of children all over the world, regardless of ethnicity, socioeconomic influences and feeding practices.

Height-for-age (HAZ) is an index for assessing stunting (chronic malnutrition in children). It indicates the linear growth retardation and cumulative growth deficits in children due to failure to receive adequate nutrition over a long period either as a result of chronic or recurrent malnutrition. Children with height-for-age Z-score of below minus two standard deviations (–2 SD) from the median of WHO reference population are short for their age (hence stunted), or chronically malnourished. Children who are below minus three standard deviations (–3 SD) are severely stunted. Height-for-age, therefore, represents the long-term effects of malnutrition in a population and not the recent, short-term changes in dietary intake.

The weight-for-height index (WHZ) measures body mass in relation to body height or length and describes the current nutritional status resulting from failure to receive adequate nutrition during the

period immediately preceding the survey and may result from inadequate food intake or a recent episode of illness causing loss of weight, leading to malnutrition. Children with Z-scores of below minus two standard deviations (–2 SD) are thin (wasted) or acutely malnourished. Children with a weight-for-height index of below minus three standard deviations (–3 SD) are considered severely wasted. The weight-for-height index also provides data on overweight and obesity. Children with more than two standard deviations (+2 SD) above the median weight-for-height are overweight or obese going by WHO standards.

Weight-for-age (WAZ) is a composite index of height-for-age and weight-for-height. It considers both chronic and acute malnutrition. Children with weight-for-age below minus two standard deviations (–2 SD) are underweight. Children with weight-for-age of below minus three standard deviations (–3 SD) are severely underweight based on WHO Child Growth Standards.

In this survey, we obtained anthropometric measurements for 2,556 study participants. Each interviewing team carried a lightweight, bathroom-type scale with a digital screen and measuring board. These scales were designed and manufactured with the support of United Nations Children's Fund (UNICEF). All the study participants were asked to stand during the measurement of their heights.

> Weight-for-age (WAZ) is a composite index of height-for-age and weight-for-height. It considers both chronic and acute malnutrition. Children with weight-for-age below minus two standard deviations (–2 SD) are underweight. Children with weight-for-age of below minus three standard deviations (–3 SD) are severely underweight based on WHO Child Growth Standards.

4.5 Prevalence of malnutrition stratified by the type of malnutrition

Figure 3 presents the nutritional status of children and adolescents aged 5–19 years stratified by the type of malnutrition and demographic characteristics. Overall, 45.7 per cent were anaemic, 15.6 per cent were stunted, 13.9 per cent were underweight and 8.4 per cent were overweight/obese.

Figure 3: Prevalence of stunting, underweight, anaemia and overweight/obesity among primary and secondary school children aged 5–19 years using WHO AnthroPlus Software (N=2,556)
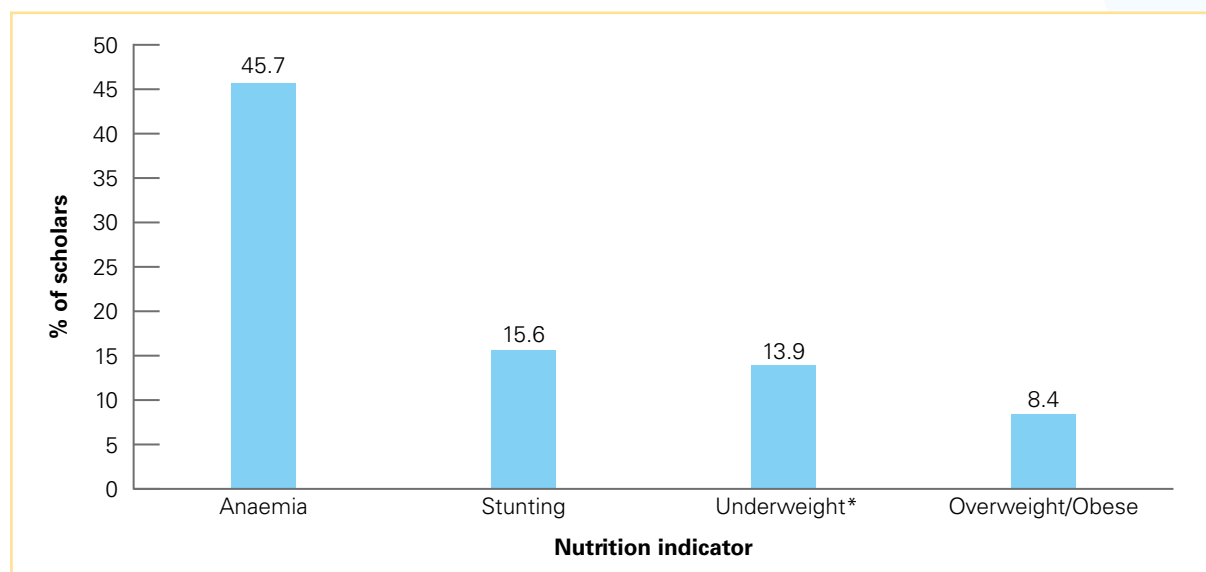
Malnutrition in school-age children (5–9 years) (n=784)

≫ 10.2 per cent were stunted (HAZ < –2 SD)

≫ 14.0 per cent were underweight (WAZ < –2 SD)

≫ 9.2 per cent were thin (BMI-for-age < –2 SD)

≫ 3.2 per cent were overweight or obese (BMI-for-age >1 SD)

Malnutrition in school-age children (10–14 years) (n=1,058)

≫ 19.1 per cent were stunted (HAZ < –2 SD)

≫ 9.6 per cent were thin (BMI-for-age < –2 SD)

≫ 10.5 per cent were overweight (BMI-for-age >1 SD)

Malnutrition in adolescents (15–19 years) (n=714)

≫ 16.4 per cent were stunted (HAZ < –2 SD)

≫ 8.1 per cent were thin (BMI-for-age < –2 SD)

≫ 10.9 per cent were overweight (BMI-for-age > 1 SD)

4.6 Prevalence of stunting or height-for-age among SAC

4.6.1 Stunting or height-for-age among SAC by district

The stunting among school-age children and adolescents stood at 15.6 per cent (see Figure 4), varying with gender and residence.

Figure 4: Prevalence of stunting among children and adolescents aged 5–19 years by district in Zanzibar
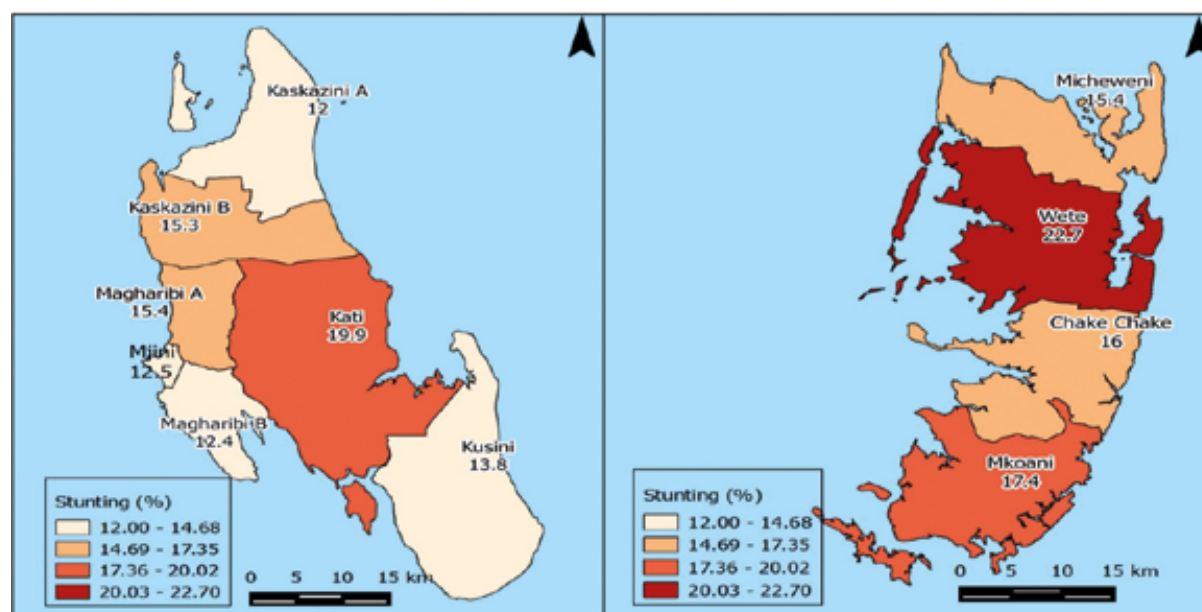
The prevalence thresholds and patterns for stunting or height-for-age stratified by demographic characteristics among children and adolescents aged 5–19 years are as described below.

Sex

≫ Over 1 in 5 boys (21.0 per cent) are stunted in Zanzibar compared to 1 in 10 girls (10.6 per cent).

Age

≫ Malnutrition in older children and adolescents produced a pattern that differed from that of under-five children. Overall, 10.2 per cent of children aged 5–9 years were stunted. In older children, the conditions of malnutrition have largely been set and do not vary significantly through later childhood and adolescence. The prevalence of stunting was 19.1 and 16.4 per cent, respectively, among those aged 10–14 and 15–19 years (Table 10). Implicitly, there is no catch-up growth during this school-age period of childhood. At the age of 10, the prevalence of stunting began to gradually increase.

Residence

≫ The prevalence of stunting did slightly vary by residence. Almost 16.3 per cent of students from rural schools and 15.1 per cent from urban schools in Zanzibar are stunted.

Region

≫ The prevalence of stunting was highest in Kaskazini Pemba (19.5 per cent) and lowest in Mjini Magharibi (13.4 per cent).

Districts

≫ The prevalence of stunting among school-age children and adolescents aged 5–19 years was the lowest in Kaskazini A (12 per cent) and Magharibi B (12.4 per cent) and the highest in Wete (22.7 per cent).

4.6.2 Determinants of stunting

The results of the Poisson regression model in Table 9 shows that the overall rates of stunting increased significantly at the early adolescent age and started to drop at the late adolescent age. Proportion of children and adolescents aged 5–19 years who are stunted is 90 per cent greater among 10- to 14-year-old children, and 60 per cent higher when they reach 15–19 years. Additionally, the rates of stunting were 100 per cent higher among males compared to their female counterparts (UPR 2.0 (95% CI, 1.6–2.4)). Although not statistically significant, children schooling in government schools were more likely to be stunted compared to those from private schools. Furthermore, compared to the highest quantile, children belonging to the lowest socioeconomic households had a 40 per cent higher prevalence rate of being stunted, with a PR of 1.4 (95% CI, 1.05–1.8). Additionally, the prevalence of stunting varies among regions in Zanzibar although not statistically significant.

Table 9   Factors associated with stunting

Variable	UPR95% CI	p-value
Age in years		
5–9	1	
10–14	1.9(1.5–2.4)	<0.001
15–19	1.6(1.2–2.1)	<0.001
Gender		
Male	2.0(1.6–2.4)	<0.001
Female	1	
Ownership		
Private	1	
Government	1.5 (0.8–2.7)	0.204
Level		
Primary	1.2 (1.0–1.5)	0.047
Secondary	1	
Residence		
Rural	0.9 (0.8–1.1)	0.406
Urban	1	
Region		
Kaskazini Unguja	1	
Kusini Unguja	1.2 (0.9–1.7)	0.225
Mjini Magharibi	1.0 (0.7–1.3)	0.903
Kaskazini Pemba	1.4 (1.04–2.0)	0.027
Kusini Pemba	1.2 (0.9–1.7)	0.233
Wealth quintile		
Lowest	1.4 (1.05–1.8)	0.022
Second	1.0 (0.8–1.4)	0.828
Middle	1.2 (0.9–1.6)	0.253
Fourth	0.8 (0.6–1.2)	0.292
Highest	1	

4.7 Underweight or weight-for-age SAC (5–10 years)

According to WHO, the weight-for-age reference data are not available beyond the age of 10 because this indicator does not distinguish between height and body mass in the period when many children experience the pubertal growth spurt and may appear to have excess weight (by weight-for-age) when, in fact, they are just tall [44]. The overall prevalence of underweight among school children aged 5–10 years was 13.9 per cent.

The prevalence thresholds and patterns for underweight are as follows:

Sex

≫ Among school children aged 5–10 years, the prevalence of underweight varied by sex with a higher percentage of underweight being among boys (16.7 per cent) compared to girls (11.4 per cent).

Age

≫ Among school children aged 5–10 years, the prevalence of underweight is 13.9 per cent.

Residence

≫ The prevalence of underweight did not vary by residence, with 14.2 per cent of the children from the urban areas and 13.7 per cent of rural children being underweight.

Region

≫ Among school children aged 5–10 years, the prevalence of underweight was the highest in Kusini Pemba (17.9 per cent) and the lowest in Mjini Magharibi (10.6 per cent).

Districts

≫ The prevalence of underweight was the lowest in Magharibi B (8.7 per cent) and the highest in Mkoani (18.5 per cent) (Figure 5).

Figure 5: Prevalence of underweight among school-age children by district
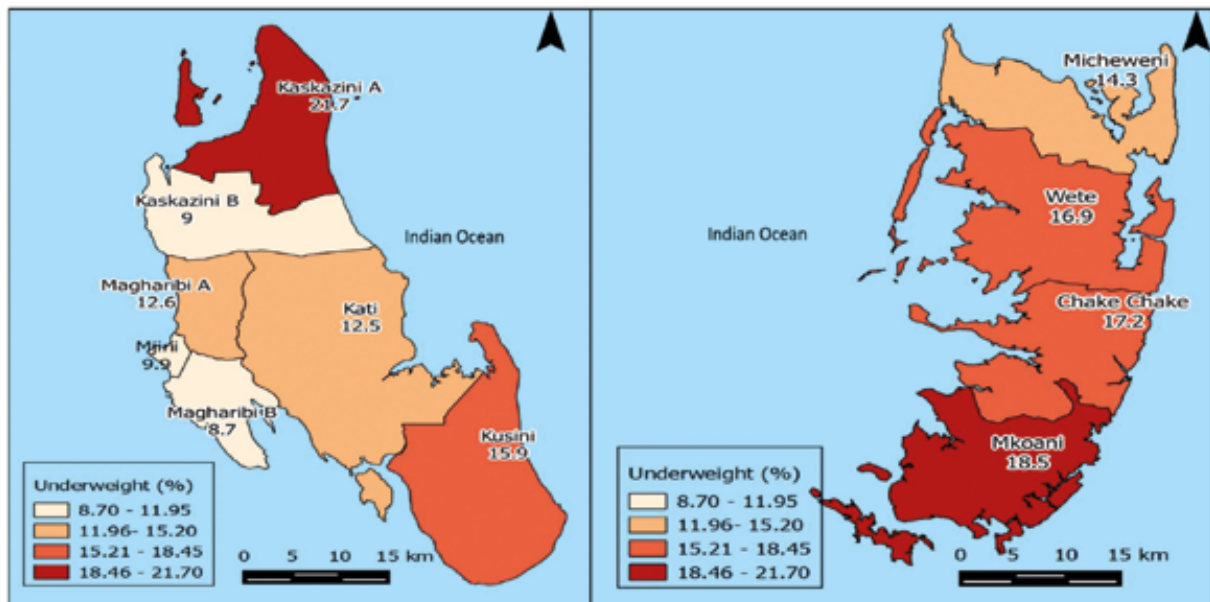
4.8 **Thinness or low body mass index (BMI)-for-age**

For adolescents, underweight as measured by weight-for-age is not used; however, BMI-for-age is recommended instead as presented below. According to WHO body mass index (BMI) for age Z-score standard [44], the prevalence of thinness among school children was 9.0 per cent (Table 8).

Figure 6: Prevalence of thinness among school-age children by district
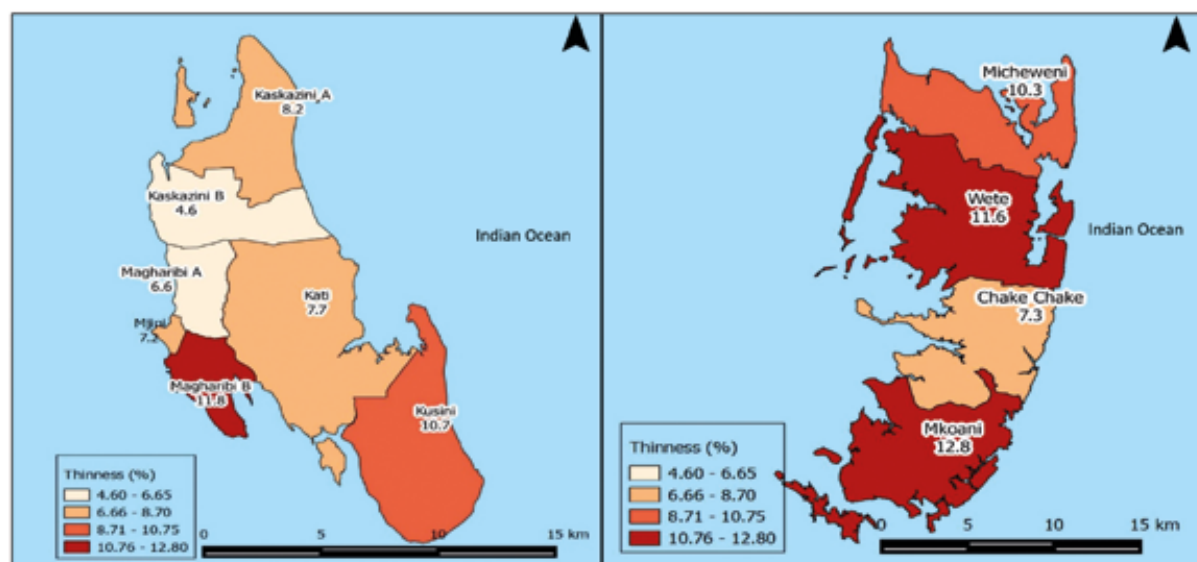
The prevalence thresholds and patterns for thinness or low body mass index (BMI)-for-age are as follows:

Sex

➤ The prevalence of thinness was higher among boys (11.5 per cent) than in girls (6.7 per cent).

Age

➤ The prevalence of thinness was highest (9.6 per cent) among 10- to 14-year-old children as compared to 9.2 per cent among children aged 5–9 years, and among older group of 15- to 19-year-olds (8.1 per cent).

Residence

➤ Thinness was more prevalent in urban areas (9.2 per cent) than in rural areas (8.9 per cent).

Region

➤ Among school-age children and adolescents aged 5–19 years, the prevalence of thinness was the highest in Kaskazini Pemba (11.0 per cent) and lowest in Kaskazini Unguja (6.3 per cent).

Districts

➤ The prevalence of thinness was the highest in Mkoani (12.8 per cent) and the lowest was in Kaskazini B (4.6 per cent).

4.9 **Overweight children**

According to WHO, overweight is BMI-for-age greater than 1 standard deviation above the WHO growth reference median whereas obesity is greater than 2 standard deviations above the WHO growth reference median. The results of this survey indicate that only 8.4 per cent of school-age children and adolescents aged 5–19 years are overweight. About 2.2 per cent of children aged 5–19 years were obese (BMI > +2SD) (Table 10).

Figure 7: Prevalence of overweight among school-age children by district
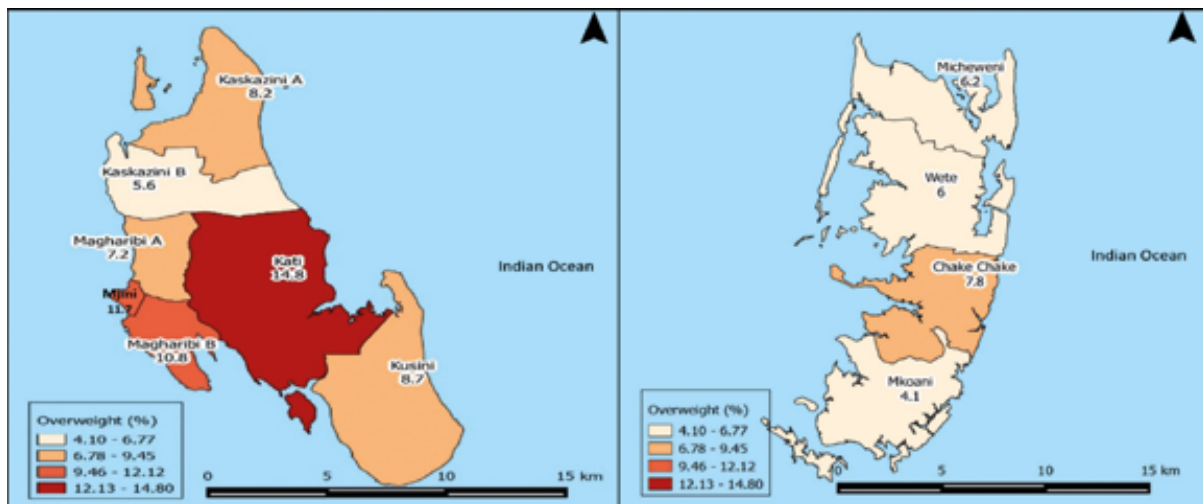
The prevalence thresholds and patterns for overweight are as follows:

Sex

➤ The rate of obesity and overweight were higher in girls (12.3 per cent) than boys (4.1 per cent).

Age

➤ In contrast, school-age children and adolescents in the higher age group (15–19 years) were more overweight (10.9 per cent) compared to the younger age group of 5- to 9-year-olds (3.2 per cent).

Residence

➤ School-aged children and adolescents in urban areas were more overweight (9.5 per cent) as compared to (7.0 per cent) those in rural areas.

Region

➤ Among school-age children and adolescents aged 5–19 years, the prevalence of overweight was the highest in Kusini Unguja (11.7 per cent) and lowest in Kaskazini Pemba (6.0. per cent).

Districts

➤ The prevalence of overweight was higher in Kati (14.8 per cent) and lowest in Mkoani (4.1 per cent).

Table 10 Proportion of children aged 5–19 years classified as malnourished according to three anthropometric indices of nutritional status

Variable	Height-for-age			Weight-for-age				BMI-for-age				
	Stunted (<-2 SD)	Severe stunting (<-3 SD)	n	Underweight (<-2 SD)	Moderate underweight (<-2 SD & ≥ -3 SD)	Severe underweight (<-3)	n	Overweight (BAZ>1SD)	Obesity (BAZ>2SD)	Thinness (BAZ<-2)	Severe thinness (BAZ<-3)	n
Age in years												
5–9	10.2	1.0	784	NA	NA	NA	NA	3.2	0.6	9.2	1.8	784
10–14	19.1	3.2	1,058	NA	NA	NA	NA	10.5	3.0	9.6	2.2	1,058
15–19	16.4	2.2	714	NA	NA	NA	NA	10.9	2.7	8.1	1.0	714
Gender												
Male	21.0	3.7	1,234	16.7	13.0	3.7	377	4.1	1.0	11.5	2.8	1,234
Female	10.6	0.9	1,322	11.4	10.2	1.2	422	12.3	3.3	6.7	0.8	1,322
Ownership												
Government	15.8	2.3	2,463	13.8	11.4	2.4	793	7.8	1.8	9.1	1.8	2,463
Private	10.8	0.0	93	33.3	33.3	0.0	6	23.7	11.8	6.5	0.0	93
Level												
Primary	16.6	2.6	1,768	13.9	11.5	2.4	789	6.4	1.5	10.4	2.1	1,768
Secondary	13.4	1.5	788	10.0	10.0	0.0	10	12.8	3.7	6.1	0.9	788
Residence												
Rural	16.3	2.7	1,194	13.7	10.6	3.0	432	7.0	1.8	8.9	1.8	1,194
Urban	15.1	1.9	1,362	14.2	12.5	1.6	367	9.5	2.5	9.2	1.6	1,362
Region												
Kaskazini Unguja	13.7	1.1	380	15.4	12.5	2.9	136	6.8	2.1	6.3	0.5	380
Kusini Unguja	16.8	2.0	392	14.7	12.8	1.8	109	11.7	2.6	9.2	0.8	392
Mjini Magharibi	13.4	1.7	901	10.6	9.6	1.0	303	9.9	3.1	8.7	1.7	901

Variable	Height-for-age			Weight-for-age				BMI-for-age				
	Stunted (<-2 SD)	Severe stunting (<-3 SD)	n	Underweight (<-2 SD)	Moderate underweight (<-2 SD & ≥ -3 SD)	Severe underweight (<-3)	n	Overweight (BAZ>1SD)	Obesity (BAZ>2SD)	Thinness (BAZ<-2)	Severe thinness (BAZ<-3)	n
Kaskazini Pemba	19.5	2.7	446	15.8	10.8	5.0	139	6.1	1.1	11.0	3.6	446
Kusini Pemba	16.7	4.4	437	17.9	15.2	2.7	112	6.0	1.1	10.1	1.8	437
Island												
Pemba	18.1	3.5	883	16.7	12.8	4.0	251	6.0	1.1	10.5	2.7	883
Unguja	14.3	1.6	1,673	12.6	11.0	1.6	548	9.6	2.8	8.3	1.2	1,673
Wealth quintile												
Lowest	19.8	3.6	530	17.7	14.3	3.4	147	4.7	1.1	8.3	2.1	530
Second	14.8	2.0	493	14.7	12.9	1.8	163	6.1	0.6	9.7	0.6	493
Middle	17.0	2.9	513	17.4	13.4	4.0	201	7.4	2.0	11.5	3.7	513
Fourth	12.1	1.3	538	8.7	8.1	0.6	173	13.8	3.5	8.0	0.9	538
Highest	14.3	1.5	482	9.6	7.8	1.7	115	9.8	3.7	7.7	1.2	482
Total	**15.6**	**2.3**	**2,556**	**13.9**	**11.5**	**2.4**	**799**	**8.4**	**2.2**	**9.0**	**1.7**	**2,556**

This table is based on children with valid dates of birth (month and year) and valid measurement of both height and weight.

[1] Weight-for-age reference data are not available beyond the age of 10 because this indicator does not distinguish between height and body mass during an age period when many children experience the pubertal growth spurt and may appear as having excess weight (by weight-for-age) when in fact they are just tall. As such, weight-for-age analysis in this report was done only covering 5 to 10 years.

NA: means 'Not applicable'

4.10 Determinants of malnutrition among children and adolescents aged 5–19 years in Zanzibar

The findings of the multinomial regression model (Table 11) comparing malnutrition prevalence rates across different age groups – 5–9, 10–14 and 15–19 years – revealed that the prevalence of malnutrition is equally likely to occur in both age groups. The proportion of students and adolescents aged 5–19 years with malnutrition in Zanzibar is 10 per cent greater if it is a girl (PR = 1.1; 95% CI, 1.02–1.2). While both private and government ownership did not show any statistical significance, but children and adolescents in private schools exhibited a lower malnutrition prevalence rate compared to those from government schools (UPR = 0.8; 95% CI, 0.7–1). Comparing lower and middle wealth quantiles to the highest, it was observed that the rates of malnutrition increased by 10 per cent when a child or adolescent aged 5–19 years is either living in a lower or middle social economic household. All islands of Zanzibar are equally affected by malnutrition with no statistically significant difference between the two islands. Similar trends were observed when comparing urban and rural settings.

Table 11 Determinants of malnutrition according to sociodemographic characteristics among primary and secondary school children in Zanzibar (N=2,556)

Variable	UPR95% CI	p-value
Age in years		
5–9	1	
10–14	1.0(0.9–1.03)	0.265
15–19	1.0(0.9–1.1)	0.508
Gender		
Male	1	
Female	1.1(1.02–1.2)	0.005
Ownership		
Private	1	
Government	0.8(0.7–1.0)	0.105
Level		
Primary	1.0(0.9–1.1)	0.911
Secondary	1	
Settings		
Rural	1.0(1.0–1.1)	0.490
Urban	1	
Region		
Kaskazini Unguja	1	
Kusini Unguja	1.0(0.9–1.2)	0.571
Mjini Magharibi	0.9(0.8–1.0)	0.111
Kaskazini Pemba	1.0(0.9–1.1)	0.666
Kusini Pemba	1.0(0.9–1.1)	0.958

Variable	UPR95% CI	p-value
Wealth quintile		
Lowest	1.1(1.01–1.2)	0.041
Second	1.1(0.9–1.2)	0.372
Middle	1.1(1.01–1.2)	0.047
Fourth	1.1(1.0–1.2)	0.161
Highest	1	

4.11 Determinants of single and multiple (double and triple) malnutrition in Zanzibar

Table 12 describes the predictors of single and multiple malnutrition among primary and secondary school children and adolescents aged 5–19 years in Zanzibar. Age neither predicts single nor multiple malnutrition. The proportion of students and adolescents aged 5–19 years with single malnutrition in Zanzibar increases by 40 per cent among girls (APR = 1.4, 95% CI, 1.2–1.6; p < 0.001). Moreover, although not statistically significant, but both single and multiple malnutrition rates were lower among children in private schools compared to government schools. In terms of wealth quintiles, lower quintiles were linked with both single and multiple malnutrition, although the associations of single malnutrition were not statistically significant. The proportion of students and adolescents aged 5–19 years with multiple malnutrition was 50 per cent greater if a student or adolescent is from poorest households (APR=1.5, 95% CI 1.03–2.2). The prevalence of single and multiple malnutrition varies across regions. Compared to Unguja Kaskazini, the proportion of children and adolescents aged 5–19 years with multiple malnutrition were 50 per cent higher if the child or adolescent is living in Kusini Pemba (APR=1.5, 95% CI, 1.01–2.4, p = 0.046).

Table 12 Predictors of single and multiple malnutrition among primary and secondary school scholars in Zanzibar (N=2,556)

Variable	Single malnutrition vs normal, APR 95% CI	p-value	Multiple malnutrition vs normal, APR 95% CI	p-value
Age in years				
5 to 9	1		1	
10 to 14	0.9(0.7-1.1)	0.290	0.9(0.7-1.2)	0.487
15-19	0.9(0.7-1.1)	0.374	1.0(0.7-1.3)	0.879
Gender				
Male	1		1	
Female	1.4(1.2-1.6)	<0.001	0.9(0.7-1.2)	0.578
Ownership				
Private	0.7(0.4-1.0)	0.075	0.8(0.4-1.5)	0.406
Government	1		1	

Variable	Single malnutrition vs normal, APR 95% CI	p-value	Multiple malnutrition vs normal, APR 95% CI	p-value
Level				
Primary	1.0(0.8-1.2)	0.900	1.0(0.8-1.3)	0.980
Secondary	1		1	
Settings				
Rural	1.1(0.9-1.2)	0.492	1.0(0.8-1.3)	0.715
Urban	1		1	
Region				
Kaskazini Unguja	1		1	
Kusini Unguja	1.0(0.8-1.4)	0.898	1.4(0.9-2.1)	0.173
Mjini Magharibi	0.8(0.6-1.0)	0.098	0.9(0.6-1.3)	0.604
Kaskazini Pemba	0.9(0.6-1.2)	0.339	1.3(0.8-1.9)	0.315
Kusini Pemba	0.9(0.7-1.2)	0.394	1.5(1.01-2.4)	0.046
Wealth quintile				
Lowest	1.2(0.9-1.6)	0.120	1.5(1.03-2.2)	0.032
Second	1.1(0.9-1.5)	0.428	1.2(0.8-1.7)	0.499
Middle	1.3(1.0-1.7)	0.055	1.3(0.9-1.9)	0.234
Fourth	1.2(0.9-1.6)	0.171	1.2(0.8-1.7)	0.425
Highest	1		1	
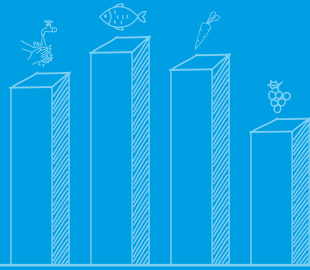
ANAEMIA

5.0 **Introduction**

Anaemia, a condition marked by low haemoglobin (Hb) levels, is a global public health problem and affects 24.8 per cent of the world population [45]. One in four individuals (~430 million) aged 10–24 years suffer from anaemia, with the highest prevalence found in LMICs [46]. Since the period between childhood and adulthood represent a sensitive period for developmental, physiological and behavioural changes, anaemia in this formative phase of life becomes an important risk factor for the poor health and development of children and adolescents. As such, anaemia adversely affects psychomotor [47] and brain development; impairs neurocognitive and pubertal development; causes weakness, fatigue and poor productivity; and increases susceptibility to infections [48]. Low haemoglobin level is caused by inadequate bioavailability of micronutrients (iron, folate, vitamin B12); parasitic infections such as malaria and helminthic infestation of hookworms and other parasitic worms and flukes; genetic haemoglobinopathies such as thalassemia and sickle cell disease; chronic infection and inflammation; and chronic disease conditions such as renal failure [49–51]. Another key objective of this inquiry was to assess the (a) prevalence and (b) characterization of anaemia among school-age children (5–9), early adolescents (10–14 years) and late adolescents (15–19 years) in primary and secondary schools in Zanzibar. In this study, anaemia was assessed based on haemoglobin concentration obtained from venous whole blood using the HemoCue machine. The haemoglobin levels were adjusted for altitude in enumeration areas that were situated above 1,000 metres of altitude. The WHO guidelines for haemoglobin concentrations for the diagnosis of anaemia in children and adolescents are presented in Table 13.

> Anaemia, a condition marked by low haemoglobin (Hb) levels, is a global public health problem and affects 24.8 per cent of the world population [45].

Consequences of anaemia

- Adverse effect on psychomotor and brain development
- Impaired neurocognitive development
- Poor pubertal development
- Weakness
- Fatigue
- Poor productivity
- Increased susceptibility to infections

Table 13 Haemoglobin levels to diagnose anaemia among children and adolescents

	Haemoglobin level (g/dl)		
Anaemia status	**Children aged 5–11 years**	**Adolescents aged 12–14 years**	**Adolescents aged 15 –19 years**
Any anaemia	<11.5 g/dl	< 12.0 g/dl	Girls: < 12.0 g/dl Boys: < 13.0 g/dl
Mild	11.0–11.4 g/dl	11.0–11.9 g/dl	Girls: 11.0–11.9 g/dl Boys: 11.0–12.9 g/dl
Moderate	8.0–10.9 g/dl	8.0–10.9 g/dl	8.0–10.9 g/dl
Severe	<8.0 g/dl	<8.0 g/dl	<8.0 g/dl

Note: Haemoglobin (Hb) levels were adjusted for altitude in survey enumeration areas > 1,000 metres.

Source: Haemoglobin concentration for diagnosis of anaemia and assessment of severity, Geneva, WHO, 2011.

Overall, almost half of school children and adolescents 5–19 years in Zanzibar are anaemic with the prevalence of 45.7 per cent of anaemia (Figure 8). Out of these, 24.2 per cent had mild, 21.1 per cent moderate and 0.4 per cent had severe anaemia (Table 14).

Figure 8: Prevalence of anaemia among children and adolescents aged 5–19 years in Zanzibar

	5–11 years both sex (n=1097)	12–14 years both sex (n=745)	15–19 years boys (n=362)	15–19 years girls (n=352)	All years (n=2556)
Not anaemic	54	55.4	61.6	45.4	54.3
Anaemic	46	44.6	38.4	54.6	45.7

% of scholars
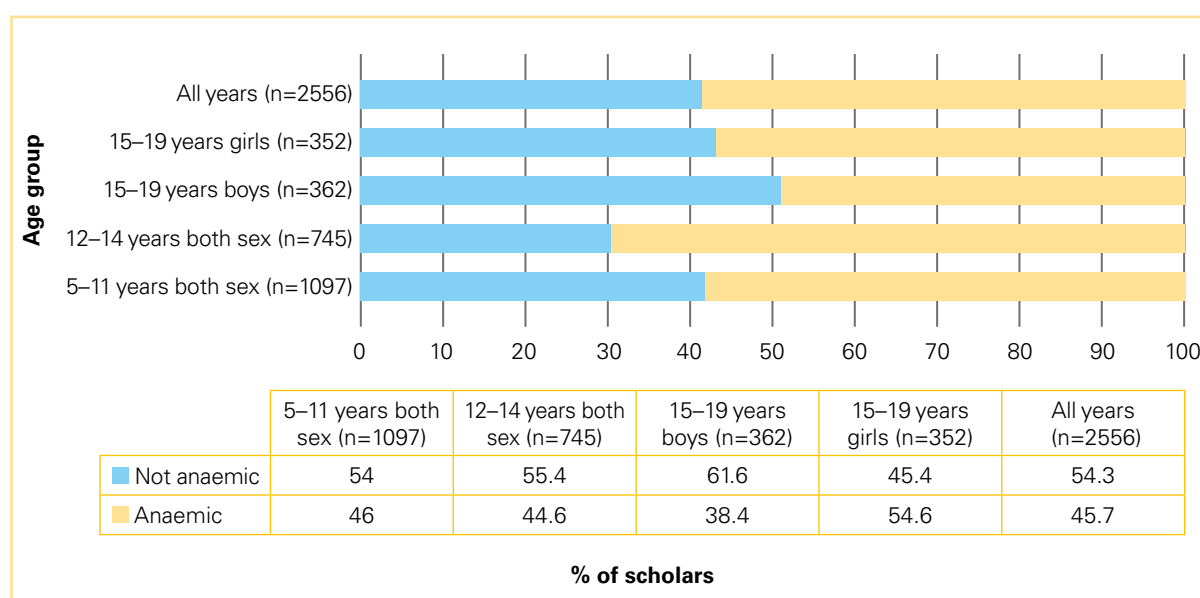
Figure 9 describes level of anaemia among children and adolescents aged 5–19 years. Almost one in four children had mild anaemia followed by children with moderate anaemia (21.1 per cent). The prevalence of severe anaemia was 0.4 per cent with a slight variation according to age.

Figure 9: Level of anaemia among children and adolescents aged 5–19 years in Zanzibar

	5–11 yrs (n=1097)	12–14 yrs (n=745)	15–19 yrs (n=714)	All ages (n=25 56)
■ Severe	0.3	0.8	0.3	0.4
■ Moderate	27.2	18.4	14.6	21.1
■ Mild	18.5	25.4	31.5	24.2
■ Normal	54.0	55.4	53.6	54.3
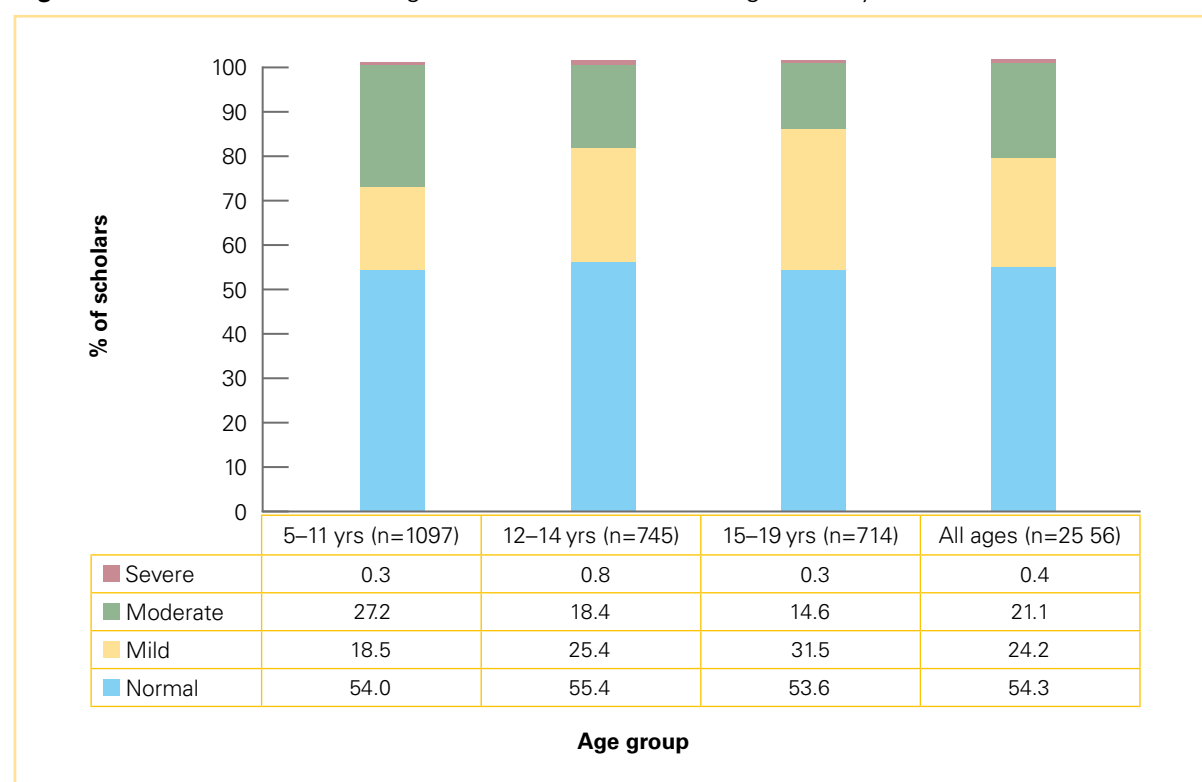
Age group

The prevalence thresholds and patterns of anaemia varies across various demographic characteristics are as detailed below:

Sex

The majority of the girls in both age groups were anaemic.

≫ Among school children aged 5–11 years, 46.1 per cent of girls were anaemic compared to 45.9 per cent of boys.

≫ Likewise, among adolescents aged 12–14 years, girls (47.0 per cent) were more anaemic than boys (41.9 per cent).

≫ Moreover, among adolescents aged 15–19 years, girls (54.6 per cent) were more anaemic than boys (38.4 per cent).

Age

≫ Overall, 46.0, 44.6 and 43.6 per cent of school children and adolescents aged 5–11, 12–14 and 15–19 years, respectively, were anaemic.

Residence

≫ The prevalence of anaemia did not vary across residential areas. Whereas 46.6 per cent of the rural dwellers were anaemic, a slightly lower figure (44.9 per cent) was anaemic among urban dwellers.

Region

≫ About 52.9 per cent school-age children and adolescents aged 5–19 years are anaemic in Kusini Pemba as compared to 41.9 per cent from Mjini Magharibi.

Districts

≫ The prevalence of anaemia varied by district. It was highest in Mkoani (57.3 per cent) and Kaskazini A (53.3 per cent) and lowest in Mjini (37.9 per cent)

Table 14 Prevalence of anaemia among children and school adolescents aged 5–19 years stratified by background characteristics, ZSHNS 2022 (N=2,556)

Variable	Children aged 5–11 years					Teenagers aged 12–14 years					Adolescents aged 15–19 years						Any Anaemia	
	Normal (%)	Mild (%)	Moderate (%)	Severe (%)	n	n	Normal (%)	Mild (%)	Moderate (%)	Severe (%)	n	Normal (%)	Mild (%)	Moderate (%)	Severe (%)	n	n	%
Gender																		
Male	54.1	17.7	27.6	0.6	514	358	58.1	23.7	17.9	0.3	362	61.6	31.2	7.2	0.0	362	1,234	42.5
Female	53.9	19.4	26.7	0.0	583	387	53	26.9	18.8	1.3	352	45.4	31.8	22.2	0.6	352	1,322	48.6
Ownership																		
Government	54.0	18.6	27.1	0.3	1,090	703	54.3	25.9	18.9	0.9	670	52.1	32.4	15.2	0.3	670	2,463	46.4
Private	42.9	14.3	42.8	0.0	7	42	73.8	16.7	9.5	0.0	44	77.3	18.2	4.5	0.0	44	93	26.9
Level																		
Primary	53.7	18.7	27.3	0.3	1,079	575	57.6	24.0	17.6	0.8	114	47.4	39.4	13.2	0.0	114	1,763	45.4
Secondary	66.7	11.1	22.2	0.0	18	170	48.2	30.0	21.2	0.6	600	54.8	30.0	14.9	0.3	600	788	46.3
Settings																		
Rural	52.2	19.3	28.2	0.3	590	341	55.1	23.8	20.2	0.9	263	54.0	32.7	12.9	0.4	263	1,194	46.6
Urban	56.0	17.8	26.0	0.2	507	404	55.7	26.7	16.8	0.8	451	53.4	30.8	15.5	0.3	451	1,362	44.9
District																		
Kaskazini A	31.5	19.2	47.9	1.4	73	51	60.8	17.7	15.7	5.8	60	53.3	31.7	15.0	0.0	60	184	53.3
Kaskazini B	54.4	20.0	25.6	0.0	90	63	63.5	20.6	15.9	0.0	43	58.1	25.6	16.3	0.0	43	196	41.8
Kati	63.3	15.2	21.5	0.0	79	68	51.4	26.5	20.6	1.5	49	51.0	34.7	14.3	0.0	49	196	43.9
Kusini	56.0	16.5	27.5	0.0	109	33	51.5	36.4	12.1	0.0	54	44.4	50.0	5.6	0.0	54	196	48.0
Mjini	64.9	14.4	20.7	0.0	111	55	56.4	25.4	18.2	0.0	98	62.2	24.5	13.3	0.0	98	264	37.9
Magharibi A	53.2	17.3	28.2	1.3	156	74	67.6	18.9	12.2	1.3	75	44.0	32.0	24.0	0.0	75	305	45.6
Magharibi B	55.8	18.1	26.1	0.0	138	131	61.1	20.6	18.3	0.0	63	57.1	30.2	12.7	0.0	63	332	41.9
Wete	56.9	19.8	23.3	0.0	116	71	53.5	24.0	21.1	1.4	64	39.1	37.5	23.4	0.0	64	251	48.6

Variable	Children aged 5–11 years					Teenagers aged 12–14 years					Adolescents aged 15–19 years					Any Anaemia	
	Normal (%)	Mild (%)	Moderate (%)	Severe (%)	n	Normal (%)	Mild (%)	Moderate (%)	Severe (%)	n	Normal (%)	Mild (%)	Moderate (%)	Severe (%)	n	n	%
Micheweni	63.8	18.8	17.4	0.0	69	58.3	29.2	12.5	0.0	48	59.0	32.0	9.0	0.0	78	195	39.5
Chake Chake	44.4	25.6	30.0	0.0	90	58.0	20.3	21.7	0.0	69	55.0	30.0	15.0	0.0	60	219	48.4
Mkoani	40.9	22.7	36.4	0.0	66	28.1	45.1	26.8	0.0	82	61.4	24.3	11.4	2.9	70	218	57.3
Region																	
Kaskazini Unguja	44.2	19.6	35.6	0.6	163	62.3	19.3	15.8	2.6	114	55.3	29.2	15.5	0.0	103	380	47.4
Kusini Unguja	59.0	16.0	25.0	0.0	188	51.5	29.7	17.8	1.0	101	47.6	42.7	9.7	0.0	103	392	45.9
Mjini Magharibi	57.3	16.8	25.4	0.5	405	61.9	21.2	16.5	0.4	260	55.1	28.4	16.5	0.0	236	901	42.0
Kaskazini Pemba	59.5	19.5	21.0	0.0	185	55.5	26.1	17.7	0.7	119	50.0	34.5	15.5	0.0	142	446	44.6
Kusini Pemba	42.9	24.4	32.7	0.0	156	41.7	33.8	24.5	0.0	151	58.5	26.9	13.1	1.5	130	437	52.9
Wealth quintile																	
Lowest	47.3	16.7	35.5	0.5	203	53.0	21.6	24.9	0.5	181	50.0	35.6	14.4	0.0	146	530	50.0
Second	53.2	19.1	27.7	0.0	220	54.8	28.0	15.1	2.1	146	52.0	34.6	12.6	0.8	127	493	46.6
Middle	53.7	19.8	26.5	0.0	257	55.4	29.5	15.1	0.0	139	55.6	26.5	17.9	0.0	117	513	45.4
Fourth	57.1	19.2	23.7	0.0	245	55.3	25.5	17.7	1.5	141	54.0	29.0	16.3	0.7	152	538	44.2
Highest	58.7	17.4	22.7	1.2	172	59.4	23.2	17.4	0.0	138	56.4	31.4	12.2	0.0	172	482	41.9
Total	**54.0**	**18.5**	**27.2**	**0.3**	**1,097**	**55.4**	**25.4**	**18.4**	**0.8**	**745**	**56.4**	**31.4**	**12.2**	**0.0**	**714**	**2,556**	**45.7**

Note: Prevalence of anaemia, based on haemoglobin levels is adjusted for altitude (above 1,000 metres). Anaemia levels classified according to age and sex of adolescents.

• For adolescent boys: Severe anaemia <8.0 g/dl; Moderate anaemia 8.0–10.9 g/dl; Mild anaemia 11.0–11.4 g/dl for 10–11 years, 11.0–11.9 g/dl for 12–14 years and 11.0–12.9 g/dl for 15–19 years; Any anaemia<11.5 g/dl for 10–11 years, <12.0 g/dl for 12–14 years and <13.0 g/dl for 15–19 years.

• For adolescent girls: Severe anaemia<8.0 g/dl; Moderate anaemia 8.0–10.9 g/dl; Mild anaemia 11.0–11.4 g/dl for 10–11 years, 11.0–11.9 g/dl for 12–14 years and 11.0–11.9 g/dl for 15–19 years; Any anaemia<11.5 g/dl for 10–11 years, <12.0 g/dl for 12–14 years and <12.0 g/dl for 15–19 years

• Haemoglobin levels are shown in grams per decilitre (g/dl).

Source: Haemoglobin concentration for diagnosis of anaemia and assessment of severity, Geneva, WHO, 2011.

Figure 10: Prevalence of anaemia among children and adolescents aged 5–19 years by district
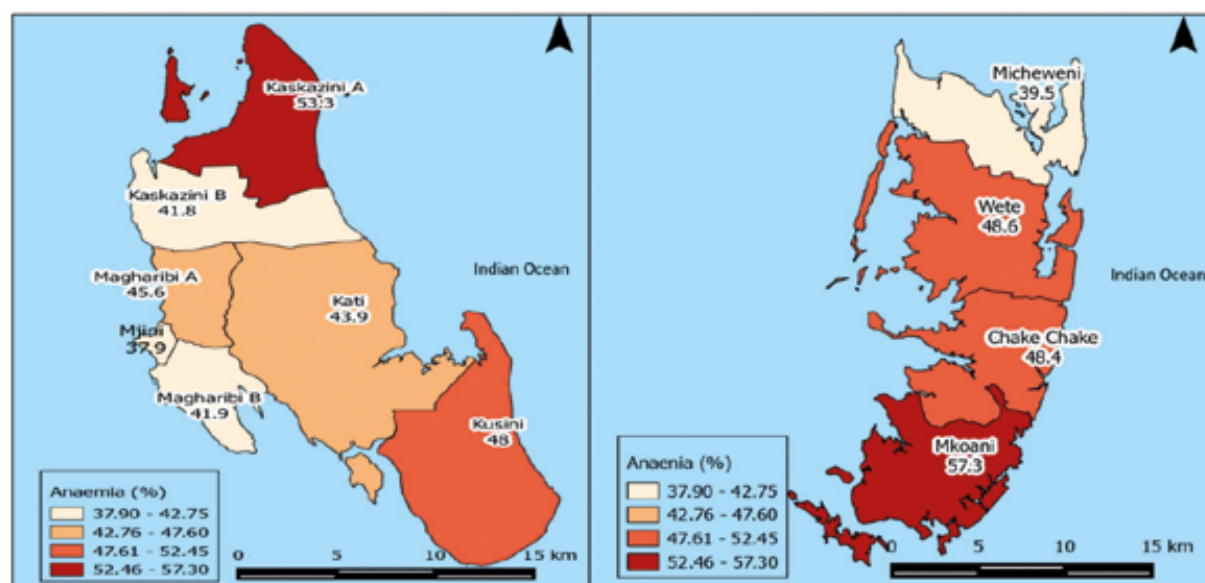
Table 15 Definition of public health significance of anaemia prevalence

Prevalence of anaemia (percentage)	Category of public health significance
< 5 per cent	No public health problem
5 per cent- 19.9 per cent	Mild public health problem
20 per cent- 39.9 per cent	Moderate public health problem
>= 40 per cent	Severe public health problem

Source: Department of Nutrition for Health and Development, World Health Organization, 2011.

5.1 Determinants of anaemia among children and adolescents aged 5–19 years in Zanzibar

In this study, the prevalence of anaemia is as high among children aged 5–9 years as it is for older adolescents aged 15–19 years. According to Table 16, the proportion of children and adolescents with anaemia was 30 per cent greater among children aged 5–9 years, and 10 per cent higher among adolescents aged 15–19 years. The high prevalence of anaemia observed among the youngest may be attributable to childhood anaemia based on the TDHS –MIS2015/16 report, which indicated a very high prevalence of anaemia (64.5 per cent) among under-five [52], signifying that pupils aged 5–9 may have had anaemia since their childhood. On the other hand, the high prevalence of anaemia observed, especially among older adolescents, is of severe public health significance [53] since adolescents undergo rapid physiological changes involving intense growth and development that require an increased demand for iron and other nutrients to counteract the additional nutrients required during puberty. Prevalence of anaemia was 10 per cent higher among the girls and 70 per cent higher among government school students. Wealth quintile analysis demonstrated varying odds of anaemia. Children and adolescents from the lowest wealth quintile had 20 per cent higher probability of being anaemic than those from the highest social economic status. Other wealth quintiles did not exhibit significant associations.

Table 16 Level of anaemia by socioeconomic and demographic characteristics of pupils and students

Variable	UPR95% CI	p-value
Age in years		
5–9	1.3(1.1–1.4)	<0.001
10–14	1	
15–19	1.1(1.02–1.3)	0.023
Gender		
Male	1	
Female	1.1(1.05–1.3)	0.002
School		
Private	1	
Government	1.7(1.2–2.4)	0.002
Level		
Primary	1.0(0.9–1.1)	0.672
Secondary	1	
Settings		
Rural	1.0(0.9–1.1)	0.408
Urban	1	
Region		
Kaskazini Unguja	1	
Kusini Unguja	1.0(0.8–1.1)	0.686
Mjini Magharibi	0.9(0.8–1.0)	0.069
Kaskazini Pemba	0.9(0.8–1.1)	0.429
Kusini Pemba	1.1(1.0–1.3)	0.120
Wealth quintile		
Lowest	1.2(1.04–1.4)	0.011
Second	1.1(1.0–1.3)	0.137
Middle	1.1(0.9–1.3)	0.266
Fourth	1.1(0.9–1.2)	0.454
Highest	1	
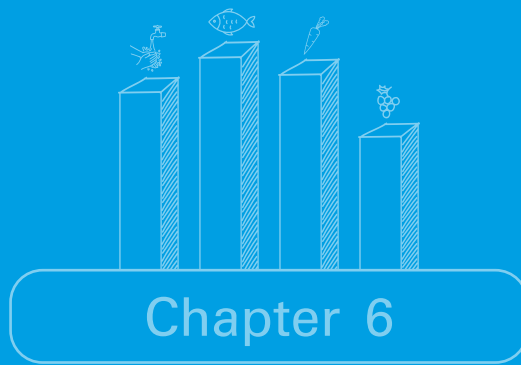
FOOD CONSUMPTION

6.0 **Introduction**

Globally, 42 per cent of school-going adolescents in LMICs consume carbonated sugary soft drinks at least once a day and 46 per cent eat fast foods at least once a week. Those rates go up to 62 and 49 per cent, respectively, for adolescents in high-income countries. Therefore, the key objective was to assess the dietary (a) intake, (b) quality and (c) practices among school-age children (5–9 years), early adolescents (10–14 years) and late adolescents (15–19 years) in primary and secondary schools in Zanzibar. Appropriate nutrition is one of the most important factors affecting proper development, nutritional status and maintenance of good health. Adolescence is a period for developing and acquiring skills of self-determination and self-realization – and a pivotal moment for nutrition as well. Children and school-age youth are the most vulnerable group to the effects of incorrect nutrition. In fact, nutrition during this period determines psychophysical and emotional development, effectiveness in learning process and has a bearing on subsequent adulthood health. Therefore, a balanced diet is essential for the healthy growth and development of children and adolescents. As such, the study assessed dietary habit and quality for children aged 5–9 years and adolescents aged 10–19 years focusing on the consumption of a variety of food groups such as grains, root and tubers, legumes and nuts, dairy products, flesh foods, eggs; vitamin A-rich fruits and vegetables and other fruits and vegetables at least once day and once per week.

> Appropriate nutrition is one of the most important factors affecting proper development, nutritional status and maintenance of good health. Adolescence is a period for developing and acquiring skills of self-determination and self-realization – and a pivotal moment for nutrition as well. Children and school-age youth are the most vulnerable group to the effects of incorrect nutrition.

6.1 **Dietary quality using Prime Diet Quality Score (PDQS)**

Dietary quality is an optimal measure of nutrients for the well-being. Dietary quality among schoolchildren and adolescents aged 5–19 years was assessed using the Prime Diet Quality Score (PDQS). The PDQS was recently developed using a modified Prime Screen questionnaire as a way to characterize diet quality globally and was associated with a lower risk of coronary heart diseases (CHD) to a large population in United States. PDQS contained 21 food groups; 13 were categorized as healthy and 8 as unhealthy food groups. Food groups were queried on a 5-point Likert scale: 0= never, 1= once in a week, 2–4 times a week, 5–6 times a week and every day. Points were assigned for the consumption of healthy food groups as follows: 0–1 serving/week= 0 points; 2–3 servings/week= 1 point; and ≥4 servings/week=2 points. Scoring for unhealthy food groups was assigned as follows: 0–1 serving/week=2 points; 2–3 servings/week= 1 point; and ≥4 servings/week= 0 points. Individual scores were aggregated to generate an overall score, which ranged from 0 to 42; the higher the score the quality of diet consumed by a respective children or adolescent.

The frequency thresholds of consumption of healthy food groups for at least >4 serving per week among school-age children are as described in Table 17:

≫ Less than half of school-age children and adolescent consumed fish (48 per cent), other vitamin A-rich vegetables and fruits (69.8 per cent) and dark leafy green vegetables (56.7 per cent) for at least >4 serving per week.

≫ Eggs (1.6 per cent), cruciferous vegetables (1.8 per cent) and other whole fruits (3.9 per cent) were the least consumed.

The frequency thresholds of consumption of six unhealthy food groups for at least >4 servings per week among school-age children are as follows:

≫ Over two in five school-age children and adolescents consumed refined grains and baked goods (40.9 per cent), and desserts and ice cream (26.0 per cent). Moreover, about 25.9 per cent consumed fried foods obtained away from home for at least >4 servings per week.

≫ **Processed meat (0.7 per cent) and red meat (2.4 per cent) were the least consumed.**

Table 17 Frequency distribution of Prime Dietary Quality Scores (PDQS) among SAC in Zanzibar (N=2,556)

Food group	0–1 serving/wk		2–3 servings/wk		≥4 servings/wk	
	n	per cent	n	per cent	n	per cent
Healthy food groups						
Dark green leafy vegetables	1,080	42.3	1,259	49.3	217	8.5
Cruciferous vegetables	2,271	88.9	239	9.4	46	1.8
Rich vegetable and fruits	594	23.2	965	37.8	997	39.0
Other vegetables	1,346	52.7	699	27.4	511	20.0
Fruits – whole citrus	2,110	82.6	339	13.3	107	4.2
Other whole fruits	2,089	81.7	367	14.4	100	3.9
Legumes	1,437	56.2	979	38.3	140	5.5
Nuts	1,811	70.9	558	21.8	187	7.3
Poultry	2,045	80.0	444	17.4	67	2.6
Fish	401	15.7	928	36.3	1,227	48.0
Whole grains	1,959	76.6	347	13.6	250	9.8
Liquid vegetable oils	1,281	50.1	805	31.5	470	18.4
Eggs frequency	2,186	85.5	328	12.8	42	1.6
Unhealthy food groups						
Red meats	2,204	86.2	291	11.4	61	2.4
Processed meat	2,478	97.0	60	2.4	18	0.7
Refined grains and baked goods	945	37.0	567	22.2	1,044	40.9

Food group	0–1 serving/wk		2–3 servings/wk		≥4 servings/wk	
	n	**per cent**	**n**	**per cent**	**n**	**per cent**
Sugar-sweetened beverages	2,007	78.5	417	16.3	132	5.2
Fried foods	1,222	47.8	672	26.3	662	25.9
Ice cream	1,065	41.7	806	31.5	685	26.8
Roots and tubers (cooked potatoes)	1,492	58.4	888	34.7	176	6.9
Low-fat dairy: Drinking milk or milk products (e.g. yoghurt)	2,036	79.7	378	14.8	142	5.6

Note: The mean PDQS was 16.4±3.7 with min=7 and max=34 out of 42 possible scores.

6.2 **Predictors of maximum PDQS scores**

The assessment of the Prime Dietary Quality Scores (PDQS) among school-age children in Zanzibar revealed a mean PDQS of 16.4±3.7, with scores ranging from a minimum of 7 to a maximum of 34 out of a possible maximum score of 42. According to Table 18, statistically significant maximum PDQS scores were associated with a male gender, living in Kaskazini A, Magharibi A, Kaskazini Unguja and Mjini Magharibi. On the contrary, the following were statistically significantly associated with decreased chances of having maximum PDQS scores; age group 5–9 years, children and adolescents studying in private schools, primary school students, those living in Kaskazini B and Kusini Unguja as well as children and adolescents from middle and fourth quantiles.

Table 18 Factors associated with PDQS scores (max scores)

Variable	Mean (SD)	P-value	uβC, 95%CI	P-value
Gender				
Male	17.2(3.9)	<0.001	1.5(1.2–1.8)	<0.001
Female	15.7(3.4)		1	
Age in years				
5–9	16.6(3.8)	0.109	0.4(0.02–0.8)	0.040
10–14	16.4(3.7)		0.14(-0.22–0.50)	0.443
15–19	16.2(3.7)		1	
School				
Government	16.4(3.7)	0.020	1	
Private	17.3(4.4)		0.9(0.15–1.7)	0.02
Level				
Primary	16.5(3.8)	0.001	0.4(0.1–0.7)	0.01
Secondary	16.1(3.6)		1	
Settings				
Rural	16.3(3.5)	0.057	1	
Urban	16.5(3.9)		0.3(-0.01–0.6)	0.057

Variable	Mean (SD)	P-value	uβC, 95%CI	P-value
District				
Kaskazini A	16.2(3.8)	<0.001	1.4(0.6–2.1)	<0.001
Kaskazini B	17.6(4.4)		0.9(0.1–1.6)	0.024
Kati	17.1(3.8)		-0.6(-1.4–0.12)	0.098
Kusini	15.6(3.3)		1.0(0.3–1.7)	0.006
Mjini	17.2(4.1)		0.5(-0.21–1.1)	0.176
Magharibi A	16.7(4.1)		1.0(0.4–1.7)	0.003
Magharibi B	17.2(4.1)		-0.3(-1.0–0.4)	0.351
Wete	15.9(3.1)		-0.7(-1.5–0.03)	0.059
Micheweni	15.5(2.9)		-0.7(-1.4–0.06)	0.071
Chake Chake	15.5(3.0)		-0.7(-1.4–0.6)	0.073
Mkoani	15.5(2.7)		1	
Region				
Kaskazini Unguja	16.9(4.2)	<0.001	1.4(0.9–1.9)	<0.001
Kusini Unguja	16.3(3.6)		0.8(0.3–1.3)	0.003
Mjini Magharibi	17.0(4.2)		1.5(1.1–1.9)	<0.001
Kaskazini Pemba	15.7(3.0)		0.2(-0.3–0.7)	0.515
Kusini Pemba	15.5(2.8)		1	
Wealth quintile				
Lowest	15.7(3.3)	<0.001	1	
Second	16.0(3.6)		0.4(-0.1–0.8)	0.109
Middle	16.3(3.7)		0.6(0.15–1.04)	0.009
Fourth	16.4(3.6)		0.7(0.3–1.2)	0.001
Highest	17.8(4.1)		2.2(1.7–2.6)	<0.001
Total	**16.4(3.7)**			

Unadjusted beta coefficient (uβC) and confidence interval (CI).

6.3 Dietary habits among SAC

Although the nutritional status of children and adolescents is of primary concern, various interventions and modifications aimed at promoting healthy eating behaviours have had limited impact due to insufficient understanding of what constitutes dietary habits between different age groups and genders. This survey, therefore, explored dietary habits among school children aged 5–9 years and adolescents aged 10–19 years by assessing three items: habits of eating outside home, having breakfast and eating snacks seven days before the survey. Breakfast consumption is an important aspect of a healthy lifestyle for improving nutrient intake and providing energy for physical and cognitive function [54,55]. Skipping breakfast among children and adolescents is associated with poor school attendance and academic performance, reduced well-being and unhealthy dietary and physical activity behaviours [55,56], each

of which continue to have adverse effects throughout one's life [57,58]. A recent systematic review reporting on the prevalence of breakfast skipping among children and adolescents from 33 countries (N = 285,626, aged 2–18 years) concluded that between 10 and 30 per cent of young people skipped breakfast [59].

Our study findings found that overall, in the previous 7 days leading up to the survey, 50.4 per cent of the children and adolescents aged 5–19 years in Zanzibar never had breakfast; only 2 per cent reported to eat outside home for at least three or more times a week and 56.6 per cent eat snacks almost every day (see Figures 11 and 12).

Figure 11: Number of times SAC had breakfast in the last month
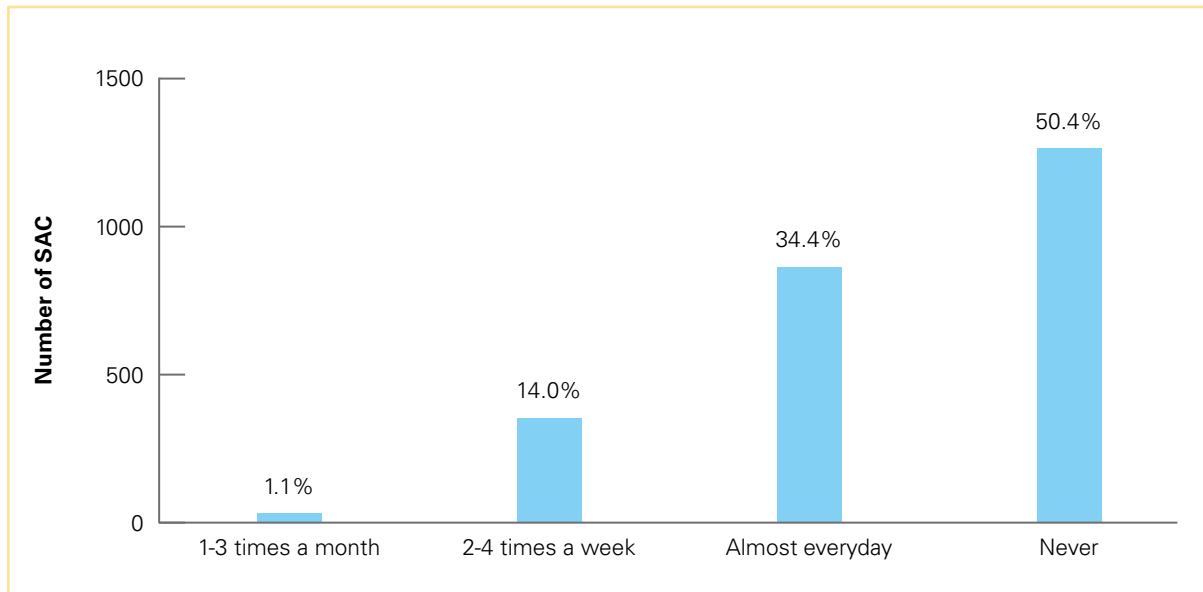
Figure 12: Number of times SAC had snack in the previous month
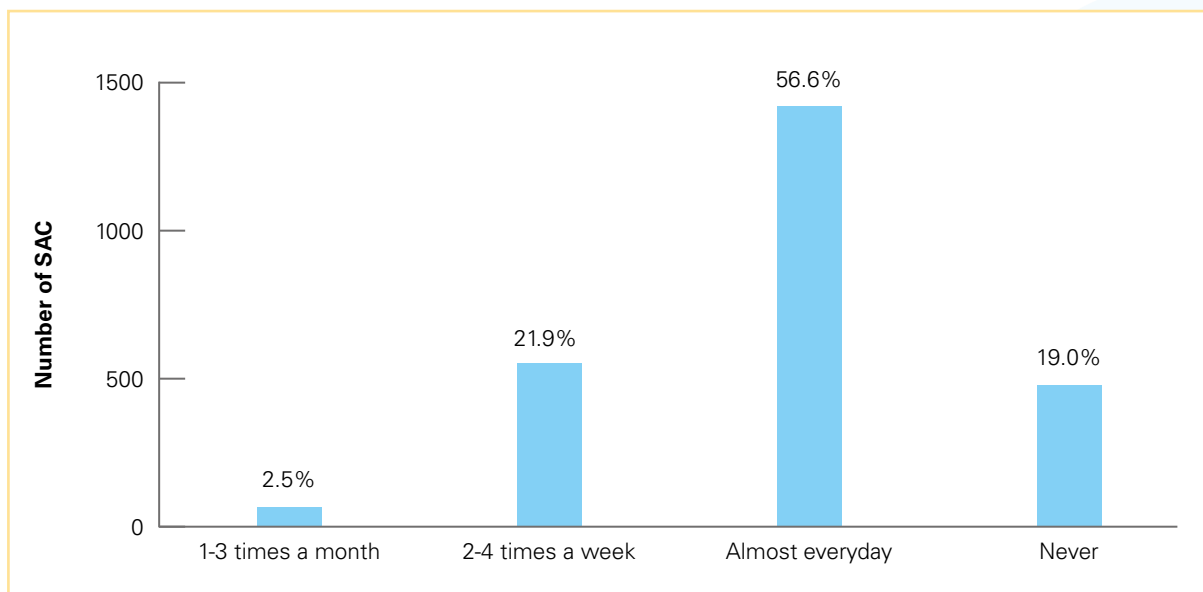
The following data set details the dietary habits related to takingL breakfast by social demographic characteristics (Table 19):

Eating breakfast:

Sex

≫ Missing breakfast was almost similar for both genders – boys and girls; however, the proportion is slightly higher for boys (51.1 per cent) than for girls (49.8 per cent), who reported having missed breakfast in the last 7 days before the survey.

Age

≫ Among SAC who did not have breakfast at all in the last 7 days before the survey, children in the early adolescence aged 10–14 years were more likely to miss breakfast (53.5 per cent) compared to the youngest aged 5–9 years (48.3 per cent) and the older group aged 15–19 years (48.2 per cent).

Residence

≫ Among the SAC who did not have any breakfast, 50.8 per cent were from rural settings and 49.7 per cent from urban settings.

Region

≫ Having breakfast among children is very heterogeneous across regions. The findings indicate that more than half of school-age children and adolescents aged 5–19 years from Kusini Unguja (53.8 per cent) and Mjini Magharibi (52.1 per cent) had not had any breakfast in the past 7 days.

Districts

≫ Having breakfast among children is very heterogeneous across districts. The study findings indicate that more than half of the school-age children and adolescents 5–19 years from Kati (56.1 per cent), Magharibi B (56.6 per cent) and Micheweni (57.4 per cent) had not had any breakfast in the past 7 days.

Snacking

Sex

≫ Among SAC who ate snacks almost every day, the majority were girls (60.1 per cent) compared to boys (52.8 per cent).

Age

≫ A high proportion of younger school-age children (62.9 per cent) reported to eat snacks at school on a daily basis compared to children in the early adolescence (56.4 per cent) and older children (50 per cent).

Residence

≫ Eating snacks in school was more common among SAC from urban (57.8 per cent) than those from rural settings (55.8 per cent).

Region

≫ Eating snacks in school was more common among school children and adolescents 5–19 years in Kusini Pemba (78.3 per cent), Kaskazini Pemba (57.6 per cent) and Mjini Magharibi (54.1 per cent).

Districts

≫ By district, eating snacks in school almost daily was observed to be higher among school children and adolescents aged 5–19 years from Chake Chake (79.9 per cent), Mkoani (76.6 per cent) and Mjini (59.5 per cent) whereas the lowest was in Kaskazini A (42.4 per cent).

Table 19 Dietary habits (having breakfast) among school children and adolescents of 5–19 years by sex and age

Background characteristics	Never	Almost every day	2–4 times a week	1–3 times a month
Sex				
Girls	49.8	33.3	15.5	1.4
Boys	51.1	35.6	12.5	0.9
Age group				
10 – 14	53.5	30.3	14.7	1.4
15–19	48.2	31.8	18.8	1.3
5 – 9	48.3	42.2	8.8	0.6
Residence				
Rural	50.8	32.6	14.8	1.8
Urban	49.7	36.3	13.5	0.5
Region				
Kaskazini Pemba	53.6	30	13.2	3.1
Kaskazini Unguja	43.7	35.8	18.4	2.1
Kusini Pemba	46.7	42.6	10.8	0
Kusini Unguja	53.8	29.6	15.3	1.3
Mjini Magharibi	52.1	34.1	13.7	0.2
District				
Chake Chake	44.3	45.7	10	0
Kaskazini A	32.6	42.4	20.7	4.3
Kaskazini B	54.1	29.6	16.3	0
Kati	56.1	27.6	14.3	2
Kusini	51.5	31.6	16.3	0.5
Magharibi A	51.5	33.8	14.1	0.7
Magharibi B	56.6	31.9	11.4	0
Micheweni	57.4	29.7	10.8	2.1
Mjini	47	37.1	15.9	0
Mkoani	49.1	39.4	11.5	0
Wete	50.6	30.3	15.1	4

Chapter 7

PHYSICAL ACTIVITY

7.0 **Introduction**

The Centers for Disease Control and Prevention (CDC) stipulates that children and adolescents aged 6–17 years should engage in 60 minutes (1-hour) or more of moderate-to-vigorous physical activity on daily basis. Physical activity has significant health benefits for the heart, body and mind. Indeed, it contributes to the prevention and management of non-communicable ailments such as cardiovascular diseases, cancer and diabetes. Moreover, it reduces symptoms of depression and anxiety while enhancing thinking, learning and judgment skills. Furthermore, physical activity ensures healthy growth and development among young people in addition to improving the overall well-being. Conversely, physical inactivity in a person increases the risk of death to 20–30 per cent compared to sufficiently active people. Yet, statistics show that more than 80 per cent of the world's adolescent population is insufficiently physically active. Therefore, this survey assessed the physical activity situation to determine the proportion of school-age children and adolescents who meet the WHO-recommended daily physical activity by age and gender in Zanzibar [60]. The key objective of this survey was to determine the levels of physical activity among schoolchildren aged 5–9 years, early adolescents aged 10–14 years and late adolescents aged 15–19 years in Zanzibar primary and secondary schools. We collected data on the physical activity of children and adolescents using internationally approved Physical Activity Questionnaire.

Benefits of physical activity

Prevents ailments like cardiovascular diseases, cancer, diabetes

Reduces symptoms of depression and anxiety

Enhances thinking, learning, and judgment skills

Ensures healthy growth and development

Improves overall well-being
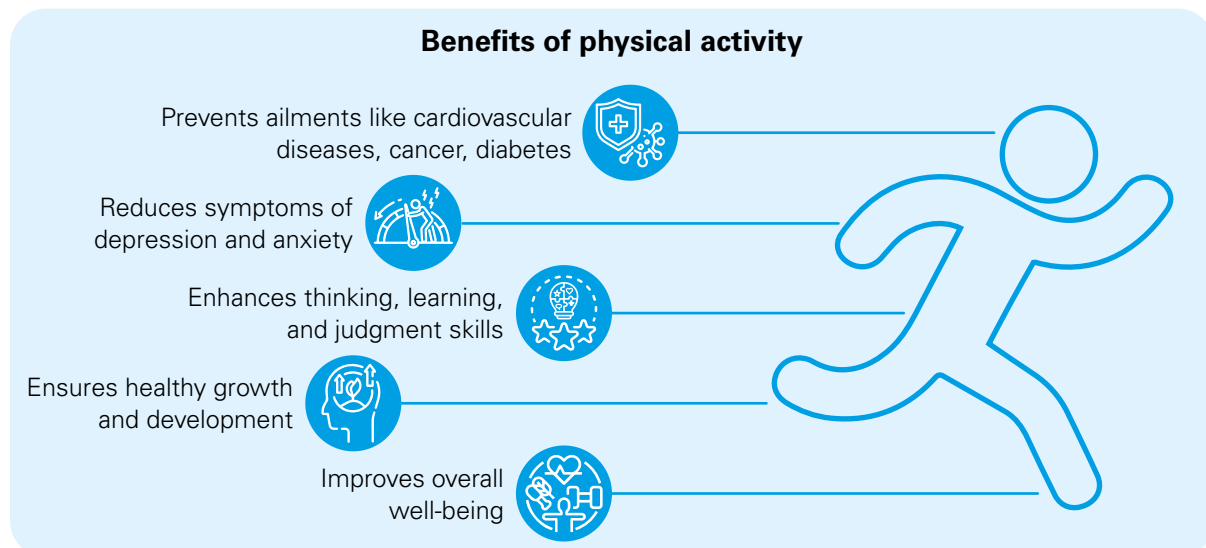
7.1 **School-age children and adolescents' engagement in physical activity**

The findings from this survey were consistent with an earlier study [59] that the majority of school-age children and adolescents surveyed had low levels of physical activity. The findings further show that children from Zanzibar experienced a transition marked by decrease in levels of physical activity and increased sedentary lifestyle behaviour. The availability of nationwide representative data on physical activity levels in this age group is key to accurately determining the overall activity patterns among Tanzanian school-age children and adolescents to inform the planning process. Overall, the results indicate that 61.9 per cent (n=1,582) of the school children and adolescents aged 5–19 years engaged in some form of physical activity. The following data set and Table 20 demonstrate the prevalence of low, moderate and high physical activity levels among school-age children and adolescents aged 5–19 years by background characteristics:

Sex and age

≫ The prevalence of high physical activity levels was higher among older children aged 15–19 years (40 per cent) than younger ones and adolescents. Low physical activity level was observed in girls (53 per cent) versus boys (47 per cent). Boys were more engaged in higher physical activities than the girls.

Residence

≫ Overall, physical activity levels were reported to be moderate in all the Zanzibari regions with two in three school children and adolescents aged 5–19 years remaining active. Urban children were more highly active (56 per cent) than their rural counterparts (44 per cent).

Regions

≫ The average physical activity levels in all the regions of Zanzibar indicate that with respondents from Mjini Magharibi reported the highest level of activity (31 per cent) compared to those from Kaskazini Unguja who reported the least activity (12 per cent).

Table 20 Physical activity and background information for school-age children and adolescents

Variable	Low		Moderate		High	
	Number	**%**	**Number**	**%**	**Number**	**%**
Gender						
Girls	816	53	909	51	262	33
Boys	725	47	863	49	535	67
Age						
5–9	61	4	0	0	0	0
10–14	900	58.4	1058	58	437	0
15–19	580	37.6	714	40	360	40
Setting						
Rural	700	45.4	769	43	354	44
Urban	841	54.6	1003	57	443	56
District						
Chake Chake	152	9.9	162	9	93	12
Kaskazini A	86	5.6	119	7	49	6
Kaskazini B	118	7,7	131	7	45	6
Kati	131	8.5	165	9	63	8
Kusini	101	6.6	122	7	42	5
Magharibi A	149	9.7	188	11	100	13
Magharibi B	188	12.2	229	13	77	10
Micheweni	129	8.4	139	8	82	10
Mjini	150	9.7	184	10	71	9
Mkoani	170	11	164	9	86	11
Wete	167	10.8	169	10	89	11
Region						
Kaskazini Pemba	296	19.2	308	17	171	22
Kaskazini Unguja	204	13.2	250	14	94	12
Kusini Pemba	322	20.9	326	18	179	23
Kusini Unguja	232	15.1	287	16	105	13
Mjini Magharibi	487	31.6	601	34	248	31
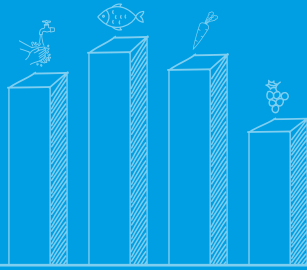
SCHOOL NUTRITION PROGRAMMES

8.0 **Introduction**

Zanzibar adopted free basic education as a government policy and building human capital through quality education as a central pillar of Vision 2025. Improving education indicators is one of the main purposes of the school nutrition programmes (SNP) in Zanzibar, which aim to provide at least one nutritious meal a day to boost enrolment, attendance and retention. After all, well-fed children perform better in class and contribute to better learning outcomes and income in adult life. On the other hand, hunger impedes concentration and undermines the ability of the children to participate in the learning process. The components within programmes include school meals, micronutrient supplementation, deworming, health and nutrition check-ups, physical activities, entertainment/sports, school gardening and school infrastructure. The key objective of this inquiry on this aspect was to assess the school health and nutrition environment regarding the (a) existing health and nutrition interventions – school meal, (b) infrastructure – playgrounds, school garden, school kitchen, canteen, WASH facilities and (c) nutrition education in the school curricula. Data on the SNP describe its status in public and private schools in Zanzibar. The overall assessment of SNP in this assessment was based on the following aspects: availability of school nutrition programme, components of school nutrition programme available in school, coordination of SNP, characteristics of school health infrastructure, beneficiaries of SNP, source of food, types of food offered and availability of food vendors from selected schools under review.

> Improving education indicators is one of the main purposes of the school nutrition programmes (SNP) in Zanzibar, which aim to provide at least one nutritious meal a day to boost enrolment, attendance and retention. After all, well-fed children perform better in class and contribute to better learning outcomes and income in adult life.

Components of school nutrition programme

- School meals
- Micro-nutrients supplementation
- Deworming
- Health and nutrition check-ups
- Physical activities
- Entertainment
- Gardening
- School infrastructure
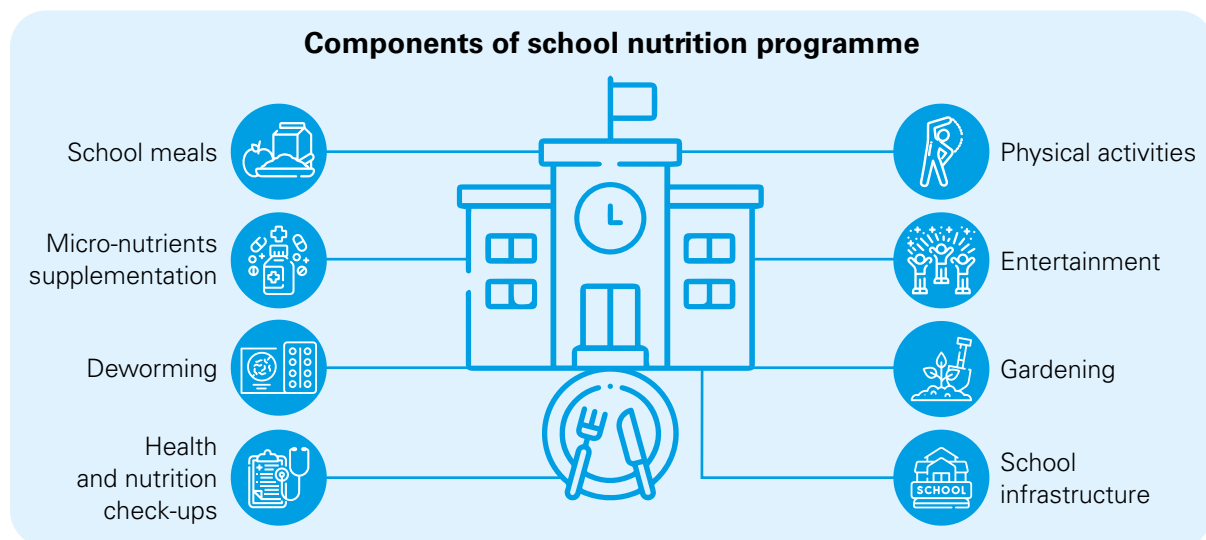
8.1 **School nutrition programmes in primary and secondary schools in Zanzibar**

The analysis revealed that only 22 per cent of the schools visited reported to have some sort of school nutrition programme. Implicitly, the school-age children in most of the schools had limited access to school meals, micronutrient supplementation, physical exercise and sport, as well as school health infrastructure.

8.1.1 School nutrition programme by district

The survey reveals district-based variations in the schools that offer meals in school, with 40 per cent offering meals at school location, that is, only two out of 11 districts. These two districts are Kaskazini A and Kusini. None of the schools reported a food feeding programme in Kati district, as Figure 13 illustrates.

Figure 13: Percentage distribution of schools offering meals in Zanzibar by district
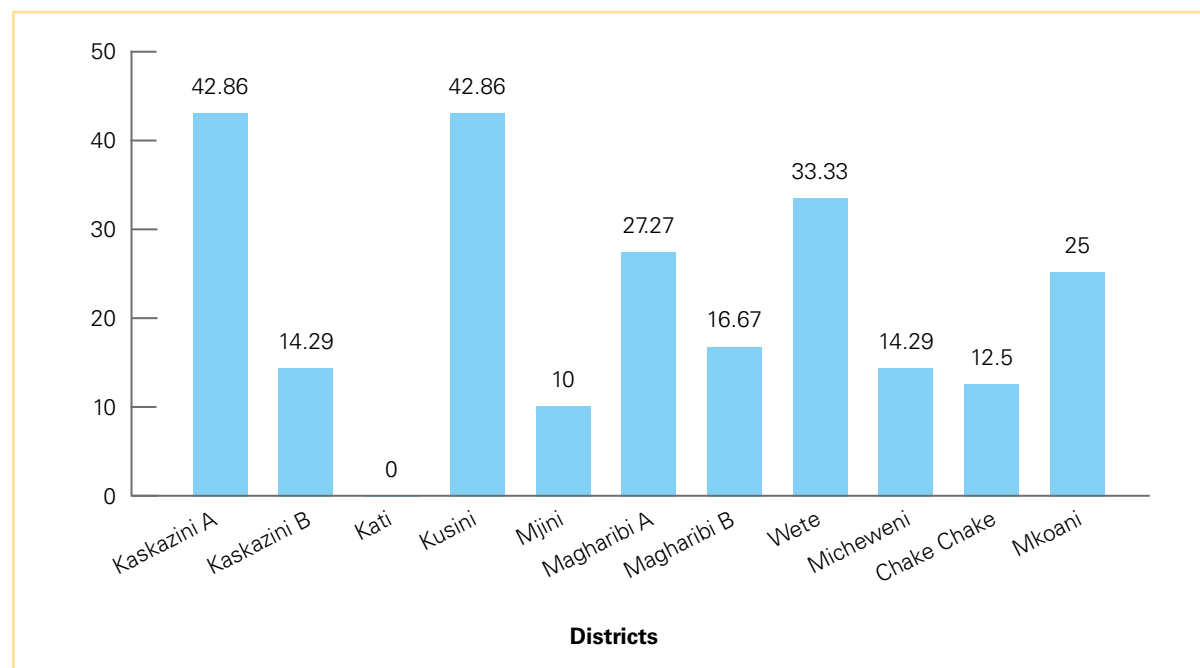
8.1.2 Status of school nutrition programme (SNP) in Zanzibar

The survey assessed the status of the SNP components. The results indicate that among the schools with SNP, the majority have deworming services (83.9 per cent), sports and entertainment (60.2 per cent) and lowest micronutrients supplementation (1.1 per cent), as Figure 14 further demonstrates.

Figure 14: Services offered through school nutrition programmes in Zanzibar
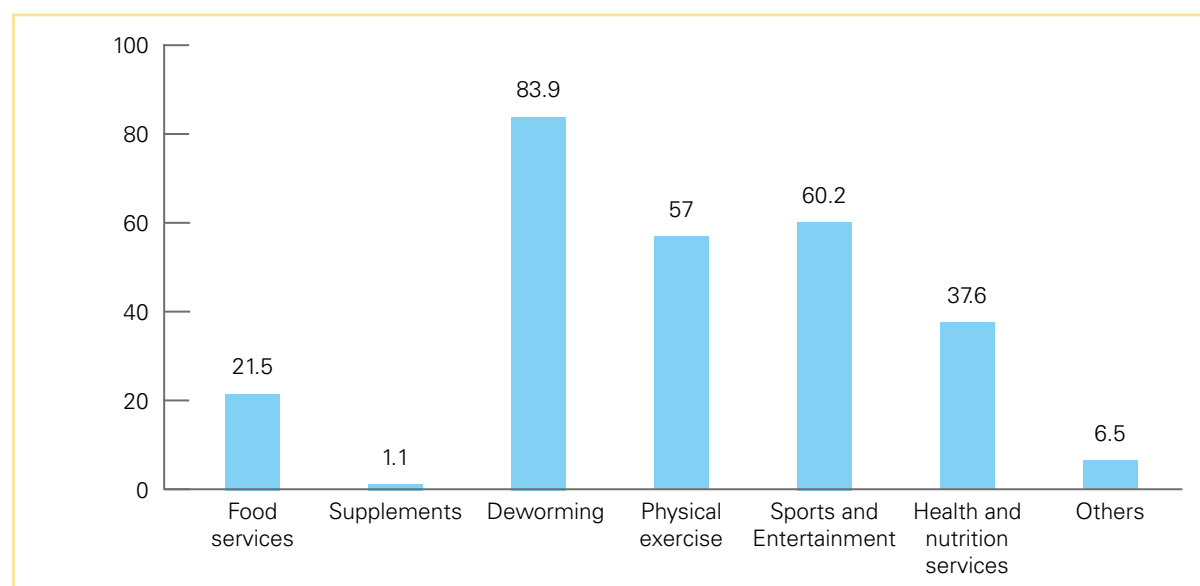
8.2 **School environment assessment**

8.2.1 School health infrastructure in Zanzibar

The survey further assessed the schools under review to determine whether they had the basic elements amenable to the SNP implementation. This assessment focused on school health infrastructure such as the availability of clean water, clean and safe drinking water, playgrounds, pupil's toilets, handwashing facilities, food storage rooms, dining hall and school kitchen. The survey results suggest that the availability of these school health infrastructure varies from one school to another. Most of the schools (93.3 per cent) reported having clean water, handwashing facilities (75.3 per cent) and clean and safe drinking water treated using water guard tablets and chlorination by Zanzibar Water Authority (69.9 per cent). On the other hand, only a minute number (4.3 per cent) reported having dining halls and a few others (9.7 per cent) had food stores. Close to one-third of the schools surveyed (30.1 per cent) had a school kitchen, as Figure 15 illustrates.

Figure 15: School health infrastructure in schools
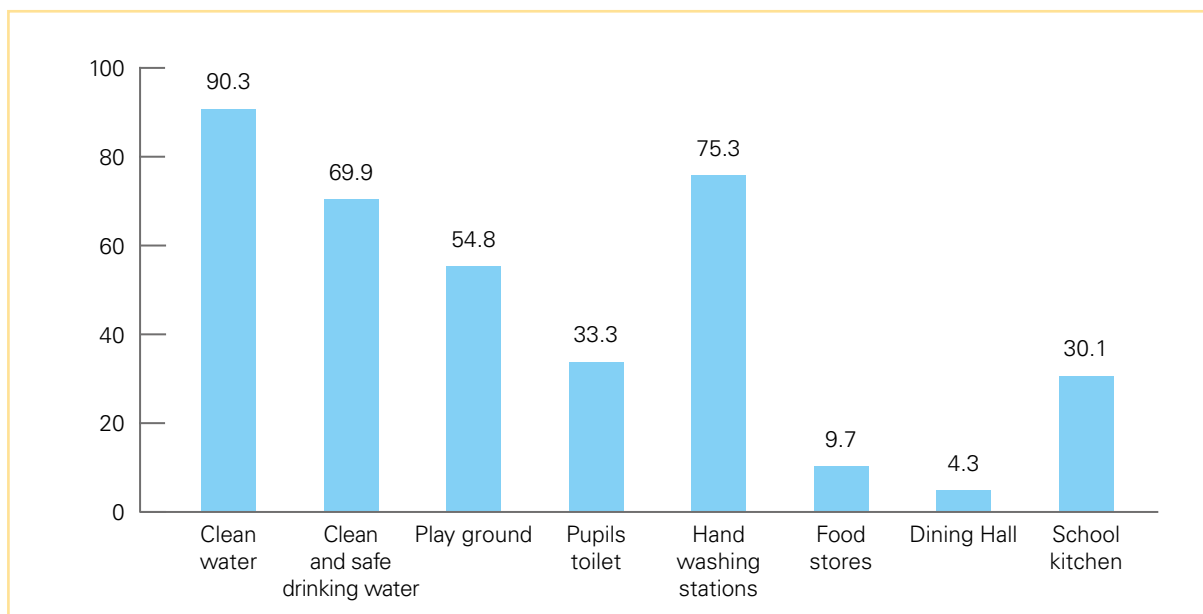
8.2.2 School health infrastructure by district

The study results indicate that the existence of school health infrastructure varies across the districts. Regarding clean water as the key school health provision, Table 21 shows that all schools (100 per cent) in Mkoani, Kusini, Magharibi A, Kati and Wete districts had access to clean water. Of the remaining six districts, the overall percentage of schools with access to clean water was above 71 per cent. Besides, most of the schools had playgrounds in Chake Chake (75 per cent), Kusini and Micheweni (each with 71.4 per cent), Magharibi A (63.6 per cent), Kaskazini A and Kati (57.1 per cent) and Wete (55.6 per cent) districts. The district with the least schools having playgrounds is Mjini (30.0 per cent), as presented in Table 21.

Majority of the schools had handwashing facilities (50 per cent). The highest reported schools with handwashing facilities were found in Kaskazini B (100 per cent), Magharibi B (91.7 per cent) and Wete (88.9 per cent). As regards food store, five in 11 schools reported having special rooms for food staff

storage whereas the majority reported not having food storage facilities. The school kitchen was found to be unevenly distributed in the districts, with 10 out of 11 reporting to have less than half of their schools with kitchens.

Table 21 School health infrastructure by district

Name of district	Clean water	Clean and safe drinking water	Play grounds	Hand-washing stations	Food stores	Dining hall	School kitchen
Kaskazini A	71.4	57.1	57.1	57.1	14.3	0	42.9
Kaskazini B	85.7	42.9	42.9	100	0	0	28.6
Kati	100	71.4	57.1	85.7	0	0	57.1
Kusini	100	57.1	71.4	57.1	0	0	28.6
Mjini	80	70	30	80	10	20	20
Magharibi A	100	81.8	63.6	81.8	9.1	0	18.2
Magharibi B	83.3	50	41.7	91.7	33.3	16.7	41.7
Wete	100	88.9	55.6	88.9	11.1	0	33.3
Micheweni	85.7	71.4	71.4	71.4	14.3	0	14.3
Chak-chak	87.5	87.5	75	62.5	0	0	37.5
Mkoani	100	87.5	50	37.5	0	0	12.5

8.2.3 Types of food available from different food vendors around schools

The survey also assessed the availability of food from different vendors surrounding the school environment. Among the schools surveyed, 93 schools were surrounded by food vendors selling various types of foods. Food vendors assist pupils with at least snacks as majority of the schools do not have a school nutrition programme.

Overall, the study findings show that ice creams, fruit juice with added sugar and sweet snacks, respectively, were reported to be available in 94.6, 89.3 and 83.9 per cent of the schools visited. Fried foods, crips and salted nuts were available in 83.9, 71.0 per cent and 71.0 per cent of the surveyed schools, respectively. Nearly half of the schools under review reported selling bottled water. Vegetables were present in less than 20 per cent of the schools. Figure 16 presents the results.

Figure 16: Types of food available from different food vendors around schools in Zanzibar
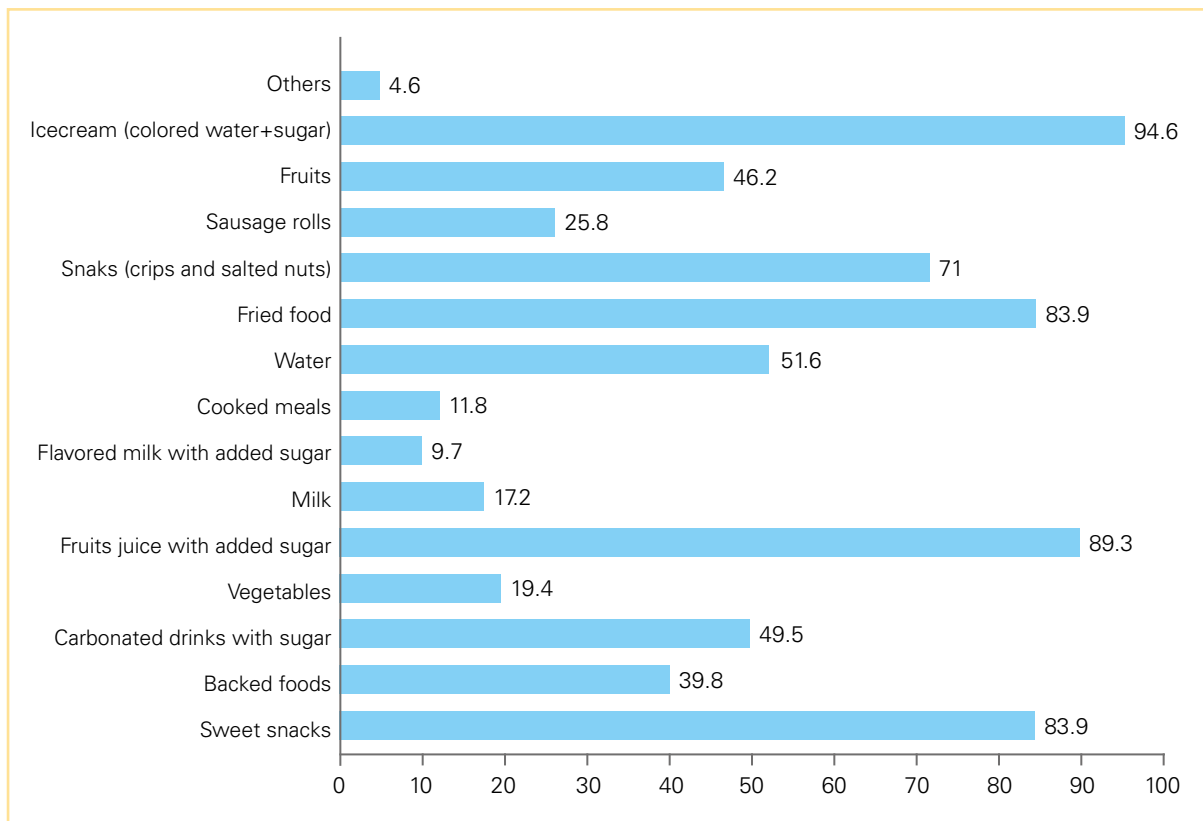
8.2.4 Shops, markets and restaurants available around schools

The survey also assessed the availability of shops, markets and restaurants around or nearby schools that are easily accessible to pupils. The results show that 8 out of 10 schools had a restaurant selling food, 76.3 per cent had a shop, market and kiosk, and almost 6 out of 10 reported having fruits and access to salads (59.1 per cent).

Figure 17: Availability of shops, markets and restaurants
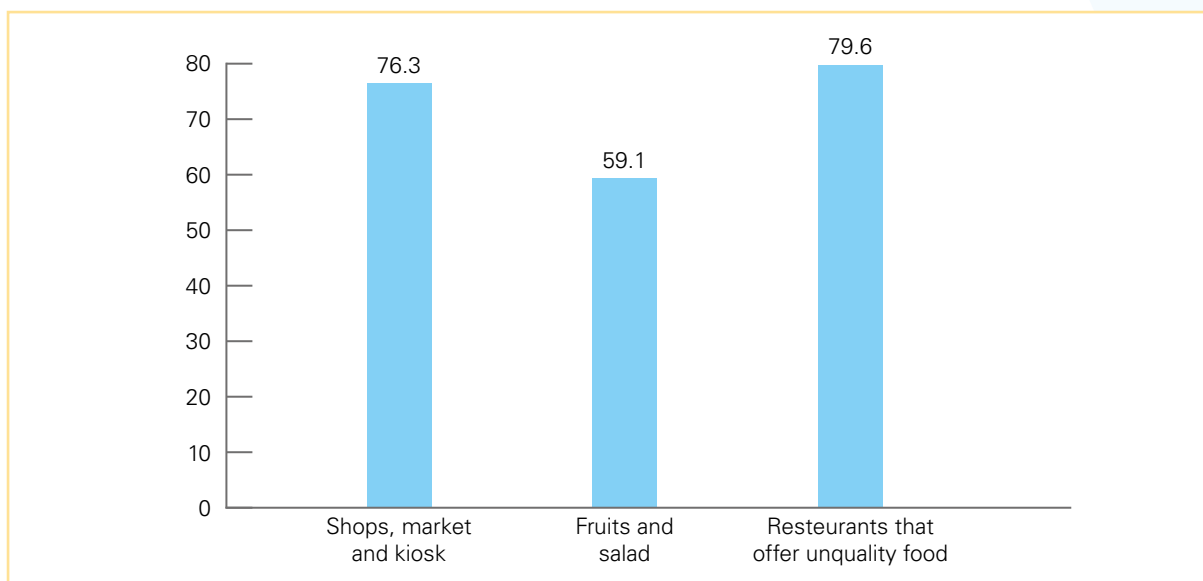
8.2.5 Challenges to the ready availability of food services in schools in Zanzibar

The study found that many of the respondents (43 per cent) mentioned low government and private sector support, high implementation cost (15.1 per cent), lack of awareness among stakeholders (7.4 per cent), low community involvement (4.3 per cent), lack of infrastructure (5.4 per cent) and human resources (1.1 per cent) as impeding the effective implementation of SNP. Figure 18 presents the results.

Figure 18: Challenges to effective food services at Zanzibar schools
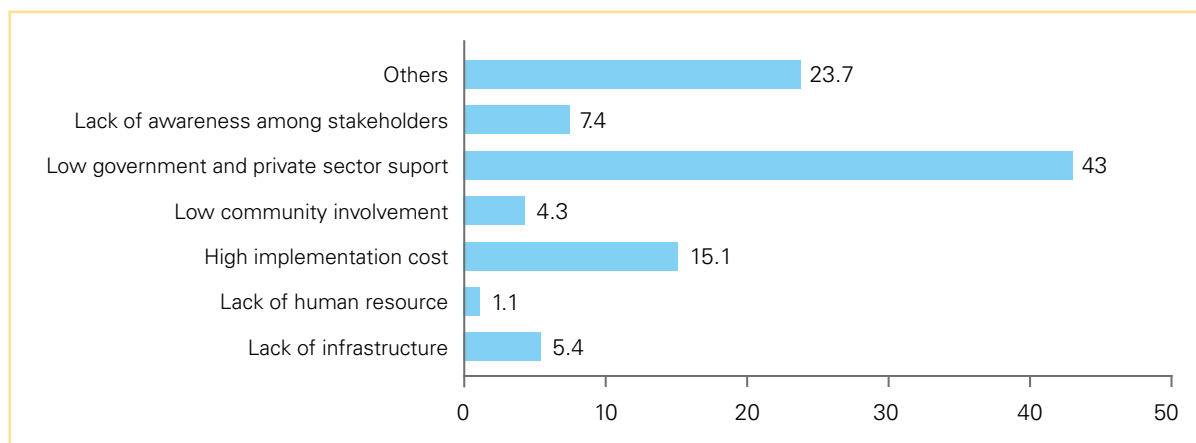
8.3 Coordination of school nutrition programme

The results from this survey indicate that in the majority of the schools (46.7 per cent), the SNP is coordinated by the head teachers whereas in 26.7 per cent of the institutions they were coordinated by the head teacher in collaboration with the nutrition teacher. Also, in 13.3 per cent, the programme is coordinated by the head of school, nutrition teachers and the school food committee (see Table 22).

8.3.1 Source of food in schools

Regarding the source of food used in schools, the majority (80.0 per cent) of the respondents reported that their schools bought food from the market. Only 3.3 per cent of the respondents reported that their schools managed to get food from parental contributions and 23.3 per cent indicated other sources.

8.3.2 Food beneficiaries

The survey found that school food is not universally available for the students and classes since 90 per cent of the schools reported that only some classes benefited from the food, with 10 per cent indicating that only students with special needs accessed the food.

Table 22 Coordination of school food programme

Name of district	Number	Percentage
Coordinator of school meal		
School food committee	4	13.3
Head teacher	14	46.7
Head teacher and nutrition teacher	8	26.7
Others	4	13.3

Name of district	Number	Percentage
Source of food		
Market	24	80
School farm/garden	0	0
Contribution from parents	1	3.3
Others	7	23.3
Food beneficiaries		
All classes	0	0
Students with special needs	3	10
Some classes	27	90
Total	**30**	**100**

8.4 Water, sanitation and hygiene (WASH) practices

The water, sanitation and hygiene (WASH) initiative is a strategic approach to fostering the availability of water, sanitation and hygiene in Zanzibar's school environment. Even though WASH in schools has a high-level political commitment at an international level and its relevance for good health and learning is clear, the progress achieved thus far is too insufficient to guarantee universal access to safe WASH services for the pupils, especially in LMICs. WASH at school has widely promoted child-friendly water, sanitation and hygiene in schools in addition to improving health, boosting education achievements and having a positive impact on communities [61]. Yet, most of the schools in developing countries including Tanzania lack the basic WASH programme necessities. In this regard, a UNICEF study conducted in 2009 in 16 districts in Tanzania found that 84 per cent of the schools had no functional handwashing facilities, 34 per cent had no water supply in the school premises and 52 per cent have no doors on the girls' latrines [62]. School WASH also reportedly contributed to the children's learning, hence reducing the number of school days they missed, especially during menstruation, and thus providing more time for their learning while boosting their dignity and safety. Because of inadequate school WASH, many children failed to attain their learning potential. Thus, this study also evaluated school and household health and nutrition environment for students relating to the WASH facilities [63–67].

8.4.1 Household drinking water: Source of drinking water and water treatment

The study found that more than 50 per cent of the respondents reported using tap water for drinking purposes whereas 26 per cent relied on their neighbours for tap water. Only 5 and 0.4 per cent reported using water from uncovered wells and bottled water, respectively. None of the respondents reported using water from springs. Figure 19 shows different water sources as reported by school-age children and adolescents' households:

Figure 19: Drinking water sources for the households of school-age children and adolescents aged 5–19 years
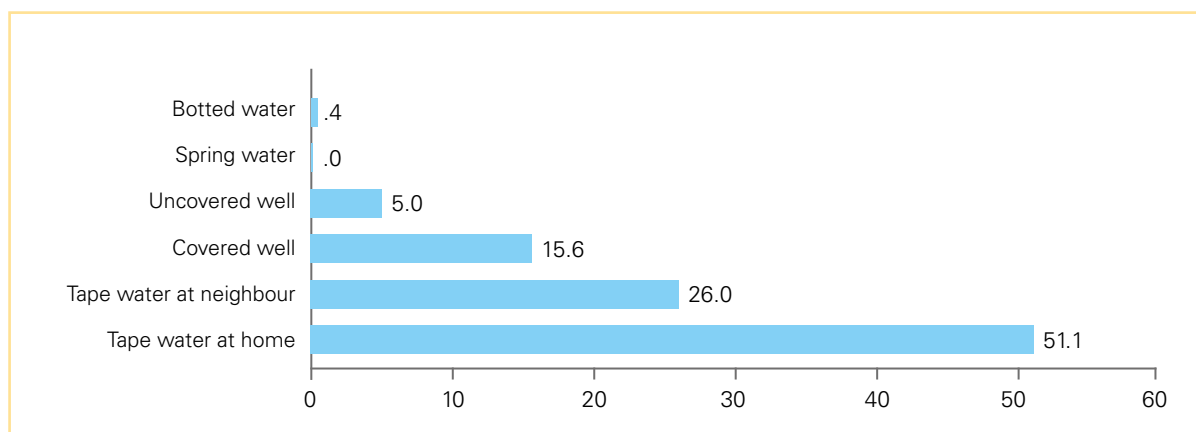
8.4.2 Improved and unimproved water sources

Based on the survey findings, water sources were categorized into improved and unimproved water sources. Improved water sources were tap water within dwellings, tap water in the neighbourhood, covered wells and bottled water. On the other hand, unimproved water sources were springs/rivers and unprotected wells. Most of the households in Zanzibar (94.2 per cent) reported using improved drinking water sources, particularly tap water for drinking purposes as compared to unimproved sources (5. per cent). Figure 20 shows percentage distribution of water sources as reported by the participants:

» The survey findings revealed that the majority of the households in Zanzibar used water from improved sources for drinking purposes, whereas 96.3 per cent of urban residents reported using improved water sources compared to 91.7 per cent from rural settings.

Figure 20: Percentage distribution of water sources by residence as reported by the participants
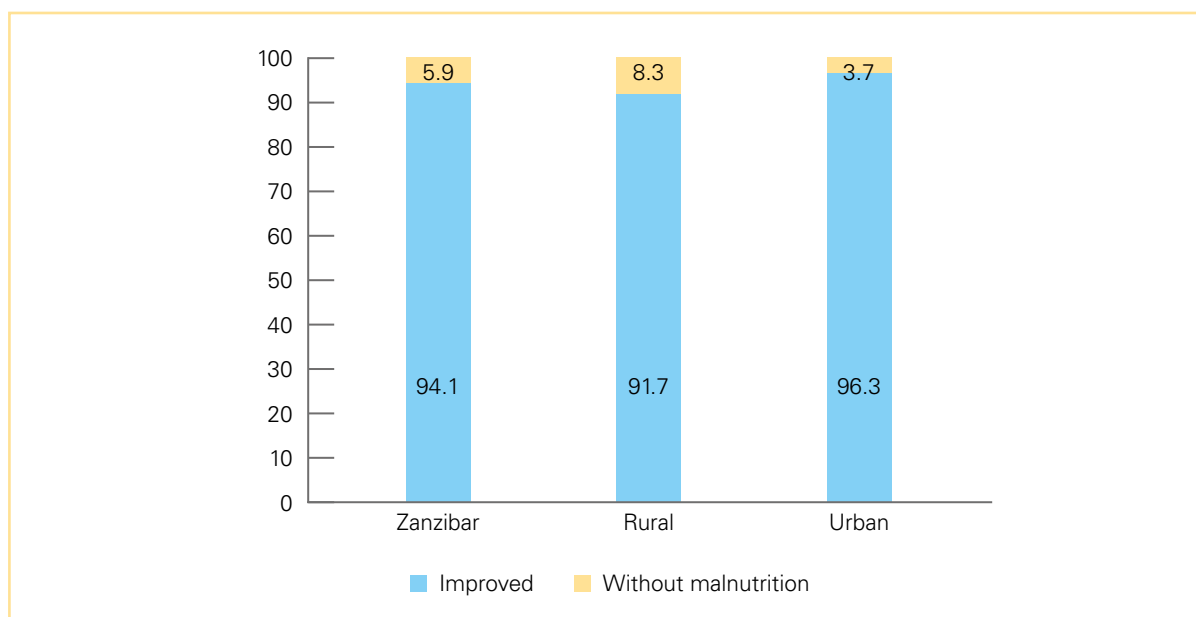
8.4.3 Water treatment methods

More than half of the households (67 per cent) reported treating water for drinking purposes with at least 13 per cent boiling water, 12 per cent using chlorination methods and almost 8 per cent letting water to settle. Other treatment methods included straining through a cloth, using machine filters and solar disinfection methods; however, these latter methods were minimally practised by fewer households of the population under review (Figure 21). The percentage of de jure population using various methods of treating drinking water and percentage using an appropriate treatment method, according to residential areas, according to background characteristics as detailed in the table titled 'Percentage of de jure population using various methods to treat drinking water, and percentage using an appropriate treatment method, according to residence, according to background characteristics in Zanzibar', attached as Annex 1.

Figure 21: Percentage distribution of water treatment methods as reported by the participants
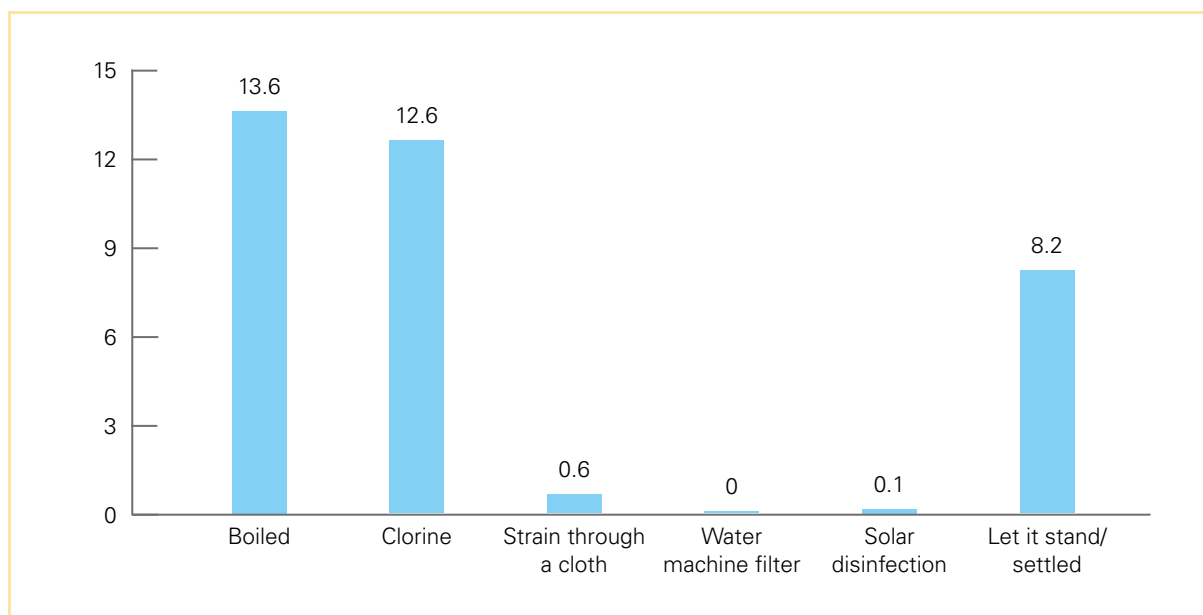
8.4.4 Household sanitation facilities

Improved toilet facilities are non-shared facilities that prevent people from coming into contact with human waste/faeces, thus reducing the transmission of diseases, particularly diarrhoea-associated ailments. Survey results indicate that more than 70 per cent of the respondents reported having improved toilet facilities in their respective households (flush toilet facilities, 59.7 per cent; covered pit-latrines/VIP, 11.1 per cent and ecological toilets, 0.4 per cent) whereas more than 20 per cent had unimproved toilet facilities (14.9 per cent, uncovered pit-latrine; 8.3 per cent, covered pit-latrine but not washable) whereas 5.6 per cent did not have latrines at all. The survey results further show that out of the households that reported using improved toilet facilities, 73.3 per cent were not shared with other households. Among those with unimproved toilet facilities, only 18.4 per cent reported not sharing with other household members (see Figures 22 and 23).

Figure 22: Type of toilet facility
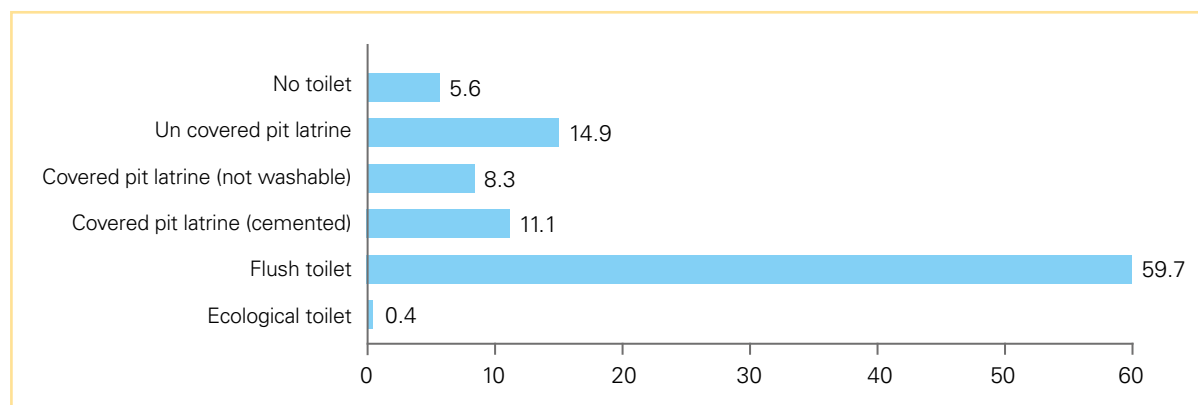
Figure 23: Toilet facility sharing
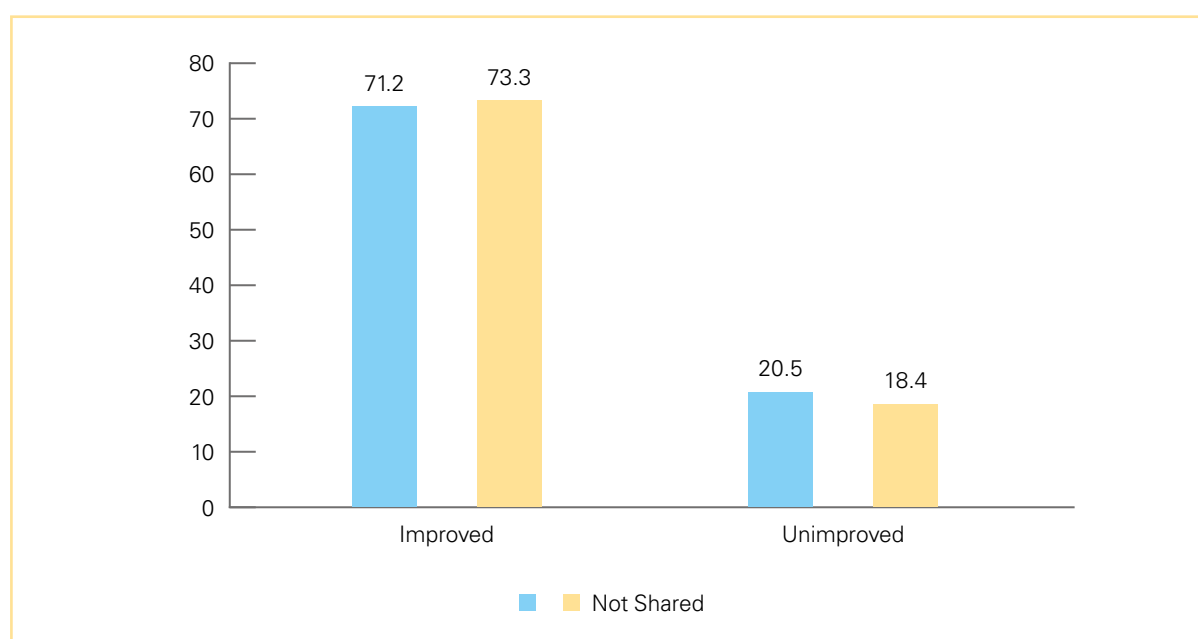
Table 23 further presents details on the sanitation service ladder in terms of percentage distribution of de jure population by type of sanitation service, according to background characteristics.

Table 23 Sanitation service ladder

Background characteristics	At least basic service1	Limited service2	Unimproved3	Open defecation3	Total	Number of persons
Residence						
Urban	71.9	11.8	14.3	2.1	100.0	1,241
Rural	52.2	16.4	21.1	10.3	100.0	1,054
Region						
Kaskazini Pemba	57.3	15.3	12.7	14.6	100.0	424
Kaskazini Unguja	43.5	14.3	34.6	7.6	100.0	315

Background characteristics	At least basic service1	Limited service2	Unimproved3	Open defecation3	Total	Number of persons
Kusini Pemba	71.7	10.7	8.3	9.3	100.0	420
Kusini Unguja	49.2	25.6	23.0	2.2	100.0	313
Mjini Magharibi	73.8	10.2	15.7	0.4	100.0	823
Wealth quintile						
Lowest	66.3	14.0	15.6	4.1	100.0	1,893
Second	60.3	13.3	21.2	5.3	100.0	151
Middle	47.6	9.5	42.9	0.0	100.0	21
Fourth	100.0	0.0	0.0	0.0	100.0	1
Highest	37.2	14.6	26.6	21.7	100.0	226
Total	**62.8**	**13.9**	**17.4**	**5.8**	**100.0**	**2,295**

[1]Improved sanitation facilities include a pit-latrine with slab, a ventilated improved pit-latrine, a flush toilet, a pour-flush toilet or a composting toilet that are single-sex and usable toilet.

[2]Improved sanitation facilities such as a pit-latrine with slab, a ventilated improved pit-latrine, a flush toilet, a pour-flush toilet or a composting toilet that are no single-sex or unusable.

[3]A pit-latrine with no slab, or a no ventilated improved pit-latrine, or no composting toilet or no sanitation facilities.

3Same as open defecation by standard definition should added together.

8.5 Hygiene situation and habits among the participants

About 67 per cent of the participants reported to wash their hands with soap and water before eating. Another 29.8 per cent reported using water only whereas a negligible number (0.2 per cent) reported not washing their hands with water and soap. The results further show that 1.3 per cent of the respondents normally did not wash hands with either water or soap, as Figure 24 further illustrates:

Figure 24: Percentage distribution of handwashing practices among participants
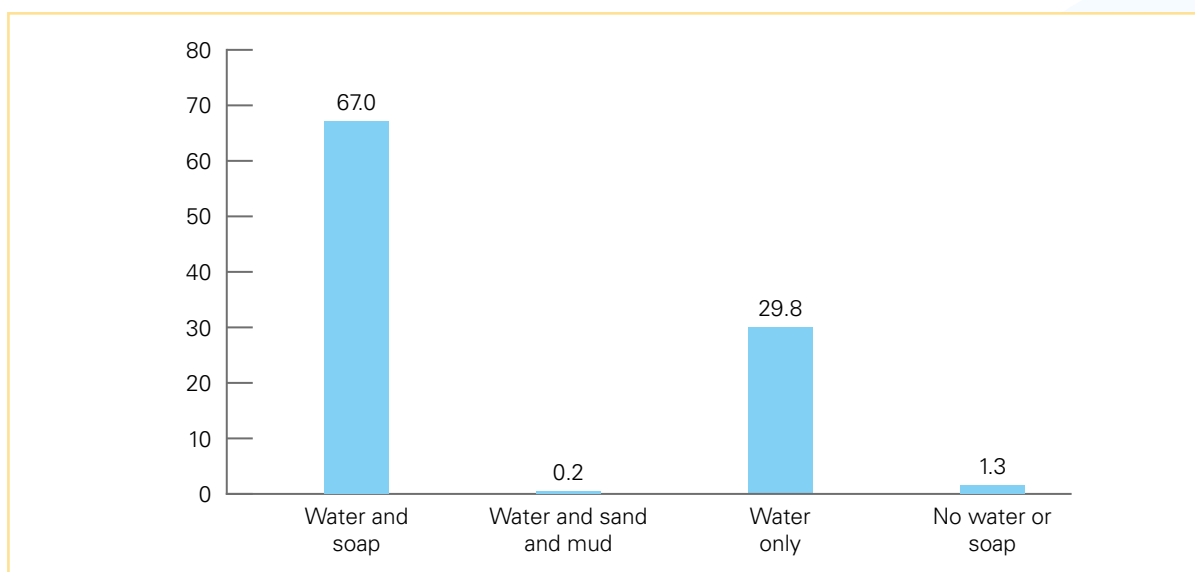
Age and sex

➤ Handwashing practices after using the toilets was also observed by age groups and sex. The results indicate that the behaviour of washing hands increased with increase in age.

Age

➤ About 70.9 per cent of participants aged 15–19 years and 63.7 per cent of the respondents aged 10–14 years were more likely to wash their hands after using the toilets compared to 57.4 per cent of the participants aged 5–9 years.

Sex

➤ Boys (66.1 per cent) were more likely to wash their hands after visiting the toilets than 61.7 per cent of the girls.

Table 24 Handwashing practice after using toilets among the participants by demographic characteristics

	Washing hands practice after using the toilet					
	Never		**Rarely**		**Many times**	
	Number	Per cent	Number	Per cent	Number	Per cent
Sex						
Boys	102	8.3	314	25.6	812	66.1
Girls	159	12.1	346	26.3	813	61.7
Age						
5–9 years	104	13.4	226	29.1	446	57.5
10–14 years	116	11	267	25.3	673	63.7
15–19 years	41	5.7	167	23.4	506	70.9

8.5.1 Washing hands before eating

Participants were also assessed for their practice of washing their hands before eating. The results show that more than two-thirds (63.9 per cent) of the pupils reported washing their hands before eating with only 0.2 per cent reporting otherwise.

Optimal washing of hands behaviour before eating was also observed by age groups (Table 25).

➤ The results indicate that the behaviour of washing hands increased with an increase in age. Pupils aged 15–19 years (69.5 per cent) and 10–14 years (64.5 per cent) were more likely to wash their hands after eating compared to pupils aged 5–9 years.

➤ Boys (73.4 per cent) were more likely to wash their hands after eating than girls (55.1 per cent), and the majority reported to use water and soap (65.8 per cent, n=1,681). Almost one in three children reported to wash their hands with water only.

Table 25 Handwashing practice before eating among the participants by demographic characteristics

	Washing hands practice before eating				
	Never	**Really**	**Sometimes**	**Many times**	**Most of the time**
Sex					
Boys	0.3	0.6	9.1	16.5	73.4
Girls	0.2	1.4	13.6	29.6	55.1
Age (years)					
5–9	0.3	1.7	15.5	24	58.6
10–14	0.2	0.8	12.3	22.3	64.5
15–19	0.3	0.8	5.7	24.1	69
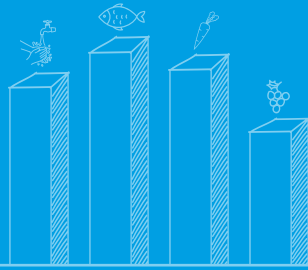
HEALTH STATUS

9.0 Introduction

The primary objective of educational institutions is to ensure and maintain education standards. However, research evidence reveals a significant relationship between academic achievement and the health status of students. Health problems such as vision and oral health problems, malaria, diarrhoea, malnutrition and obesity are associated with low scholastic performance [1]. Students with good health tend to perform better in school than those with poor health. As such, the health status of the participants was assessed by asking whether the individual participant had diarrhoea, coughing or fever a month before the survey. The key objective in this regard was to assess the prevalence of the disease burden among school children aged 5–9 years, early adolescents aged 10–14 years and late adolescents aged 15–19 years in the primary and secondary schools in Zanzibar.

> Research evidence reveals a significant relationship between academic achievement and the health status of students. Health problems such as vision and oral health problems, malaria, diarrhoea, malnutrition and obesity are associated with low scholastic performance [1].

9.1 Prevalence of disease burden among school children and adolescents

Overall, the national prevalence of malaria among school children and adolescents was very low at 0.3%. However, the national prevalence of diarrhoea, coughing and fever accounted for 22.0 per cent, 37.8 per cent and 32.4 per cent, respectively. Slight differences were notable in the incidences of diarrheal, coughing and fever by gender, residence and districts as described in the following data set.

9.1.1 Proportional disease incidence by demographic characteristics

Gender

➤ Diarrhoeal incidences among boys were slightly higher (20.5 per cent) compared to that of girls (17.3 per cent) while incidences of coughing among boys were slightly lower (36.7 per cent) compared to that of girls (38.7 per cent). Fever incidences did not vary by gender (32.7 per cent of girl's vs 32.2 per cent boys).

Reidence

➤ There was no variation in the occurrence of diarrhoea between rural and urban areas where 18.8 per cent of the rural dwellers reported diarrhoea compared to 18.7 per cent of the urban residents. Slightly high incidences of coughing (38.8 per cent) and fever (36 per cent) were reported among rural residents compared to 36.9 per cent coughing and 29.3 per cent fever incidences reported among urban residents.

Regions

➤ The incidence of diarrhoea above the national average (20.2 per cent) was reported in Kusini Unguja and Mjini Magharibi regions even though it was insignificant. High incidences of coughing above the national average were reported in Kaskazini Unguja (50.6 per cent), Kaskazini Pemba (47.5 per cent) and Micheweni (43.6 per cent), whereas the lowest incidences of coughing were reported in Kaskazini Pemba (31.6 per cent),

which was also below the national average. Furthermore, the high incidences of fever of above the national average were reported in Kaskazini Pemba (44.2 per cent) whereas Mjini Magharibi reported the lowest incidence of fever (28 per cent), which was below the national average.

District

≫ High incidences of diarrhoeal diseases above the national average (22.8 per cent) were noted in Chake Chake district whereas Mkoani registered the lowest incidence (10.6 per cent). Other districts with high incidences of diarrhoeal diseases above the national average were Chake Chake, Kati, Magharibi B, Micheweni and Wete. For coughing, high incidences above the national average were reported in Micheweni (43.6 per cent) and Kaskazini A (42.4 per cent) whereas the lowest incidences below the national average were reported in Kusini district (29.6 per cent). Also, high incidences of fever above the national average were reported in Kaskazini Pemba (44.2 per cent) whereas Mjini Magharibi region reported the lowest incidence of fever (28), which is below the national average.

Table 26 Proportional disease incidence by demographic characteristics

Demographic characteristics	Diarrhoeal incidence		Coughing incidence			Fever incidence		
	Yes	**No**	**Yes**	**No**	**Don't know**	**Yes**	**No**	**Don't know**
Gender								
Boys	20.5	79.5	36.7	63.1	0.2	32.7	66.8	0.5
Girls	17.3	82.8	38.7	61.0	0.2	32.2	67.5	0.4
Residence								
Rural	18.8	81.2	38.8	60.8	0.4	36.0	63.4	0.6
Urban	18.9	81.1	36.9	63.1	0.0	29.3	70.4	0.3
District								
Chake Chake	22.8	77.2	34.3	64.8	0.9	32.9	66.2	0.9
Kaskazini A	14.1	85.9	42.4	57.6	0.0	33.2	66.9	0.0
Kaskazini B	18.4	81.6	37.8	62.2	0.0	37.2	62.8	0.0
Kati	21.4	78.6	33.7	65.8	0.5	33.2	65.8	1.0
Kusini	18.9	81.1	29.6	70.4	0.0	25.5	74.0	0.5
Magharibi A	16.7	83.3	39.7	60.3	0.0	28.9	70.5	0.7
Magharibi B	21.4	78.6	33.7	66.3	0.0	25.6	73.5	0.9
Micheweni	19.0	81.0	43.6	55.9	0.5	40.5	59.5	0.0
Mjini	22.7	77.3	36.0	64.0	0.0	29.9	69.7	0.4
Mkoani	10.6	89.5	33.9	65.6	0.5	27.1	72.9	0.0
Wete	19.1	80.9	50.6	49.4	0.0	47.0	53.0	0.0
Region								
Kaskazini Pemba	19.1	80.9	47.5	52.2	0.2	44.2	55.8	0.0
Kaskazini Unguja	16.3	83.7	40.0	60.0	0.0	35.3	64.7	0.0

Demographic characteristics	Diarrhoeal incidence		Coughing incidence			Fever incidence		
	Yes	**No**	**Yes**	**No**	**Don't know**	**Yes**	**No**	**Don't know**
Kusini Pemba	16.7	83.3	34.1	65.2	0.7	30.0	69.6	0.5
Kusini Unguja	20.2	79.9	31.6	68.1	0.3	29.3	69.9	0.8
Mjini Magharibi	20.2	79.8	36.4	63.6	0.0	28.0	71.4	0.7
Zanzibar	18.8	81.2	37.8	62.1	0.2	32.4	67.1	0.4

9.1.2 Health-seeking behaviours and training by demographic characteristics

The study further explored the behaviours of the respondents regarding their health-seeking behaviours when they fell sick and whether they were trained on preventive measures for intestinal worms or schistosomiasis. Overall, 91.20 per cent (n=2,330) of the study participants reported to have been ill in the past one month prior to the survey. Of the 2,330 participants, only 27.1 per cent (n=632) reported seeking medical attention. More than 86.1 per cent reported seeking care in either hospitals or health centres. Another 9 per cent visited pharmacies for care and 2.4 per cent opted for intervention from the traditional healers. Almost half (45.6 per cent) reported having been trained to avoid intestinal worms or schistosomiasis. The survey further considered the health-seeking behaviours and training situation by gender, residence, district and region and the results are as delineated in the following data set as well as in the table titled 'Health-seeking behaviour stratified by demographic characteristics' attached as Annex 2.

Gender

➤ The results from the survey show that, among those who seek care, 51.3 per cent (n=324) were girls as compared to 48.7 per cent (n=308) girls who do not.

➤ 47.2 per cent and 44.2 per cent of boys and girls, respectively, have been trained to avoid intestinal worms or schistosomiasis.

Reidence

➤ Regarding the participants' residences, a high percentage of health-seeking behaviour or advice were from rural areas (54 per cent) than from urban areas (46 per cent). Likewise, for training to avoid intestinal worms or schistosomiasis, the majority (51.5 per cent) were from rural than from urban areas (40.5 per cent).

District

➤ Majority of the participants from Wete reported seeking medical treatment or advice compared to participants from Mjini district while 71.1 per cent of the participants reported being trained to avoid intestinal worms or schistosomiasis compared to only 33.7 per cent in Magharibi B, which was the lowest.

Regions

➤ Participants from Mjini Magharibi reported seeking medical treatment or advice is higher (27.8 per cent) than the national average compared to participants from Kusini Unguja (16.1 per cent), which is lower than the national average. Moreover, majority of the participants from Kusini Pemba (65.7 per cent) reported being trained to avoid intestinal worms or schistosomiasis compared to Mjini Magharibi, which reported the lowest (35.3 per cent) compared to the national average.

Table 27 Proportion of participants trained to avoid intestinal worms or schistosomiasis

Demographic characteristics	Trained to avoid intestinal worms or schistosomiasis		
	Yes	**No**	**Don't know**
Gender			
Boys	47.2	50.7	2.2
Girls	44.2	53.9	2.0
Residence			
Rural	51.4	46.5	2.1
Urban	40.5	57.4	2.1
District			
Chake Chake	60.3	37.0	2.7
Kaskazini A	39.7	57.1	3.3
Kaskazini B	43.4	54.1	2.6
Kati	39.8	60.2	0.0
Kusini	34.2	63.3	2.6
Magharibi A	37.4	58.4	4.3
Magharibi B	33.7	64.8	1.5
Micheweni	58.0	40.5	1.5
Mjini	34.9	63.6	1.5
Mkoani	71.1	27.1	1.8
Wete	57.8	41.4	0.8
Region			
Kaskazini Pemba	57.9	41.0	1.1
Kaskazini Unguja	41.6	55.5	2.9
Kusini Pemba	65.7	32.0	2.3
Kusini Unguja	37.0	61.7	1.3
Mjini Magharibi	35.3	62.3	2.4
Zanzibar	45.6	52.3	2.0
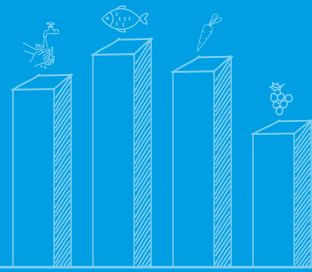
DISABILITY AND CHILD LABOUR

10.0 **Disability**

Globally, UNICEF estimated that 28.9 million children (4.3 per cent) aged 0–4 years, 207.4 million children (12.5 per cent) aged 5–17 years and 236.4 million children (10.1 per cent) aged 0–17 years have moderate to severe disabilities based on household surveys of child functional status. Using UNICEF-estimated prevalence of 10.1 per cent, approximately 266 million children aged 0–19 years are expected to have moderate to severe disabilities [68].

> The disability-inclusive provisions in the Sustainable Development Goals (SDGs) require policy interventions to address the needs of children with disabilities and bridge the inequalities that exist between children with and without disabilities [69].

The disability-inclusive provisions in the Sustainable Development Goals (SDGs) require policy interventions to address the needs of children with disabilities and bridge the inequalities that exist between children with and without disabilities [69]. However, unlike child mortality, which has improved substantially since 2000 [70], reliable global estimates of children with disabilities have been lacking, a situation that has often been misconstrued as evidence that disability is not an important or a serious enough public or global health issue [71].

In 2001, the World Health Organization (WHO) launched the International Classification of Functioning, Disability and Health (ICF) to standardize the evaluation of disabilities over the life course. In the same year, the Washington Group on Disability Statistics (Washington Group) was commissioned under the auspices of the United Nations to develop suitable disability measures that will facilitate comparable disability data within the ICF framework [72,73]. Noting the need for data on disability among children and adolescents aged 5–19 years with disability, this survey included questions to assess disability among survey participants. Questions devised by the Washington Group were used to assess different kinds of impairments that would limit children's participation in class activities. This includes hearing, seeing, walking, remembering, self-care as well as difficulties in communicating with others. Overall, 13.3 per cent (n=340) of children and adolescents aged 5–19 years in Zanzibar are disabled. The results further show that difficulty in seeing was the most reported type of disability (5.8 per cent) followed by difficulty in remembering (3.9 per cent) and then difficulty in hearing (3.1 per cent). The least reported was difficulty in self-care (0.7 per cent) (Table 28).

Table 28   Percentage of school children with disability level

Types	No disability (%)	Little difficult (%)	Very difficult (%)	Complete disability (%)
Difficulty in seeing	2,409 (94.2)	129 (5.1)	18 (0.7)	0
Difficulty in hearing	2,477 (96.9)	74 (2.9)	5 (0.2)	0
Difficulty in walking	2,519 (98.6)	32 (1.3)	4 (0.2)	1 (0.04)
Difficulty in remembering	2,455 (96.1)	98 (3.8)	3 (0.1)	0
Difficulty in self-care	2,535 (99.2)	12 (0.5)	4 (0.2)	5 (0.2)
Difficulty in communication	2,528 (98.9)	27 (1.1)	1 (0.04)	0

10.1 **Child labour**

The latest global estimates indicate that the number of children in child labour has risen to 160 million worldwide – an increase of 8.4 million children in the last four years [74]. In 2020, 63 million girls and 97 million boys were in child labour, accounting for about 1 in 10 kids worldwide. About 70 per cent of these children – 112 million – work in agriculture, mostly farming and livestock herding [74,75]. Across all age groups, boys are more likely to work than girls. One in three children in child labour are out of school. Across geographies, 86.6 million children are engaged in child labour in sub-Saharan Africa, followed by 26.3 million in central and southern Asia. Numbers are rising, particularly in the 5- to 11-year-old group, and the COVID-19 pandemic had reversed years of progress [76]. Child labour is a violation of both child protection and rights.

In this study, labour was defined as any type of work that SAC undertook to earn money or food in the previous 12 months prior to the survey date. The highest child labour rates were reported in rural areas (21.6 per cent) compared to urban areas (12.7 per cent). It was also observed that boys participated more in child labour (26.7 per cent) than girls (7.6 per cent). Adolescents aged 15–19 years were the most SAC involved in labour (30.7 per cent) than any other group. Further, over three in 10 children and adolescents aged 5–19 years are engaged in child labour (Table 29).

Table 29 — Percentage of SAC who engaged in child labour by background characteristics, Zanzibar, SHNS 2022

	Number of students engaged in child labour	Per cent of students engaged in child labour	Number of interviewed pupils
Sex			
Girls	101	7.6	1,322
Boys	330	26.7	1,234
Age (years)			
5–9	33	4.2	784
10–14	179	16.9	1,058
15–19	219	30.7	714
Area			
Rural	58	21.6	1,194
Urban	171	12.7	1,345
District			
Chake Chake	37	16.9	219
Kaskazini A	43	23.4	184
Kaskazini B	34	17.3	196
Kati	38	19.4	196
Kusini	46	23.5	196
Magharibi A	26	8.5	305
Magharibi B	15	4.5	332
Micheweni	69	35.4	195

	Number of students engaged in child labour	Per cent of students engaged in child labour	Number of interviewed pupils
Mjini	20	7.6	264
Mkoani	54	24.8	218
Wete	49	19.5	251
Total	**429**	**16.9**	**2,539**

The prevalence and patterns of SAC who reported in this study to have engaged in work to earn money or food during the previous 12 months prior the survey date were as follows.

Sex

≫ Among SAC, the results show that boys (26.7 per cent) are more engaged in work than girls (7.6 per cent).

Age

≫ Older adolescents aged 15–19 years were more engaged in work (30.7 per cent) compared to other school-age children.

Residence

≫ The results show that majority of children engaged in work were mainly from rural areas (21.6 per cent) compared to those from urban areas (12.7 per cent).

Region

≫ Over one in four SAC from Kaskazini Pemba was engaged in child labour as compared to 6.8 per cent in Mjini Magharibi.

District

≫ Majority of SAC who reported to have engaged in work were from Micheweni (35.4 per cent), and the least were from Magharibi B (4.5 per cent).

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ANNEXES

Annex 1: Percentage of de jure population using various methods to treat drinking water and percentage using an appropriate treatment method according to residence and background characteristics in Zanzibar

Background characteristic	Boil	Bleach/chlorine added	Strain through cloth	Ceramic, sand or another filter	Solar disinfection	Let it stand and settle	Other	Don't know	No treatment	Percentage using an appropriate treatment method[1]	Number of persons
Residence											
Urban	58.7	63.7	57.1	0.0	0.0	36.6	100.0	60.0	0.0	54.6	1,363
Rural	41.3	36.3	42.9	0.0	100.0	63.4	0.0	40.0	45.4	45.4	1,194
Region											
Kaskazini Pemba	16.3	7.2	0.0	0.0	33.3	30.8	100.0	40.0	0.0	18.2	446
Kaskazini Unguja	15.7	9.8	28.6	0.0	0.0	11.2	0.0	0.0	0.0	16.1	380
Kusini Pemba	16.9	5.2	7.1	0.0	66.7	26.8	0.0	20.0	0.0	18.3	437
Kusini Unguja	14.2	17.3	28.6	0.0	0.0	17.4	0.0	20.0	0.0	14.5	392
Mjini Magharibi	36.9	60.5	35.7	0.0	0.0	13.8	0.0	20.0	0.0	32.9	901
Source of drinking water											
Improved	95.6	97.1	78.6	0.0	66.7	92.4	100.0	100.0	0.0	95.0	2,363
Unimproved	2.9	2.6	21.4	0.0	33.3	7.1	0.0	0.0	0.0	4.3	146
Surface	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1
Wealth quintile											
Lowest	84.6	89.8	57.1	0.0	33.3	79.9	100.0	80.0	0.0	55.4	2,099
Second	8.7	3.9	35.7	0.0	0.0	6.7	0.0	20.0	0.0	35.0	167
Middle	1.5	0.0	0.0	0.0	0.0	0.9	0.0	0.0	0.0	0.4	23
Fourth	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	8.2	2
Highest	5.2	6.2	7.1	0.0	66.7	12.5	0.0	0.0	0.0	1.1	262

Note: Respondents may report multiple treatment methods so the sum of treatment methods may exceed 100 per cent.
[1]Appropriate water treatment methods are boiling, bleaching, filtering and solar disinfecting.

Annex 2: Health-seeking behaviour stratified by demographic characteristics

Variable	Seek treatment				Place of seeking care							
	No		Yes		Health Facility		Phamacy		Traditional healer		Others	
	Number	%	Number	%	Number	%	Number	%	Number	%	Number	%
Age												
10 to 14	816	42.4	242	38.3	232	22	21	36.8	5	33.3	5	31.3
15 to 19	584	30.4	130	20.6	117	16	19	33.3	6	40	7	43.8
5 to 9	524	27.2	260	41.1	252	32	17	29.8	4	26.7	4	25
Gender												
Girls	998	51.9	324	51.3	310	23	30	52.6	9	60	5	31.3
Boys	926	48.1	308	48.7	291	24	27	47.4	6	40	11	68.8
Location												
Rural	853	44.3	341	54	326	27	33	57.9	9	60	6	37.5
Urban	1071	55.7	291	46	275	20	24	42.1	6	40	10	62.5
Ownership												
Private	76	4	17	2.7	17	18	1	1.8	0	0	0	0
Government	1848	96	615	97.3	584	24	56	98.2	15	100	16	100
District												
Chake Chake	162	8.4	57	9	55	25	17	29.8	1	6.7	1	6.3
Kaskazini A	135	7	49	7.8	48	26	2	3.5	1	6.7	0	0
Kaskazini B	137	7.1	59	9.3	57	29	0	0	1	6.7	1	6.3
Kati	144	7.5	52	8.2	49	25	0	0	0	0	3	18.8
Kusini	146	7.6	50	7.9	46	23	1	1.8	1	6.7	3	18.8
Magharibi A	246	12.8	59	9.3	54	18	3	5.3	2	13.3	3	18.8
Magharibi B	262	13.6	70	11.1	66	20	4	7	4	26.7	0	0
Micheweni	141	7.3	54	8.5	51	26	7	12.3	1	6.7	2	12.5
Mjini	217	11.3	47	7.4	45	17	4	7	1	6.7	1	6.3
Mkoani	165	8.6	53	8.4	50	23	12	21.1	2	13.3	1	6.3

Variable	Seek treatment				Place of seeking care							
	No	Yes	No	Yes	Health Facility		Phamacy		Traditional healer		Others	
	Number	%	Number	%	Number	%	Number	%	Number	%	Number	%
Wete	169	8.8	82	13	80	32	7	12.3	1	6.7	1	6.3
Region												
Kaskazini Pemba	310	16.1	136	21.5	131	29	14	24.6	2	13.3	3	18.8
Kaskazini Unguja	272	14.1	108	17.1	105	28	2	3.5	2	13.3	1	6.3
Kusini Pemba	327	17	110	17.4	105	24	29	50.9	3	20	2	12.5
Kusini Unguja	290	15.1	102	16.1	95	24	1	1.8	1	6.7	6	37.5
Mjini Magharibi	725	37.7	176	27.8	165	18	11	19.3	7	46.7	4	25

Annex 3: School Health and Nutrition Survey Questionnaires 2022

Environment-related questionnaires

SECTION A: SCHOOL ENVIRONMENT AND NUTRITION INFORMATION

1. **Are any of the following services available in your school or anywhere close to your school?**

Services	Yes =	1
	No =	2
a. Are there many shops, markets or shopping centres near the school that are easily accessible by walking?		
b. Is there plenty of fruit and vegetables (cucumber, carrot, salad) at the market or shopping centres near the school so it is easy to choose what you like?		
c. Are there many food restaurants or vendors that sell substandard food (like crispy potato chips) with too much salt, fat or sugar near the school?		

SECTION B: SCHOOL HEALTH, PHYSICAL EXERCISE AND FOOD SERVICES INFORMATION

2. **Are the following services or infrastructure available at your school?**

Services/infrastructure	Yes =	1
	No =	2
a. Availability of clean water		
b. Clean and safe water for drinking		
c. Playground/special places for play		
d. Adequate toilets for students		
e. Handwashing facilities		
f. Food stores		
g. Dining hall		
h. Kitchen for cooking food for students		
i. School garden		
j. Nutrition clubs for students		

SECTION C: SCHOOL FOOD SERVICE INFORMATION

	Yes =	1
3. Does this school provide food and nutrition to students?	End of interview	
	No =	2

4. **Choose the services offered by the school (MORE THAN ONE ANSWER IS ACCEPTABLE)**

School food services ………………………………………………	A	
Supplements services ……………………………………..	B	
Offering deworming medicines ………………………………………	C	
Fitness activities …………………………………………	D	
Entertainment and sports ………………………………	E	
Health and nutrition screening services …………………………	F	
Other services (please specify) ………………...…………………	99	

SECTION C: SCHOOL FOOD SERVICE INFORMATION

5. Who usually manages the entire food supply system?

School food committee ……………………………………..	1
Head teacher ………………………………………………..	2
Head teacher and food teacher ……………………………………	3
Others (please specify) …………………………………	99

6. From where do schools get food to feed their students? (MORE THAN ONE ANSWER IS ACCEPTABLE)

Purchased from market ………………………………………	A
School farm / school garden ………………………………………	B
Contribution from parents ………………………………………	C
Others (please specify)………………………………………	99

7. What kind of food is served at school?

8. Which students benefit from school meal?

All classes ………………………………………………….	1
Students with special needs ……………………………………..	2
Some classes (please specify) ……………………………………	99

9. In your opinion, what are the challenges that hinder or affect the implementation of school food services? (Choose only one answer)

Lack of infrastructure …………………………………………	1
Lack of human resources………………………………………..	2
High implementation costs ……………………………………………	3
Limited community participation ………………………………..	4
Subsidies from government and private sector ...……………........	5
Lack of understanding among stakeholders ……..…………………	6
Others (please specify) ………………………………………	99

	Yes =	1
10. Are there any formal or informal food vendors near the school?	No =	2
	End of interview	

11. Name the items sold by the sellers from the following list?

Food and drink groups	Yes =	1
	No =	2
a. Sweet snacks (sweet biscuits, sweets, chocolate, cakes, cookies)		
b. Baked foods (bread, scones, cashews)		
c. Soda and soft drinks with colour and sugar		
d. Vegetables (vegetable salad, pickle, carrot, cucumber)		
e. Real fruit juices added with sugar		
f. Flavoured milk with sugar		

SECTION C: SCHOOL FOOD SERVICE INFORMATION

g.	Real milk, yogurt		
h.	Cooked food (bananas, potato, rice, porridge and stew)		
i.	Water		
j.	Fried food (candy, kaimati, chips, spices, chapati, sambusa, potato, fried cassava)		
k.	Salty and oily snacks (crisps, party, biscuits, pasta)		
l.	Mishakaki, sausages		
m.	Fruits, including those found in native trees		
n.	Ice cream		
o.	Other (please specify)		

School-related questionnaires

SCHOOL AREA IDENTIFICATION

This section is to be filled up by all selected schools and must be fully completed.

No.	Question	Responses		
ID1	Name of region			☐☐
ID2	Name of districts			☐☐
ID3	Name of Shehia			☐☐☐
ID4	Area of school	Urban …………….....………………….....	1	☐
		Rural …………….....…..…………….......		
ID5	School number			☐☐☐☐☐☐☐☐
ID6	School name			
ID7	What is the ownership status of the school?	Government ……....…...…....……………	1	☐
		Private ……....…................................		
ID8	What is the education level of the school?	Primary …….….……......………………....	1	☐
		Secondary ….…....................………....		
		Basic …..		
ID9	Date of interviews (Day/Month/Year)	Day/Month/Year……....................………		☐☐☐☐☐☐☐☐
ID10	GPS of school location	Height from sea level …...........…...		
		Latitude		
		Longitude		
ID11	Team number			☐
ID12	Number of students interviewed			☐

SECTION A: INTERVIEWER INFORMATION				
No	**Question**		**Responses**	
AO1	Interviewer's full name **Note:** Write the name in capital letters			
AO2	Registration number of interviewer		☐☐☐☐	
A03	What is your date of birth? If you are unsure, estimate your date of birth well.	(Day/Month/ Year)	☐☐☐☐☐☐	
A04	Sex of interviewer	Male…...........................	1	
		Female….......................	2	
A05	Which grade are you studying in?	Nursery 0 Form1 8		
		Std1 .... 1 Form2 9		
		Std2 .... 2 Form3 10		
		Std3 .... 3 Form4 11		
		Std4 .... 4 Form5 12		
		Std5 .... 5 Form6 13		
		Std6 6		
		Std7 7		
A06	Did you do any work in the last 12 months? Work refers to any job that earns you money or food.	Yes	1	
		No	2	
A06.1	If yes, how many hours per week?	Number of hours ….........................	☐☐ Hours per week	
		I don't know …...............................	98	
		No answer …...................................	99	
A07	Is your parent(s)/guardian(s) still alive?	Yes	1	
		No	2	
		I don't know …...............................	98	
		No answer…...................................	99	
A08	Currently, with whom do you live at home? **(Choose all answers he/she mentions)**	Mother…..	A	
		Father …..	B	
		Male guardian …...........................	C	A A11
		Female guardian …........................	D	D A11
		Relatives …...................................	E	F A13
		Alone …...	F	94 .... SECB
		Others, mention …........................	94	98 .... SECB
		I don't know …...............................	98	99 .... SECB
A09	How many people (including yourself) usually live with you at home?	Number of relatives …...................		
		I don't know …...............................	98	
		No answer…...................................	99	

SECTION B: HOUSEHOLD RESOURCES INFORMATION

B01	What is the main type of fuel used for cooking at your home?	Electricity	1
		Gas	2
		Kerosene oil	3
		Charcoal	4
		Firewood	5
		They do not cook food at home	6
		Others, mention	94
		I don't know	98
		No answer	99

B02	Does the household own the following items?		
B02a	Electricity	Yes...........................1	No..................2	
B02b	Radio	Yes...........................1	No..................2	
B02c	Television	Yes...........................1	No..................2	
B02d	Mobile phone	Yes...........................1	No..................2	
B02e	Refrigerator	Yes...........................1	No..................2	
B02f	Washing machine	Yes...........................1	No..................2	
B02g	Computer	Yes...........................1	No..................2	
B02h	Camera	Yes...........................1	No..................2	
B02i	DVD/CD	Yes...........................1	No..................2	
B02j	Bed/mattress	Yes...........................1	No..................2	
B02k	Table	Yes...........................1	No..................2	
B02l	Chair/sofa	Yes...........................1	No..................2	
B02m	Cupboard	Yes...........................1	No..................2	
B02n	Bicycle	Yes...........................1	No..................2	
B02o	Motorcycle/tricycle/vespa	Yes...........................1	No..................2	
B02p	Car or lorry	Yes...........................1	No..................2	
B02q	Solar	Yes...........................1	No..................2	

C. PHYSICAL EXERCISES

C1. LIGHT PHYSICAL EXERCISES

C1.1	During the last 7 days, did you do light exercise / activities that did not cause sweating or shortness of breath? LIST OF LIGHT PHYSICAL EXERCISE: Walking to school, cycling, moderate running, jumping rope, dancing, playing music and daily activities such as field activities and household cleaning)	Yes …….		1	No …….	2 Skip to C.2.1
C1.1a	How often did you exercise lightly in the last 7 days?	1 time				
		2 times				
		3 times				
		4 times				
		5 times				
		6 times				
		7 times				
C1.1b	How long did that exercise last?	Less than ½ hr				
		Less than 1 hr				
		Less than 1½ hrs				
		More than 1½ hrs				

C2. VIGOROUS EXERCISES

C.2.1	During the last 7 days, did you do vigorous exercise / activities that caused sweating or rapid breathing? LIST OF VIGOROUS EXERCISE: Taking heavy load, do vigorous exercises and short and speed running)	Yes …….		1	No …….	2 Skip to C.3.1
C2.2	How often did you exercise vigorously in the last 7 days?	Times 1				
		Times 2				
		Times 3				
		Times 4				
		Times 5				
		Times 6				
		Times 7 or more				
C2.3	How long did that exercise last?	Less than ½ hr				
		Less than 1hr				
		Less than 1hr				
		Less than 1½hrs				
		More than 1½ hrs				

C. WALKING						
C.3.1	During the last 7 days, did you walk on foot? WALKING ON FOOT INCLUDES: from home to school and back home, from one place to another or any other walk	Yes …….	1	No …….	2 Skip to C.4.1	
C3.2	How did you walk on feet in the last 7 days?	1 time				
		2 times				
		3 times				
		4 times				
		5 times				
		6 times or more				
C3.3	How long did that exercise last?	Less than ½ hr				
		Less than 1 hr				
		Less than 1½ hrs				
		More than 1½ hrs				
C4. SEATING						
C.4.1	During the last 7 days, did you spend your time sitting and watching TV, playing computer games, chatting with friends or engaging in other activities while sitting?	Yes …….	1	No …….	2	
C4.2	How often did you perform the activities mentioned above in the last 7 days?	1 time				
		2 times				
		3 times				
		4 times				
		5 times				
		6 times				
		7 times or more				
C4.3	How long did you perform these activities?	Less than ½ hr				
		Less than 1 hr				
		Less than 1½ hrs				
		More than 1½ hrs				
		Less than ½ hr				

SECTION D: WATER, SANITATION AND HYGIENE (WASH)					
No	**Question**		**Answer Codes**		
D01	What is the main source of drinking water in your household?	Piped water within the home ……………….…………………....	1		
		Piped water from neighbourhood …………….…………………....	2		
		Dug well, protected well ……………….…………………....	3		
		Unprotected well, river ……………….……	4		
		Bottled water ………….…….…………	5		
		Others, specify ……….………………	94		
		Don't know ……….…………………..	98		
		Refuse to answer ….……….…………	9999		
D02	Does your household do anything to make the water safer to drink?	Yes……….……………………….…..	1		
		Yes……….……………………….…..	2	2……....	F04
		Don't know……….…………………….	98	98…….	D04
		No answer……….………….…........	99	99……..	D07
D03	What does your household usually do to make the water safer to drink? (Select all that apply)	Boil ………….…..……………….…...	A		
		Add bleach/chlorine ….....……….…..	B		
		Strain through a cloth …………........	C		
		Use water filter …………….…….....	D		
		Solar disinfection …….……………....	E		
		Let it stand/settle ….…….…………...	F		
		Others, specify ….……………..........	94		
		Don't know ……….……………….…..	98		
		Refuse to answer ………….….........	99		
D04	What kind of toilet facility do members of your household usually use?	No facility/bush/field ……………….…………………....			
		Pit latrine without slab/open pit ……………….…………………....	1		
		Pit latrine with slab (not washable ……………….…………………....	2		
		Pit latrine with slab (washable) ……………….…………………....	3		
		Flush to piped sewer system, Flush to pit latrine ……………….…...	4		
		Flush to septic tank ….……………...	5		
D05	Do you share this toilet facility with other households?	Yes …………….…......………….…...	1		
		No …………….……....………….…..	2		

The next questions are related to teeth hygiene and handwashing.					
No	**Question**		**Answer codes**		
D06	How many times did you clean or brush your teeth yesterday?	Number of times per day			
		Don't know ...……......................	98		
		Refuse to answer ..……................	99		
D07	How often do you usually wash your hands before eating?	Never ...……...............................	0		
		Rarely ...……...............................	1		
		Sometimes ...…….......................	2		
		Most of the time ..……................	3		
		Always ...…….............................	4		
		Don't know …………...................	98		
		Refuse to answer ………….........	99		
D08	How often do you usually wash your hands after using the toilet or latrine?	Never ...……...............................	0		
		Rarely ...……...............................	1		
		Sometimes ...…….......................	2		
		Most of the time ..……................	3		
		Always ...…….............................	4		
		Don't know …………...................	98		
		Refuse to answer ………….........	99		
D09	Is there any WASH infrastructure?	Yes ……………………..............			
		No ……………………...............			
		Don't know …………………........			
		Refuse to answer …………….....			
D10	What do you usually use to wash your hands at home?	Water and soup ………………....			
		Water and ash, mud or sand ………			
		Water only …………………….....			
		Others, specify …………….........			
		Don't know …………………….....			
		Refuse to answer ……………....			

No	Question	Answer codes			
SECTION E: FEMALE MENSTRUATION (10–19 years)					
E01	Have you heard of the term 'menstruation' or having one's 'period'?	Yes 1			
		No 2	2	E3	
		Don't know 98			
		Refuse to answer 99			
E02	Where did you first learn about menstruation?	At school 1			
		At madrasa 2			
		From a parent or other relative 3			
		From a friend 4			
		From television or magazines 5			
		Others, specify 94			
		Don't know 98			
		Refuse to answer 9999			
E03	Have you had your first period?	Yes 1			
		No 2	2	F1	
		Don't know 98	98	F1	
		Refuse to answer 99			
E04	At what age did you have your first period?	Years ………..................................			
		Don't know 98			
		Refuse to answer 99			
E05	What do you mainly use during periods?	Cloth/cloth pads 1			
		Disposable sanitary napkins/pads 2			
		Tampons/menstrual cups 3			
		Others, specify 94			
		Don't know 98			
E06	Have you ever missed school because of your period?	Yes – one time 1			
		Yes – more than once 2	03	F1	
		No 3	98	F1	
		Don't know 98	99	F1	
		Refuse to answer 99			

SECTION E: FEMALE MENSTRUATION (10–19 years)				
No	**Question**	**Answer codes**		
E07	What are the reasons you missed school during your period? (Select all that apply)	Pain/discomfort	A	
		Embarrassment	B	
		Fear of leakage	C	
		No water at school	D	
		No changing room available	E	
		Lack of access to sanitary products	F	
		Others, specify	94	
		Don't know	98	
		Refuse to answer	99	

SECTION F: EATING HABITS			
No	**Question**	**Answer codes**	
F01	During the last 7 days, how often did you eat fast?	Never	1
		Almost every day	2
		2 to 4 times a week	3
		1 to 3 times a month	4
F02	During the last 7 days, how often did you go hungry because there was not enough food in your home?	Never	1
		Almost every day	2
		2 to 4 times a week	3
		1 to 3 times a month	4
F03	During the last 7 days, how many days did you eat food from a fast food restaurant, such as a hotel, bar, kiosk or food vendor?	Never	1
		One time	2
		2 times	3
		3 times or more	4

SECTION G: FOOD PREFERENCES

No	Question	Response		Answer codes		
G01	In the last one week, how often did you eat green leafy vegetables (including cooked, eaten on their own or as part of a diet)? E.g., spinach, sukuma wiki greens, legumes, pumpkin leaves	Less than one time	1			
		Once a week	2			
		2 to 3 times a week	3	☐		
		4 to 5 times a week	4			
		6 times or more a week	5			
G02	In the last one week, how often did you eat cabbage, leafy vegetables (including cooked, edible or as part of a diet)? E.g., white or red cabbage, broccoli and cauliflower	Less than one time	1			
		Once a week	2			
		2 to 3 times a week	3	☐		
		4 to 5 times a week	4			
		6 times or more a week	5			
G03	In the last one week, how often did you eat vegetables or fruits that are yellow or red (including cooked, can be eaten uncooked or canned)? E.g., carrot, pumpkin, sweet or yellow sweet potato	Less than one time	1			
		Once a week	2			
		2 to 3 times a week	3	☐		
		4 to 5 times a week	4			
		6 times or more a week	5			
G04	In the last one week, how often have you eaten any other types of cooked vegetables? E.g., brinjal, tomato, capsicum, lady's fingers, cucumber, onion and zucchini	Less than one time	1			
		Once a week	2			
		2 to 3 times a week	3	☐		
		4 to 5 times a week	4			
		6 times or more a week	5			
G05	In the last seven days, how often have you eaten citrus fruits? Including raw fruits and not juices E.g., orange, lemon	Less than one time	1			
		Once a week	2			
		2 to 3 times a week	3	☐		
		4 to 5 times a week	4			
		6 times or more a week	5			

No	Question	Response	Answer codes		
G06	In the last 7 day, how often did you eat any other kinds of fruits that were not mentioned earlier?	Less than one time 1			
		Once a week 2			
		2 to 3 times a week 3	☐		
		4 to 5 times a week 4			
		6 times or more a week 5			
G07	In the last 7 days, how often did you eat legumes? E.g., beans, peas, lentils	Less than one time 1			
		Once a week 2			
		2 to 3 times a week 3	☐		
		4 to 5 times a week 4			
		6 times or more a week 5			
G08	In the last 7 days, how often did you eat any kinds of nuts? E.g., nuts, sesame seeds, sunflower seeds	Less than one time 1			
		Once a week 2			
		2 to 3 times a week 3	☐		
		4 to 5 times a week 4			
		6 times or more a week 5			
G09	In the last 7 days, how often did you eat white meat? E.g., chicken, duck, kanga, pigeon, excluding food that has been made with this kind of meat	Less than one time 1			
		Once a week 2			
		2 to 3 times a week 3	☐		
		4 to 5 times a week 4			
		6 times or more a week 5			
G10	In the last 7 days, how often did you eat fish as part of your meal? E.g., changu, sato, sangara, vibua, kolekole, perege, kibua, kambare, dagaa	Less than one time 1			
		Once a week 2			
		2 to 3 times a week 3	☐		
		4 to 5 times a week 4			
		6 times or more a week 5			
G11	In the last 7 days, how often did you eat whole grain cereals? E.g., ugali, porridge, chapati, buns, spaghetti	Less than one time 1			
		Once a week 2			
		2 to 3 times a week 3	☐		
		4 to 5 times a week 4			
		6 times or more a week 5			
G12	In the last 7 days, how often did you use cooking oil? E.g., sunflower oil, maize oil, cotton oil, soy oil	Less than one time 1			
		Once a week 2			
		2 to 3 times a week 3	☐		
		4 to 5 times a week 4			
		6 times or more a week 5			

No	Question	Response		Answer codes		
G13	In the last 7 days, how often did you eat cooked roots and tubers? E.g., cassava, plantain, yam, potato, sweet white potato	Less than one time	1			
		Once a week	2			
		2 to 3 times a week	3	☐		
		4 to 5 times a week	4			
		6 times or more a week	5			
G14	In the last 7 days, how often did you eat red meat as part of your meal? E.g., beef	Less than one time	1			
		Once a week	2			
		2 to 3 times a week	3	☐		
		4 to 5 times a week	4			
		6 times or more a week	5			
G15	In the last 7 days, how often did you eat canned meat? E.g., sausage	Less than one time	1			
		Once a week	2			
		2 to 3 times a week	3	☐		
		4 to 5 times a week	4			
		6 times or more a week	5			
G16	In the last 7 days, how often did you eat refined cereals as part of your meal? E.g., refined soughum, white bread, donuts	Less than one time	1			
		Once a week	2			
		2 to 3 times a week	3	☐		
		4 to 5 times a week	4			
		6 times or more a week	5			
G17	In the last 7 days, how often did you drink sweet beverages? Excluding tea, coffee or milk drinks E.g., soda (Coca-Cola, Pepsi, Fanta, Sprite, Azam Cola), excluding energy drinks (e.g., Red Bull, MO Energy, Azam Energy)	Less than one time	1			
		Once a week	2			
		2 to 3 times a week	3	☐		
		4 to 5 times a week	4			
		6 times or more a week	5			
G18	In the last 7 days, how often did you eat fried food that has been cooked outside your home? E.g., chips, hamburger	Less than one time	1			
		Once a week	2			
		2 to 3 times a week	3	☐		
		4 to 5 times a week	4			
		6 times or more a week	5			

No	Question	Response		Answer codes		
G19	In the last 7 days, how often did you eat sweet snacks and icecream? E.g., chocolate cake, biscuits, sugar cane, lambalamba/lai	Less than one time	1			
		Once a week	2			
		2 to 3 times a week	3	☐		
		4 to 5 times a week	4			
		6 times or more a week	5			
G20	In the last 7 days, how often did you eat/drink milk or any milk-related product?	Less than one time	1			
		Once a week	2			
		2 to 3 times a week	3	☐		
		4 to 5 times a week	4			
		6 times or more a week	5			
G21	In the last 7 days, how often did you eat eggs?	Less than one time	1			
		Once a week	2			
		2 to 3 times a week	3	☐		
		4 to 5 times a week	4			
		6 times or more a week	5			

SECTION H: HEALTH						
No	**Question**	**Response**		**Answer codes**		
H01	Have you had diarrhoea in the last month? (Diarrhoea is defined as having loose stools 3 or more times within 24 hours)	Yes	1	2		H04
		No	2	2		H04
H02	Over the last month, how many days did you have diarrhoea?	One day	1			
		2–3 days	2			☐
		4–6 days	3			
		>6 days	4			
H03	Have you noticed any blood in your stools in the last month?	Yes	1			
		No	2			☐
		Don't know	98			
H04	Have you had cough at any time in the last month?	Yes	1			
		No	2			☐
		Don't know	98			
H05	Did you have fever anytime in the last month?	Yes	2			H07
		No				☐
		Don't know				

No	Question	Response	Answer codes		
H06	Over the last month, how many days did you have fever?	One day 1			
		2–3 days 2			
		4–6 days 3			
		7 or more days 4			
H07	Have you been diagnosed with malaria in the last month?	Yes			
		No			
		Don't know			
H08	Over the last month, how many days did you have unusual or heavy sweating at night?	Never			
		One day			
		2–3 days			
		4–6 days			
		7 or more days			
H09	Over the last month, how many days did you have unusual or extreme fatigue?	Never			
		One day			
		2–3 days			
		4–6 days			
		7 or more days			
H10	Over the last month, on how many days did you vomit?	Never			
		One day			
		2–3 days			
		4–6 days			
		7 or more days			
H11	Have you sought any medical treatment or advice in the past month?	Yes			
		No .... 2 .... H13			
H12	Where did you seek medical advice?	Referral hospital			
		Regional hospital			
		District hospital			
		Government health centre			
		Private hospital			
		Private clinic			
		Doctor (specialist)			
		Traditional healer			
		Pharmacy			
		Other (specify)			

No	Question	Response	Answer codes		
H13	During this school year, were you taught in any of your classes how to avoid intestinal worms or schistosomiasis?	Yes			
		No	☐	☐	
		Don't know			
H14	During the previous school year, were you treated at school for intestinal worms or schistosomiasis?	Yes			
		No		☐	
		Don't know			

SECTION M: MEASUREMENT

We are nearing the end of our interview. Now I will take measurements of your height and weight.

No	Question	Code
M01	IIII –III	Kg-Weight1
M02	IIII –III	Kg-Weight2
M03	IIII –III	Kg-Average weight
M04	IIII –II	Sm-Height1
M05	IIII –II	Sm-Height2
M06	IIII –II	Sm-Average height

SECTION N: BLOOD SAMPLES (should be filled by the lab technician)

N1	Malaria results	1	Yes	2	No
N2	If yes, have you received treatment?	1	Yes	2	No. Give reason(s)
N3	Hb level (Hb-g/dl)				
	Signature ……………………………….				
	Finishing time …………. : …………. (…..)				

Annex 4: Persons involved in the 2022 School Health and Nutrition Survey (SHNS)

Management team		
Name	**Title**	**Position in the survey**
Salum Kassim Ali	Chief Government Statistician – Office of the Chief Government Statistician (OCGS)	Management
Dr. Germana Leyna	Managing Director – Tanzania Food and Nutrition Centre (TFNC)	Management
Dr. Salim N. Slim	Director of Preventive Services and Health Promotion, Ministry of Health (MoH)	Key Stakeholder
Khalid Masoud Waziri	Director of Planning, Policy and Research (MoEVT)	Key Stakeholder
Fahima Mohammed Issa	Director of Social Statistics, OCGS	Management/Co-team
Sabina Raphael Daima	Head, Gender and Labour Statistics Division	Management/Co-team
Said Mohammed Said	Acting Director, Pemba Office, OCGS	Management
Abdulmajid Jecha Ramadhan	Acting Head, Population and Vital Statistics Division	Co-Team
Hashim Mohammed Uzia	Head of IT Division, OCGS	Data Manager
Mashavu Khamis Omar	Former Acting Chief Government Statistician	Management
Khadija Khamis Hamad	Former Director of Social Statistics, OCGS	Co-team
Haroub Masoud	Former Director, Pemba Office, OCGS	Co-team

Technical team		
Name	**Title**	**Position in the survey**
Sauli Epimark John	Nutrition and Health Specialization Epidemiology and Public Health	Principal Investigator
Asha Hassan Salmin	Head of Nutrition, MoH	Co-principal Investigator
Ahmad Hamza Mohammed	Principal Statistician	Sampler
Kombo Mdachi Kombo	Principal Statistician, OCGS Acting Head, Population and Vital Statistics Division	Coordinator Officer
Asha Mahfoudh Mwinyi	Statistician, OCGS	Desk Officer
Aisha Said Mohammed	IT, OCGS	Assistant Data Manager
Fatma Ali Saidi	Nutritionist, Ministry of Health, Unguja	Co team/Supervisor
Adam Haji Ali	Statistician, Ministry of Education	Co-team/Supervisor
Nachia Ali Salum	Statistician, OCGS	Supervisor
Salim Abdallah Masoud	Statistical Officer, OCGS	Supervisor
Rajab Juma Ali	Laboratory Technologist	Lab Coordinator

Reviewers		
Name	**Title/Institution**	**Position in the survey**
Dr. Geofrey Mchau	Tanzania Food and Nutrition Centre (TFNC)	Reviewer
Hawa Msola	United Nations Children's Fund (UNICEF)	Reviewer
Dr.. Fatma Abdallah	Tanzania Food and Nutrition Centre (TFNC)	Reviewer
Dr. Anna Moses	Tanzania Food and Nutrition Centre (TFNC)	Reviewer
Dr. David Solomon	Tanzania Food and Nutrition Centre (TFNC)	Reviewer
Dr. Heavenlight Ayubu	Tanzania Food and Nutrition Centre (TFNC)	Reviewer
Stanlaus Erick Mollel	Tanzania Food and Nutrition Centre (TFNC)	Reviewer/Analyst
Shemsa Msellem	United Nations Children's Fund (UNICEF)	Reviewer
Ramadhan Mwiru	United Nations Children's Fund (UNICEF)	Reviewer
Mwinyi Msellem	Medical Laboratory Scientist, Manager, Zanzibar Public Health Laboratory, Ministry of Health	Reviewer
Ramadhani Noor	United Nations Children's Fund (UNICEF)	Reviewer
Joyce Ngegba	United Nations Children's Fund (UNICEF)	Reviewer
Prof. Ester Ngadala	National Institute for Medical Research	Consultant
Dr. Gibson Kagaruki	National Institute for Medical Research	Analyst