**The United Republic of Tanzania**

**Ministry of Health and Social Welfare**

# Tanzania National Nutrition Survey 2014

## Final Report

***Data collection: 24 September – 21 November 2014***

**Prepared by**

**Tanzania Food and Nutrition Centre**

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## List of Acronyms

| | |
|---|---|
| **BMI** | Body Mass Index |
| **CI** | Confidence Interval |
| **DFID** | Department For International Development |
| **DHS** | Demographic and Health Survey |
| **EA** | Enumeration Area |
| **ENA** | Emergency Nutrition Assessment |
| **FAO** | Food and Agriculture Organization of the United Nations |
| **GAM** | Global Acute Malnutrition |
| **GDP** | Gross Domestic Product |
| **HAZ** | Height-for-Age Z-scores |
| **HH** | Household |
| **IFA** | Iron-Folic Acid |
| **IYCF** | Infant and Young Child Feeding |
| **MAD** | Minimum Acceptable Diet |
| **MAFS** | Ministry of Agriculture and Food Security |
| **MAM** | Moderate Acute Malnutrition |
| **MDG** | Millennium Development Goal |
| **MKUKUTA** | Kiswahili acronym for the National Strategy for Growth and Reduction of Poverty |
| **MoH** | Ministry of Health |
| **MoHSW** | Ministry of Health and Social Welfare |
| **MUAC** | Mid-Upper Arm Circumference |
| **NBS** | National Bureau of Statistics |
| **NGO** | Non-Government Organization |
| **NNS** | National Nutrition Survey |
| **OCGS** | Office of Chief Government Statistician |
| **PPS** | Probability Proportion to Size |
| **RC** | Reserve Cluster |
| **SAM** | Severe Acute Malnutrition |
| **SD** | Standard Deviation |
| **SMART** | Standardized Monitoring and Assessment of Relief and Transitions |
| **STATA** | Data analysis and statistical software |
| **TDHS** | Tanzania Demographic and Health Survey |
| **TFNC** | Tanzania Food and Nutrition Centre |
| **TRHCS** | Tanzania Reproductive and Child Health Survey |
| **UNICEF** | United Nations Children's Fund |
| **UN-REACH** | Renewed Efforts Against Child Hunger and Undernutrition |
| **VAS** | Vitamin A supplementation |
| **WAZ** | Weight-for-Age Z-scores |
| **WFP** | World Food Programme |

| | |
|---|---|
| **WHA** | World Health Assembly |
| **WHO** | World Health Organization |
| **WHZ** | Weight-for-Height Z-scores |
| **WRA** | Women of Reproductive Age |

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# Executive Summary

This report presents the results of the first National Nutrition Survey (NNS) with the SMART Methodology in Tanzania. This nutrition survey has been conducted from September 24th to November 21st, 2014. The objectives of the survey were to assess nutritional status of children aged 0-59 months and of women 15-49 years, level of Infant and Young Child Feeding (IYCF) practices, coverage of micronutrients interventions and handwashing practices in Tanzania.

The survey was a cross-sectional survey with two stage cluster sampling. All efforts were made to follow SMART methods to ensure a high quality nutrition survey. Variations from the SMART methods are noted in the methods section. Data were collected from 991 clusters of between 16 and 22 households and 16,984 children less than 5 years of age and 18,399 women in reproductive age group have been surveyed. Sample sizes were calculated at regional level in order to estimate global acute malnutrition with a desired precision of between 2-4 percent with design effect of 1.5. Ninety-eight percent of the selected clusters for children under five and for women in child bearing age were interviewed.
The results are representative at national and regional levels. The 30 domains were selected based on the current administrative structure (30 regions).

**Data Quality Summary**
Following the SMART methods, issues of data quality are reported in the survey document in order to identify mistakes to avoid in the future and to consistently improving the quality of nutrition surveys. The full data quality report from the ENA software is included in the annex of the report.

In the raw data, 96% of the children were found to have an age calculated from an exact day, month and year of birth ranging from 82% to 100% per region. The quality of age is excellent. Boys and girls were represented in the same proportion in the sample with an overall sex-ratio equal to 1.0. At the regional level, the sex-ratio varies from 0.8 to 1.2. It is within acceptable range.

All age groups were represented in proportions between 18.4% and 24.3%; only the 48-59 months age group is slightly less represented since it represents only 14.9% of the sample. There is no differences by age group regarding the sex-ratio. The overall age distribution shows fewer older children were measured compared to younger children but this difference was not significant.

At national level, the distributions of curves of Weight/Height, Height/Age and Weight/Age all follow bell shaped curves. The standard deviation for the distribution of Height/Age z-score was found to be above 1.2 in 6 regions and at Mainland, Zanzibar and National level. The standard deviation of Weight/Height z-score and Weight/Age z-score for the 30 regions fall inside the acceptable range of standard deviation from quality data.

The plausibility check report at national level highlighted the excellent quality of anthropometric data, both in terms of sample representativeness and quality of anthropometric measurements.

**Key Findings**
**Child nutritional status**
The anthropometry Z-scores were calculated using the WHO 2006 growth references.

At national level, stunting or chronic malnutrition was identified in 34.7% (33.7-35.7 95% CI) of children 0-59 months of age which is a high rate according to WHO classification. Severe stunting was found in 11.5 % of children countrywide. For Mainland, the survey results show a level of chronic malnutrition considered “very high”, exceeding the 40% threshold in 9 regions (Iringa, Njombe, Kagera, Dodoma, Ruvuma, Rukwa, Kigoma, Katavi and Geita) among which 3 regions are above 50%: Iringa (51.3%), Njombe (51.5%) and Kagera (51.9%). For Zanzibar, stunting rates are ranging from 20.6% in Town West to 30.4% in Unguja North.
According to those results, more than 2,700,000 children under five years of age are stunted in Tanzania. Nutrition interventions should be prioritized in the regions with the higher number of stunted children and the higher prevalence of chronic malnutrition. These regions are Kagera, Kigoma, Dodoma, Mbeya and Mwanza.

On the national level, 3.8% (3.5 - 4.2 95% CI) of children aged 0 -59 months were found to have Global Acute Malnutrition (GAM) and 0.9% (0.8 – 1.1 95% CI) suffered from Severe Acute Malnutrition (SAM). For Mainland, the survey results show a level of GAM considered “acceptable” in all regions except for Dodoma with 5.2%. The lowest rates of GAM 0.7% was found in Iringa. The highest rates of GAM were found in

Dodoma, Tanga (4.8%), Mara (4.9%) and Singida (4.7%). For Zanzibar, wasting rates are ranging from 6.3% in Town West to 7.5% in Unguja South. The GAM rates for Zanzibar decreased from 12.0% in 2010 to 7.2%. It is expecting that there will be approximately 340,000 moderately acute malnourished children and more than 105,000 severely acute malnourished children in Tanzania.

The prevalence of underweight can be considered "Medium" by WHO cut-offs for level of public health significance. At national level, the prevalence of underweight is used for monitoring the MDG1 "Eradicate extreme poverty and hunger". Tanzania is very close to reach the target for 2015 (12.5%) with a national prevalence of 13.4% (12.7-14.1 95% CI).

**Vitamin A and Deworming**

The proportion of all children aged 6-59 months who had received vitamin A in the last 6 months was 72.2% (70.6-73.7 95% CI) which is better than in 2010 (61.0%). About 28.0% of the children did not receive vitamin A supplement, which is alarming. Coverage of vitamin A supplementation decreased in Zanzibar from 79.0% in 2010 to 61.0%. A high coverage of vitamin A supplementation was noted at Arusha, Kagera and Unguja North (>90%) and the lowest at Mwanza, Singida, Manyara and Town West with less than 50%.

The proportion of all children aged 12-59 months who had received deworming in the last 6 months was 70.6% (69.0-72.2) at national level. The coverage is directly correlated with Vitamin A coverage which probably happened due to effectiveness of the integrated campaign organized in October 2014 at national level. Coverage of deworming increased from 50.0% in 2010 to 70.6%. There is a slight diminution of the coverage for Zanzibar from 72.0% in 2010 to 68.4%. A high coverage of deworming was noted at Kagera and Unguja North (>90%) and the lowest at Mwanza, Singida and Manyara with less than 50%.

**IYCF**

The survey revealed that 98.4% of children 0-23 months reported to have been ever breastfed and that 50.8% of children 0-23 months initiated breastfeeding within one hour. At national level, less than 42% of infants under six months of age were exclusively breastfed. In Zanzibar, less than 20% of infants under six months of age were exclusively breastfed which is low. The survey revealed that 90.0% of children 12-15 months were fed breast milk the day prior to survey. Less than 50% of children 20-23 months were still breastfed.

At national level, the survey shows that 89.5% of children from 6 to 8 months had a timely introduction of complementary food. The proportion of children aged 6-23 months who received foods from 4 or more food groups was 24.5% at national level. The higher proportion were noted at Kilimanjaro and Tanga with respectively 66.3% and 79.5% and the lowest at Iringa, Mbeya, Singida, Tabora, Manyara and Katavi with less than 10%. The proportion in Zanzibar represents less than half of the proportion at national level with 12.1%. The proportion of children aged 6-23 months who received solid, semi-solid or soft foods the minimum number of times or more was 65.7% at national level. The survey revealed that 20.0% of children 6-23 months received a minimum acceptable diet.

**Women Nutritional Status**

At national level, 5.5% of women 15-49 years of age were considered being in thinness (with 0.4% of severe thinness). A high prevalence of thinness was found at Pemba North (10.5%), Town West (10.1%), Pemba South (9.7%) and Manyara (8.8%). Prevalence of thinness were higher in age groups 15-19 years and 45-49 years with respectively 10.2% and 7.0%. In contrast to the prevalence of thinness, 20% of women were found overweight and 9.7% of women were above the cut off point for obesity. A high prevalence of obesity, around 20.0% was found at Kilimanjaro (21.8%), Dar-Es-Salaam (19.2%), Town West (20.7%) and Unguja South (18.4%). Prevalence of overweight and obesity were higher in age groups 35-39 years and 45-49 years.

At national level, 30.9% of women 15-49 years of age with children under five years of age didn't took an iron-folic acid supplementation during pregnancy for past birth. Majority of women took this supplementation less than 60 days.

**Use of Iodized Salt**

At national level, use of iodized salt the day prior to survey to cook the meal was 62.2%. Ten regions presented a percentage of use of iodized salt below 50% ranging from 5.9% in Lindi to 49.6% in Kagera. These regions are Lindi, Mtwara, Tabora, Rukwa, Geita, Ruvuma, Shinyanga, Singida, Simiyu and Kagera. Only 5 regions are above 90%: Dar-Es-Salaam, Mbeya, Kilimanjaro, Arusha and Mwanza.

For Zanzibar, use of iodized salt was ranging from 58.9% and 69.0% in Pemba North and South respectively to 78.4% in Unguja South. At national level, more than one third of the households had a non-iodized salt the day of the survey (34.6% in Mainland and 21.5% in Zanzibar). Between 0.6% and 12.6% of the surveyed households had no salt the day of the survey (3.3% for Mainland and 7% for Zanzibar).

**Handwashing Practices**

At national level, use of soap was 91.4%. Availability of soap was ranging from 78.1% in Lindi to 99.8% in Mwanza. For Zanzibar, use of soap was ranging from 85.3% and 87.4% in Pemba North and South respectively to 94.2% in Unguja South.

At national level, only 11.7% of the interviewed households members report having used soap for handwashing at least at two critical times during past 24 hours (including "after defecating") (11.5% in Mainland and 13.2% in Zanzibar). Several regions in Mainland are below 1%. These regions are: Iringa, Mbeya, Singida, Tabora, Shinyanga and Geita. The highest rates were found in Tanga and Pwani with respectively 53.9% and 58.9%. For Zanzibar, it was ranging from 0.2% and 0.4% in Unguja North and Unguja South to 21.6% and 19.9% in Pemba South and Town West respectively.

**Recommendations**

Stunting was found at 34.7% at national level. It reflects the existence of chronic nutrition related problem in the country. It is difficult to address the problem within short period as it requires ranges of interventions which should be supported by positive behavioural and practice change of the community at large.
Chronic malnutrition is the cumulative effect through time and the country cannot afford to see children getting malnourished further which interfere with their growth and contribute to stunting. Therefore, it is recommended to continue and scale up the existing nutrition program to address children in risk of mortality.

All forms of malnutrition were found high in the first two years of age. Therefore, it is highly recommended to consider children in this age group through improving infant and young child feeding practices and maternal education towards behavioural and practice changes and to achieve them it is recommended to:

- ✓ Invest in the establishment of community, health and nutrition system workplaces and public places for promoting, supporting and protecting exclusive breastfeeding for the first six months of life and continued breastfeeding up to two years of age and beyond;
- ✓ Support community-based programs to provide information and counseling on optimal and appropriate complementary feeding practices;
- ✓ Educate pregnant women about the importance of prenatal care and protect maternal nutrition and health to prevent low birth weight babies;
- ✓ Promote regular growth monitoring and include measurement of length/height (not just weight) in nutrition programs;
- ✓ Invest in a mass communication campaign for development based on preventive activities: nutrition of pregnant women, promotion of exclusive breastfeeding, complementary feeding and continued breastfeeding, good hygienic practices, the production and consumption of available complementary foods;

Efforts should be made to improve coverage of vitamin A supplementation and deworming (80% target):

- ✓ Raising awareness of mothers on micronutrient supplementation and deworming campaigns;
- ✓ Strengthening distribution channels of vitamin A and deworming supplies and monitoring and evaluation of campaigns;
- ✓ Planning the achievement of mass activities around supplementation and deworming at least twice a year

It is also recommended to:

- ✓ Develop a plan to fight against overweight and obesity.
- ✓ Strengthen action towards universal iodization of salt in all regions, especially in the 10 regions below 50%. Improve nutritional education to prevent overweight and obesity

Finally, in order to monitor the effect of present and future interventions on trends of malnutrition, it is recommended that a follow-up SMART survey be implemented in September-November 2016 following the same methodology as the present investigation.

# 1. Context and Justification

## 1.1 Introduction and Literature Review

Located in Eastern Africa, the United Republic of Tanzania is the result of the union between the Republic of Tanganyika and the People's Republic of Zanzibar in 1964. With a surface of 947,000 square Kilometres and a population of 44.9 million people (43.6 million Mainland; 1.3 million Zanzibar) [1], Tanzania is characterized by high population growth rate (2.7%). The country was ranked 152nd out of 187 in the 2013 UN Human Development Index. Despite its economic growth, poverty remains prevalent in the country, particularly in rural areas (33% in rural area, 22% in urban) [2]. Approximately 70% of the population lives in rural households; such households make up 80% of the country's poor. Agriculture accounts for 45% of Tanzania's GDP, as well as the livelihoods of some 80% of the country population [3]. While Tanzania's food self-sufficiency has ranged from 88 to 112 percent over past 8 years, localized foods deficits are rampant.

Undernutrition is one of the world's most serious but least addressed public health problems. Research indicates that efficacious nutrition interventions exist and that these can be scaled up in a cost-effective manner [4; 5]. Stunting, i.e. a chronic restriction of a child's potential growth, has become an important target of nutrition and other development-related programs. In fact, child growth has been described as a mirror of conditions of society [6] and WHO recommends tracking stunting as a measure to assess inequities in health [7].
Evidence indicates undernutrition is handed down from one generation to the next as a grim inheritance [8]. Malnourished women or adolescent girls give birth to babies with low birth weight [8]. If these children grow up in an environment of suboptimal feeding practices and a high burden of infectious diseases, these children do not experience much catch-up growth in subsequent years, leading to an intergenerational cycle of stunting (Figure 1).

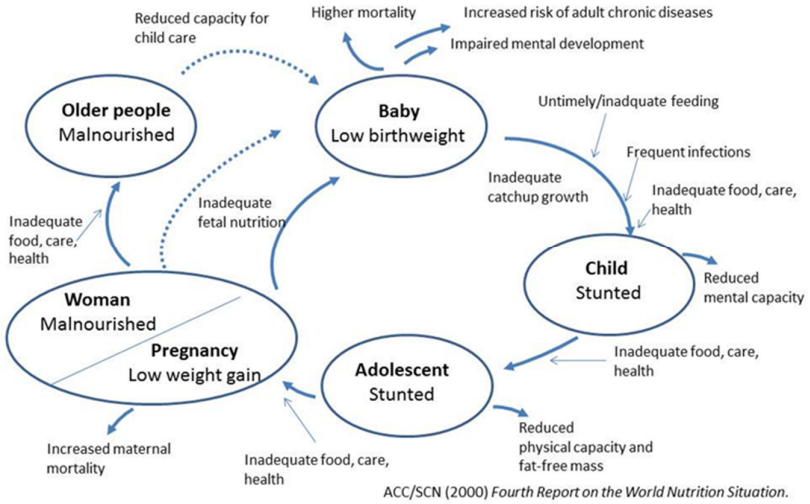


**Figure 1: The intergenerational cycle of stunting**

Given that stunting is a cumulative process that can begin in utero and continue until about 2 years after birth, particular attention is being attributed to addressing determinants of stunting during the first 1,000 days following birth [9]. It should be noted that environmental differences, rather than genetics, are the principal determinants of stunting [10]. As a result, children from different settings worldwide are expected to grow similarly if they are brought up in healthy environments.
Children who are stunted are more likely to get sick or die. If they survive they enter school late, do not learn well, and are less productive as adults. In later life, they are at an increased risk of chronic diseases. To illustrate, childhood stunting - even in its moderate form it increases mortality by 60% [11]. It is related to a 2-3 year reduced school attendance and 22% lower income in adulthood [12]. There is even evidence that poor nutritional status and childhood stunting may result in cognitive impairments which cannot be reversed in later life [13].

In Tanzania, the prevalence of chronic malnutrition or stunting, among children under five year has decreased from 50% in 1996 to 44% in 2005 [14]. But between 2005 and 2010, only 2 percent point decrease was observed and it is estimated that more than 3,000,000 children under five years of age will be affected by

stunting in 2014 [15]. Based on the WHO classification, the prevalence of 42% shows a level of chronic malnutrition being "very high" (whereby 42.3% was for Mainland and 30.2% was for Zanzibar).
The prevalence of underweight among children under five years decreased from 27% in 1996 to 17% in 2005. But between 2005 and 2010, only 1% point decrease was observed on underweight level (whereby 15.7% was for Mainland and 19.9% was for Zanzibar) [14; 15]. Regarding the prevalence of underweight, the level can be considered “medium” by WHO cut-offs for level of public health significance [14; 15].
The prevalence of global acute malnutrition (or wasting) decreased in Tanzania from 9% in 1996 to 3.5% in 2005. However, the level has increased up to 4.9% in 2010 (whereby 4.6% was for Mainland and 12.0% was for Zanzibar), including 1.3% (whereby 1.1% was for Mainland & 4.5% was for Zanzibar) of severe acute malnutrition [14; 15]. In 2014 it is expected that there will be more than 220,000 severely acute malnourished children and 380,000 moderately acute malnourished children in Tanzania.

Optimal exclusive breastfeeding and timely and appropriate complementary feeding for children under five is crucial for children development and good health. WHO recommends mothers to exclusive breastfeed infants for first six months of life to achieve optimal growth, development and good health. Thereafter for these children to meet their evolving nutritional requirements, infants should receive nutritionally adequate and safe complementary foods while continuing to breastfeed for two years or beyond. The 2010 Tanzania Demographic and Health Survey (TDHS) shows the proportion of children exclusively breastfeed was 49.8% while the overall median duration of exclusive breastfeeding was 2.4 months for Mainland and 0.5 months for Zanzibar which is below the WHO recommended time for exclusive breastfeeding of six months [15].
Studies showed strong association of sub-optimum breastfeeding with disease burden and mortality among children under five. The non-exclusive breastfed children in the first six months of life was related with 1.4 million deaths and 10% of disease burden among children under five years of age [11].Further the same article shows even with optimum breastfeeding children will become stunted if they do not receive adequate quantity and quality complementary foods after six months of age. TDHS showed the increasing trend of prevalence of stunting for children of age 7-22 months, this might be the effect of poor complementary feeding practices [15].

Vitamin A deficiency has association with disease burden and mortality among children under five years of age. Studies shows a significant association between vitamin A deficiency with diarrhea mortality and measles mortality (estimated relative risk were 1.47 and 1.35 respectively) in non-supplemented population as compared with supplemented population [11]. Recognizing the importance of vitamin A among children under five in Tanzania, apart from routine vitamin A supplementation during clinic visit, there exist twice yearly campaigns for vitamin A supplementation for all children under five. However TDHS showed coverage of vitamin A supplementation was 60.8% among children under five (whereby 60.3% was for Mainland and 78.7% was for Zanzibar), while the prevalence of vitamin A deficiency among children under five in the same survey time was estimated to be 33% [16]. Further in 2013 President Jakaya Kikwete launched large scale fortification in the country whereby edible oil is currently fortified with vitamin A as an effort to reduce prevalence of vitamin A deficiency.
Helminthes or intestinal worms represent a serious public health problem in areas where climate is tropical and inadequate sanitation and unhygienic conditions prevail. Helminthes cause significant malabsorption of iron and aggravate malnutrition and anemia, which eventually contributes to retarded growth and poor performance in school. Children under five years old are extremely vulnerable to the deficiencies induced by worm infections, therefore deworming is critical for the reduction of child morbidity and mortality.

Iodine deficiency has adverse effects on both pregnant outcome and child development; even mild and subclinical maternal iodine deficiency during pregnancy impairs motor and mental development of foetus and increases risk of miscarriage and foetus restriction [11]. As part of effort to reduce prevalence of iodine deficiency in the country salt produced in the country is currently fortified with iodine. However the test for urinary iodine concentration among women of reproductive age in Tanzania was estimated to be 21.7% for optimal urinary iodine concentration, while only 58.5% of assessed household consumed adequately iodized salt (salt with iodine content 15 ppm and above) (whereby 58.7% was for Mainland and 49.3% was for Zanzibar) [16].

To coordinate national efforts against malnutrition, Government of Tanzania has put in place a High Level Steering Committee on Nutrition with representatives from different sectors, NGOs, Private Sector, Academics, Donors and UN agencies. This committee is chaired by the Permanent secretary of the Prime Minister’s Office and the secretariat is managed by the Tanzania Food and Nutrition Centre. Although district steering committees for nutrition are in place and District Nutrition Officers appointed, their capacities remain limited and have considerable scope for improvement. A National Nutrition Strategy (2011-2015) with a US$

520 million budget was developed, but a recent Public expenditure review on nutrition has shown that only 0.22% of government expenditure was allocated to nutrition in Financial Year 2012/13 and therefore few nutrition activities are implemented [17].

## 1.2 Justification for the survey

Nutrition information in the country relies mainly in Tanzania Demographic Health Surveys (TDHS) that are carried out every 5 years. The most recent data are from TDHS 2010 and therefore may not reflect recent nutritional status of the country. In order to monitor closely key nutrition indicators such as stunting, wasting, Infant and Young Child Feeding (IYCF) practices and coverage of micronutrient interventions, Tanzania requires high quality and reliable source of nutrition information that takes short time to get the required information.
Further in the TDHS report, exclusive breastfeeding is reported only at national level and by age group, while there is no information disaggregated by regions and the proportion of children consumed the minimum acceptable diet among children 6 – 23 months is not estimated. Therefore if the situation remains like this decision makers at regional level will not be in a position to plan for appropriate nutrition interventions especially IYCF practices interventions.

Government of Tanzania will be required to report on 2015 MDGs and MKUKUTA II progress for nutrition indicator and to prepare a strategic plan for nutrition to reach the 2025 World Health Assembly (WHA) targets[1]. This planning exercise will also require more recent and high quality nutrition information.
Therefore the Ministry of Health and Social Welfare (MoHSW) through Tanzania Food and Nutrition Centre and the Ministry of Health Zanzibar conducted a National Nutrition Survey (NNS) by using SMART (Standardized Monitoring and Assessment of Relief and Transitions) methodology, which is now considered as a golden standard for the implementation of nutrition surveys. This survey will be conducted in every two years in between Tanzania Demographic and Health Survey reporting time to show trends for nutrition status in the country.

## 1.3 Overview of SMART Methodology

SMART is an inter-agency initiative launched in 2002 by a network of organizations and humanitarian practitioners. SMART advocates a multi-partner, systematized approach to provide critical, reliable information for decision-making, and to establish shared systems and resources for host government partners and humanitarian organizations [19].

Nutrition surveys using SMART methodology produce the most robust estimates of the prevalence of malnutrition, but these results are not sufficient to track nutrition conditions on a monthly basis or on the level of all health districts. For this frequency and level of information, other sources of information are needed. Nutrition survey results should always contribute in to a National Nutrition Information System. This system combines survey data, nutrition program data (such as nutrition surveillance, management of severe acute malnutrition) and other information from civil society, non-governmental organizations, religious and community groups and the press to triangulate information and develop consensus on nutrition conditions in the country. Implementation of this first National Nutrition Survey (NNS), based on SMART methodology, is a good opportunity for reinforce the Nutrition Information System in Tanzania.

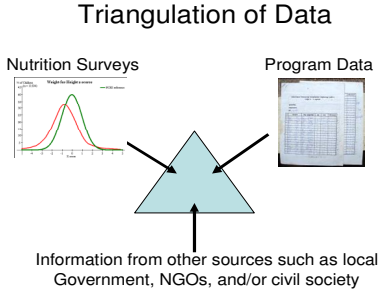


**Figure 2: Contribution to National Information System**

[1] Global target 1: 40% reduction of childhood stunting by 2025; Global target 2: 50% reduction of anemia in women of reproductive age by 2025; Global target 3: 50% reduction of low birth weight by 2025; Global target 4: No increase in childhood overweight by 2025; Global target 5: Increase exclusive breast-feeding rates in the first six months up to at least 50% by 2025; Global target 6: Reducing and maintaining childhood wasting to less than 5% [18]

# 2. Objectives

The objectives of the survey were to assess nutritional status of children aged 0-59 months and level of infant and young child feeding practices and coverage of micronutrient interventions in Tanzania.
More specifically, the survey allowed to:

- Estimate the prevalence of chronic malnutrition, acute malnutrition and underweight (global, moderate and severe) among children aged 0-59 months, at regional and national level.
- Evaluate the Infant and Young Child Feeding (IYCF) practices among children aged 0-23 months at regional and national level.
- Estimate the coverage of vitamin A supplementation among children aged 6-59 months six months prior to survey at regional and national level.
- Estimate the deworming coverage among children aged 12-59 months six months prior to survey, at regional and national level.
- Assess nutritional status of women aged 15-49 years through Body Mass Index (BMI) at regional and national level.
- Estimate the coverage of iron and/or folic acid supplementation during last pregnancy of women aged 15-49 years with children under age 5, at regional and national level.
- Estimate the coverage of iodized salt at household level for regional and national level.
- Estimate the percentage of household that have soap and the percentage of mothers/caretakers of children aged 0-59 months who report having used soap for handwashing at critical times.

# 3. Methodology

This survey was based on the SMART methodology. Based on the latest SMART methodology (Version 1, 2006), nutrition surveys using SMART methodology are simple, rapid and transparent to provide nutrition data for immediate action. Standardized procedures and recommendations are given in order to collect timely and reliable data from the field. All efforts have been made to follow SMART methodology to ensure a high quality nutrition data.

## 4.1 Target population

The target population for the anthropometric survey was all children between 0 and 59 months of age because they represent the most vulnerable portion of the population. For social and biological reasons women of the reproductive age (15-49 years of age) are amongst the most vulnerable to malnutrition [20]. For this reason women in this age category have been considered for this survey.
In selected households, all children from 0 to 59 months have been measured, all women from 15 to 49 years have been measured, handwashing practices have been assessed and the salt used by the household to cook meals, a day prior to survey, have been tested for iodine. The target group for the IYCF survey was all children between 0 and 23 months of age as recommended in the IYCF indicators [21]. Questions on IYCF have been asked to parents and caregivers of these 0-23 months aged children.

## 4.2 Study Design

The survey was designed as a cross-sectional household survey using a two stage cluster sampling representative on the regional level.

Tanzania is administratively divided into 30 regions. In order to determine the differences that exist within the regions concerning the rates of malnutrition and to provide relevant data for planning and evaluating nutrition programmes, the existing administrative structure (regions) have been used as a domain. Each region

constituted a domain. The domains used by TDHS conducted in 2010 are similar to the one this survey used which allow further comparison of results from this survey.

However, four new regions have been created on 1st March 2012: Katavi, Simiyu, Njombe and Geita. Rukwa has been divided in two regions: Rukwa and Katavi; Shinyanga has been divided in two regions: Shinyanga and Simiyu; Iringa has been divided in two regions: Iringa and Njombe; and part of Mwanza and a part of Kagera gave birth to Geita. The survey domains with their population figures are presented in Table 1 below.

## 4.3 Sampling Design

**Operational Definitions**

*Enumeration Area:*

A section subdivision operated by National Bureau of Statistics during the 2012 Tanzania Population and Housing Census. As the smallest administrative unit in Tanzania is the village, the purpose of creating this subdivision was to obtain a smaller and more convenient area unit for statistical purposes. Each cluster has been randomly selected from the total list of enumeration areas per region using PPS method.

*Household:*

"A person or a group of persons, related or unrelated, who live together and share a common source of food and livelihood, and recognize one person as a head".

In a polygamous situation, if all wives cook together, eat together and live in the same compound, this has been considered as one household. However, if each wife has her own kitchen and prepares food for her own children, those were separate households."

*Respondent:*

"A knowledgeable adult or mother/primary caretaker of children in the household"

**First stage: cluster selection**

The first stage sample of clusters has been drawn independently for each domain from the national sample frame with the support from National Bureau of Statistics (NBS) and Office of Chief Government Statistician (OCGS).

The complete list of Enumeration Areas (EA) has been used for cluster selection. The clusters have been randomly selected according to the probability proportional to size (PPS) method using the ENA software (ENA for SMART 2011, Nov. 16th 2013). The master sample that includes the list of EAs from the 2012 Tanzania Population and Housing Census has been used and random selection of the clusters has been done only once per region or domain.

**Second stage: household selection**

The second stage of sampling consisted of selecting households within each selected cluster by using a systematic random selection procedure.

The expected total number of household per cluster with detailed map has been provided by NBS and OCGS. The total number of household has been divided by the number of households to be interviewed (for example there are 176 households and 22 households to be selected – 176 / 22 = 8). This number is the sampling interval. A random number table has been used to randomly select a start number between 1 and the sampling interval (for example between 1 and 8). The random start number identified the first household, and the sampling interval has been used to identify all following households to be included in the survey.

**Special Cases**

*Absent household*

If the household was absent, the survey team asked a neighbor of the residents' whereabouts. If they were expected to return before the survey team leaves the village/EA, the survey team returned to administer the questionnaire on the same day if possible. This household had an ID, even if the survey team was not able to revisit them. The survey team continued the survey by choosing the next household according to the selection method described above. This household was not replaced.

A household was considered as absent when its members slept there last night and went out for the day of the survey.

*Abandoned house*
If the household was abandoned, the survey team ignored this household as if it was a physical barrier and replaced it with another household using the sampling method described above.

*Households without children and/or without women*
If it was determined that a selected household does not have children between 0-59 months of age and/or women between 15-49 years, the survey team tested salt for iodine and completed the section for handwashing practices. In the cluster control form, the team leader wrote the household's number and a note indicating that no children between the ages of 0 and 59 months and/or no women between the ages of 15 and 49 years belonged to the household.

*Homes that cannot be visited*
If the residents of the household refused to participate in the survey or cannot participate because of important reasons, the team leader wrote down in the cluster control form the household's number and a note explaining that the home could not be visited. The survey team chose a new household by making use of the methodology previously described. This household was not replaced with another one.

*Absent children/women*
The team leader asked the reason of the children's/women's absence. If the child/woman (or children or women) was close to the home, someone was sent to bring them back. If the child/woman was expected to return before the survey team leaves the village, then the survey team returned before the end of the day to take the measurements. If the child/woman cannot be found before the team leaves the village, the child/woman available information (age, sex, etc.) was completed in the questionnaire and a note that the child/woman was absent was recorded in the cluster control form.

*Disabled children/women*
Disabled children/women have been included in the survey. If a physical deformity prevented the measurement of child's or woman's weight or height, the data were recorded as missing and the remaining data have been collected.

## 4.4 Sample Size

The sample size for the nutrition survey has been calculated using the ENA software (ENA for SMART 2011, Nov. 16th 2013) (Table 2). The assumptions for the sample size calculation are given below.

**Expected prevalence**
The prevalence of wasting found by TDHS 2010, vary from 2.5% (Shinyanga and Simiyu) to 16.4% (Unguja North).
Concern undertook a nutrition survey in November 2013 in Iringa, Mbeya and Njombe regions, and found a Global Acute Malnutrition (GAM) prevalence of 2.0%, 2.3% and 1.8% respectively (preliminary results). These most recent regional prevalence of wasting has been used in the sample size calculations for these 3 regions.
For Katavi, Simiyu and Geita the prevalence from TDHS for Rukwa, Shinyanga and Mwanza respectively has been used to calculate the sample size.

The TDHS reports wasting (<-2 Standard Deviations Weight-for-Height) and not GAM. Oedema is not collected in TDHS surveys. However, the low SAM rates suggested that the prevalence of oedema was very low and kwashiorkor cases were hardly ever encountered

**Precision level**
The general purpose of this survey, as mentioned above, was to provide nutrition data for immediate programmatic and long-term government monitoring purposes. From a practical point of view, this means the level of precision needed for sample size calculations was high in order to allow valid comparisons; that is why the level of precision chosen varied from 2% to 4%, according to the wasting rate.

**Design effect**
As nutrition outcomes are known to generally create relatively low design effects [22], the choice was made to use a 1.5 design effect to inflate the sample size and compensate the possible heterogeneity between clusters.

SMART methodology recommend to use fixed household method instead of quota sampling method for the numerous reasons: it is easier to create lists of households than lists of children in the field; sample sizes calculated in number of children can encourage teams to skip households without any children (thus introducing a bias for household-level indicators); and household can provide a common metric for comparing sample size of many indicators.
In order to do the conversion of number of children to sample into number of households, the following assumptions were made:

**Average number of person per household, Percent of children under-five years old**
Both data were taken from the 2012 Tanzania Population and Housing Census.

**Non-response rate**
It was expected to have 4% non-response rate which refers to the number of basic sampling units that were not able to be reached due to the following reasons: refusal, accessibility, security reasons, absentees, etc.

**Table 1: Summary of parameters used for sample sizes calculations**

| | REGION | Estimated Prevalence of GAM (%) (WHO Ref. - DHS 2010) | P | q | t (98 %) | Precision | Design Effect | Number of children to include | Average Number of person per HH (Census 2012) | Percent of children U5 in total population (Census 2012) | Average Number of children U5 per HH | Percent of non-response HH | Number of HH to include | Number of Cluster (22 HH or 18 HH or 16 HH/per cluster) | Number of day for data collection (2 teams per region) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Mainland** | | | | | | | | | | | | | | | |
| 1 | **Dodoma** | 5.2 | 0.052 | 0.948 | 2.045 | 0.025 | 1.5 | 495 | 4.6 | 0.162 | 0.75 | 0.04 | 691 | 31 | 16 |
| 2 | **Arusha** | 9.5 | 0.095 | 0.905 | 2.045 | 0.03 | 1.5 | 599 | 4.5 | 0.162 | 0.73 | 0.04 | 855 | 39 | 20 |
| 3 | **Kilimanjaro** | 5.3 | 0.053 | 0.947 | 2.045 | 0.025 | 1.5 | 504 | 4.3 | 0.162 | 0.70 | 0.04 | 752 | 34 | 17 |
| 4 | **Tanga** | 5.5 | 0.055 | 0.945 | 2.045 | 0.025 | 1.5 | 522 | 4.7 | 0.162 | 0.76 | 0.04 | 713 | 32 | 16 |
| 5 | **Morogoro** | 5.3 | 0.053 | 0.947 | 2.045 | 0.025 | 1.5 | 504 | 4.4 | 0.162 | 0.71 | 0.04 | 735 | 33 | 18 |
| 6 | **Pwani** | 4.2 | 0.042 | 0.958 | 2.045 | 0.02 | 1.5 | 631 | 4.3 | 0.162 | 0.70 | 0.04 | 942 | 43 | 22 |
| 7 | **Dar-Es-Salaam** | 6.8 | 0.068 | 0.932 | 2.045 | 0.025 | 1.5 | 636 | 4.0 | 0.162 | 0.65 | 0.04 | 1021 | 60** | 4 |
| 8 | **Lindi** | 4.1 | 0.041 | 0.959 | 2.045 | 0.02 | 1.5 | 617 | 3.8 | 0.162 | 0.62 | 0.04 | 1042 | 47 | 24 |
| 9 | **Mtwara** | 2.6 | 0.026 | 0.974 | 2.045 | 0.02 | 1.5 | 397 | 3.7 | 0.162 | 0.60 | 0.04 | 689 | 31 | 16 |
| 10 | **Ruvuma** | 4.8 | 0.048 | 0.952 | 2.045 | 0.02 | 1.5 | 717 | 4.5 | 0.162 | 0.73 | 0.04 | 1022 | 46 | 23 |
| 11 | **Iringa*** | 2.0 | 0.02 | 0.98 | 2.045 | 0.02 | 1.5 | 307 | 4.2 | 0.162 | 0.68 | 0.04 | 470 | 30 | 15 |
| 12 | **Mbeya*** | 2.3 | 0.023 | 0.977 | 2.045 | 0.02 | 1.5 | 352 | 4.3 | 0.162 | 0.70 | 0.04 | 526 | 30 | 15 |
| 13 | **Singida** | 9.2 | 0.092 | 0.908 | 2.045 | 0.03 | 1.5 | 582 | 5.3 | 0.162 | 0.86 | 0.04 | 705 | 32 | 16 |
| 14 | **Tabora** | 3.9 | 0.039 | 0.961 | 2.045 | 0.02 | 1.5 | 588 | 6.0 | 0.162 | 0.97 | 0.04 | 629 | 29 | 15 |
| 15 | **Rukwa** | 3.8 | 0.038 | 0.962 | 2.045 | 0.02 | 1.5 | 573 | 5.0 | 0.162 | 0.81 | 0.04 | 736 | 33 | 17 |
| 16 | **Kigoma** | 3.2 | 0.032 | 0.968 | 2.045 | 0.02 | 1.5 | 486 | 5.7 | 0.162 | 0.92 | 0.04 | 547 | 31 | 16 |
| 17 | **Shinyanga** | 2.5 | 0.025 | 0.975 | 2.045 | 0.02 | 1.5 | 382 | 5.9 | 0.162 | 0.96 | 0.04 | 416 | 28 | 14 |
| 18 | **Kagera** | 5.0 | 0.05 | 0.95 | 2.045 | 0.025 | 1.5 | 477 | 4.7 | 0.162 | 0.76 | 0.04 | 651 | 30 | 15 |
| 19 | **Mwanza** | 3.9 | 0.039 | 0.961 | 2.045 | 0.02 | 1.5 | 588 | 5.6 | 0.162 | 0.91 | 0.04 | 674 | 31 | 16 |
| 20 | **Mara** | 5.0 | 0.05 | 0.95 | 2.045 | 0.025 | 1.5 | 477 | 5.7 | 0.162 | 0.92 | 0.04 | 537 | 30 | 15 |
| 21 | **Manyara** | 7.4 | 0.074 | 0.926 | 2.045 | 0.025 | 1.5 | 688 | 5.2 | 0.162 | 0.84 | 0.04 | 849 | 39 | 20 |
| 22 | **Njombe*** | 1.8 | 0.018 | 0.982 | 2.045 | 0.02 | 1.5 | 277 | 4.1 | 0.162 | 0.66 | 0.04 | 434 | 28 | 14 |
| 23 | **Katavi** | 3.8 | 0.038 | 0.962 | 2.045 | 0.02 | 1.5 | 573 | 5.6 | 0.162 | 0.91 | 0.04 | 657 | 30 | 15 |
| 24 | **Simiyu** | 2.5 | 0.025 | 0.975 | 2.045 | 0.02 | 1.5 | 382 | 6.9 | 0.162 | 1.12 | 0.04 | 356 | 28 | 14 |
| 25 | **Geita** | 3.9 | 0.039 | 0.961 | 2.045 | 0.02 | 1.5 | 588 | 6.1 | 0.162 | 0.99 | 0.04 | 619 | 29 | 15 |

| | REGION | Estimated Prevalence of GAM (%) (WHO Ref. - DHS 2010) | P | q | t (98 %) | Precision | Design Effect | Number of children to include | Average Number of person per HH (Census 2012) | Percent of children U5 in total population (Census 2012) | Average Number of children U5 per HH | Percent of non-response HH | Number of HH to include | Number of Cluster (22 HH/per cluster) | Number of day for data collection (2 teams per region) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Zanzibar** | | | | | | | | | | | | | | | |
| 26 | Unguja North | 16.4 | 0.164 | 0.836 | 2.045 | 0.04 | 1.5 | 538 | 5.00 | 0.156 | 0.78 | 0.04 | 717 | 33 | 17 |
| 27 | Unguja South | 10.6 | 0.106 | 0.894 | 2.045 | 0.035 | 1.5 | 485 | 4.40 | 0.156 | 0.69 | 0.04 | 735 | 33 | 17 |
| 28 | Town West | 11.5 | 0.115 | 0.885 | 2.045 | 0.035 | 1.5 | 521 | 5.20 | 0.156 | 0.81 | 0.04 | 668 | 30 | 15 |
| 29 | Pemba North | 12.7 | 0.127 | 0.873 | 2.045 | 0.035 | 1.5 | 568 | 5.30 | 0.156 | 0.83 | 0.04 | 714 | 32 | 16 |
| 30 | Pemba South | 8.9 | 0.089 | 0.911 | 2.045 | 0.03 | 1.5 | 565 | 5.40 | 0.156 | 0.84 | 0.04 | 698 | 32 | 16 |
| **TOTAL** | | | | | | | | **15,618** | | | | | **20,799** | **1,014** | |

* : Baseline Nutrition Survey Concern – Preliminary Results (November 2013)

**: All the teams in Dar (60 clusters of 18 HH)

22 HH/cluster

18 HH/cluster

16 HH/cluster

Calculations were made to determine how many households would be included in each cluster. The number of households to be completed per day (per cluster) was determined according to the time the team could spend on the field excluding transportation, other procedures and break times.
The number of households per cluster varied from 16 to 22 according to the sample size in terms of households to investigate.

It is also recommended to have a minimum of 26 clusters per domain, so it was decided to have at least 28 clusters per domain in order to avoid to be below 26 clusters in case of issues during data collection (refusal for example).

## 4.5 Data collected

**Anthropometric survey (children from 0 to 59 months of age)** (Anthropometric Questionnaire – Annex 1)

*Sex*

The child's sex was noted on the questionnaire as "F" or "M": F = female and M = male.

*Age*

The date of birth was taken from any relevant document such as birth certificate, family book or vaccination card, which recorded the name of the child and the date of birth. If the date of birth was unknown, the interviewer used the calendar of local events and the recall of the mother or caregiver was used to estimate the most correct age in months to be recorded on the questionnaire.

*Weight*

Children were weighted using a SECA Uniscale electronic scale with the precision of 100 grams. All children were measured naked following the recommended anthropometric methods. During the survey, some mothers or caregivers refused to remove the clothes for their children. During the survey training, the team leaders received the instructions to record if the weight of the child was measured with clothes. Smaller children where they were not able to stand on the scale were measured on their caregiver's hand using the mother-to-baby function of the scale.

*Height/Length*

The children's height/length was measured with a precision of 0.1 cm by using SHORR two pieces height boards. Children were measured lightly dressed with no shoes or braids, hairpieces or barrettes on their head that could interfere with a correct height measurement. Children who were less than 87 cm standing height were measured laying down while those 87 cm standing height or taller were measured standing.

*Oedema*

Only bilateral pedal oedemas are considered as nutritional oedema. Their presence was detected by applying a gentle pressure with the thumbs to top part of both feet during three seconds. If the imprint of the thumbs remained on both feet for a few seconds after releasing the thumbs, the child was considered to have nutritional oedema. Bilateral oedema were diagnosed and not graded. The diagnosis was simply recorded Y for "Yes" or N for "No".

*Mid-Upper Arm Circumference (MUAC)*

The MUAC was measured in millimetres on the left arm, at midpoint between the shoulder's tip and the elbow, on a relaxed arm. MUAC was taken only for children between 6 and 59 months of age.

*Measurement*

The team leaders recorded if the measurers measured height or length.
L = length (recumbent length)
H = height (standing height)

*Clothes*

The team leaders recorded if the measurers measured weight with or without clothes
Y = yes, with clothes (100 grams are automatically removed from the weight result in the ENA software)
N = no, without clothes

**Additional Data**

*Vitamin A supplementation in the past six months*

The interviewer first tried to confirm if the child received a vitamin A supplementation by examining an official document. If there was no document, the interviewer showed vitamin A blue and red samples to the respondent and asked him/her if the child received a vitamin A supplementation drops in the mouth in the past six months.

*Deworming in the past six months*

The deworming status in the past six months was also confirmed with an official document. If it was not possible, the interviewer asked if the child received a "worm medicine" in the past six months.

**Anthropometric survey (women from 15 to 49 years of age)** (Anthropometric Questionnaire – Annex 1)
*Age*
The age was verified with an official document (if possible) and recorded in years on the questionnaire.

*Weight*
The weight was measured with a 100g precision by using the same equipment as for children.

*Height*
The height was measured with a precision of 0.1 cm by using SHORR three pieces height boards.

**Additional Data**
*Iron and folic acid supplementation*
The interviewer first confirmed if the woman with children under five years of age took Iron/Folic Acid supplementation (tablets or syrup) during her last pregnancy by examining an official document. If there was no document, the enumerator asked her if she received or bought an Iron/Folic acid supplementation during her last pregnancy. If yes, the enumerators asked during how many days she took these tablets or syrup.

**Anthropometric Equipment**

- *Weighing Scale:* SECA 881 Standing Digital Scales for adult and children (S0141020 Scale, electronic, mother/child, 150kgx100g)
- *Length/Height measuring board:* Shorr boards for measuring adults and children (Baby/infant/adult L-hgt mea.system/SET-2 for Shorr Boards)
- *MUAC Tapes:* MUAC for children (S0145620 MUAC, Child 11.5 Red/PAC-50)

**Infant and Young Child Feeding practices (IYCF) (children from 0 to 23 months of age)** (IYCF Questionnaire – Annex 2)
Several questions on breastfeeding practices and on complementary feeding practices were asked to the mothers/caregivers of children from 0 to 23 months of age.

**Use of iodized salt at household level (all selected household)**
In all selected households, interviewers asked for a teaspoon of salt. The salt was tested for iodine using a simple rapid test kit. Salt that turned any shade of purple after being diluted with a drop of the test solution was considered to be iodized.
Tested salt was one that had been used to prepare the main meal taken by the family the day previous the survey.

**Handwashing practices**
Several questions on handwashing practices were asked to key respondents at household level. The availability of soap at household level was also assessed.

The final survey questionnaire was translated to the local language (Kiswahili) and as part of the survey training, pretested and revised based on the received comments from the participants, before teams go out for actual data collection.

## 4.6 Survey Personnel

The survey was led by TFNC, supported by a Technical Committee and under the overall supervision of a Steering Committee. The Technical Committee was in charge of managing, coordinating and monitoring the key steps of the survey and was composed of representatives of the following organizations: TFNC, Ministry of Health and Social Welfare (MoHSW), NBS, UNICEF, OCGS and Zanzibar MoH. The Steering Committee was composed of representatives of the following organizations: Prime Minister Office, TFNC, MoHSW, NBS, MAFS, OCGS, Zanzibar MoH, WHO, UNICEF, WFP, UN-REACH, FAO, Irish Aid and DFID.

As part of the implementation of this national nutrition survey, a training on SMART methodology and the adaptation of SMART methodology to Tanzanian context were required. TFNC requested UNICEF to support

recruitment of a SMART Survey Consultant to provide technical assistance for the implementation of the national nutrition survey.

The survey needed 30 teams and 15 supervisors (1 for 2 teams). Each team was composed of 1 team leader and 2 measurers. The team leader was responsible for the interviews, daily data entry and review of data quality. She/he was also responsible for the correct selection of households within the selected clusters. The measurers took anthropometric measurements. The list of all persons involved in the 2014 National Nutrition Survey is presented in Annex 3.

## 4.7 Training

In order to train properly all the personnel of the survey, 5 different trainings have been organized:

- ✓ One training on SMART methodology
- ✓ One Training of Trainers (ToT) on the survey training
- ✓ Three survey trainings

**Training on SMART Methodology**

The SMART training organized by TFNC and UNICEF in collaboration with ACF-Canada took place from Monday 25th to Saturday 30th of August (6 days), at the Edema Conference Centre in Morogoro, Tanzania, bringing together members of the Technical Committee as well as Regional Nutrition Officers from Mainland and Nutritionists and statisticians from Zanzibar.
The purpose of this training was to train all members of the Technical Committee on the SMART methodology and to identify among them and among other participants the 15 supervisors of the NNS.

32 persons from Tanzania have been identified to participate. All members of the Technical Committee have been trained (9 persons) and 23 Regional Nutrition Officers (18 from Mainland and 5 from Zanzibar) have been selected by the Technical Committee and invited to participate in this training.

The training on SMART methodology has been done by the SMART Survey consultant from UNICEF Tanzania, with the help of another SMART Specialist from ACF-Canada (ACF-Canada Regional Office, Nairobi, Kenya).

The training included the following:

- Overview of Nutrition and Mortality Surveys (relevance of doing a survey, survey planning, survey objectives)
- Sampling (concept of representative sample, simple and systematic random sampling designs, cluster design: PPS method, choosing a sampling design, sample size calculation)
- Field procedures (final stage sampling issues, special cases, daily organization)
- Survey teams (organization and recruitment, training design, evaluation and supervision)
- Anthropometric survey (indicators and their expression, age determination, measurements, entering data into ENA software)
- Standardization test (principles and organization, interpretation of results)
- Anthropometric data analysis and plausibility check (data cleaning and analysis, flags, use of weights, statistical test used in the plausibility check, reporting)

All the 32 persons have been assessed through a pre-test at the beginning of the training and a post-test at the end of the training. Depending on the results, some Regional Nutrition Officers, nutritionists and statistician have been retained as Supervisors. For this survey, Supervisors have been drawn from members of the Technical Committee and Regional Nutrition Officers.

**Training of Trainers (ToT) on the survey training**

The ToT organized by TFNC and UNICEF took place from Monday 1st to Tuesday 2nd of September (2 days), at the NIMR Conference Room in Dar-Es-Salaam, Tanzania, bringing together some members of the Technical Committee as well as the supervisors of the NNS, selected after the training on SMART Methods. The purpose of this training was to train the 15 supervisors of the National Nutrition Survey on the National Nutrition Survey methodology and on the different tools that have been used during data collection, in order that the supervisors become trainers during the survey training.

17 persons from Tanzania have been identified to participate after the training on the SMART Methodology: 7 members of the Technical Committee (whose 5 supervisors) and 10 supervisors. This ToT has been done by the SMART Survey consultant from UNICEF Tanzania.

The training included the following:

- Presentation of the National Nutrition Survey with SMART Methods in Tanzania
- Presentation of the survey training's agenda and the organization for the survey training
- Sampling (study design and clusters' selection, concept of representative sample, sample size calculation and systematic random sampling,)
- Field procedures (special cases and daily organization)
- Survey teams (organization, evaluation and supervision)
- Anthropometric survey (indicators and their expression, age determination and measurements)
- Standardization test (principles and organization) and standardization of the anthropometric equipment
- Review of the questionnaires (anthropometric and IYCF) and the tools of the NNS (forms and Rapid Test Kit for iodized salt)

The theory of the survey training has been divided in 5 sessions, as described below:

- ✓ **Session 1: Anthropometry** (Weight; Height/Length; MUAC; Oedema)
- ✓ **Session** 2 (Survey presentation; Overview on SMART Methods; Age estimation and use of the calendar of local events; Anthropometric questionnaire; Malnutrition and Referral Slip)
- ✓ **Session 3** (Sampling design: study design, cluster selection, household selection; Segmentation; Survey Team; Field Procedures: daily organization, special cases)
- ✓ **Session 4** (Standardization of anthropometric equipment; Organization of the standardization test; Writing numbers)
- ✓ **Session 5** (IYCF questionnaire; Role playing; Rapid Test Kit for iodine)

At the end of this training, the SMART Survey Consultant assigned 3 or 4 persons to one session of the survey training, based on the results of the post-test during the training on the SMART Methods and based on their knowledge/functions

**Survey training**

The first survey training organized by TFNC and UNICEF took place from Monday 15th to Monday 22nd of September (7 days), at the Msimbazi Centre in Dar-Es-Salaam, Tanzania, bringing together some District Nutrition Officers from regions as well as some students from the Tanzanian Universities, selected by the Technical Committee the week before the survey training.

The Technical Committee selected **100 potential enumerators** for the Survey Training:

- ✓ **District Nutrition Officers (DNO)** have been encouraged to apply through the Regional Administrative Secretary. Based on their availability, experience in conducting surveys, computer skills, etc., some of them have been invited to participate in the survey training.
- ✓ **Students:** An advertisement notice circulated in the universities seeking applications from suitably qualified candidates.

The purpose of this training was to train the potential enumerators on the National Nutrition Survey methodology and on the different tools that have been used during data collection.

The survey training has been done by the 15 supervisors/trainers under the supervision of the Technical Committee and the SMART Survey Consultant.

The training included the following:

- An overview of the survey and its objectives, as well as a brief introduction to SMART methodology.
- Interviewing and general communication skills
- Segmentation, community mapping, and random selection of households
- Identification of individuals to measure or interview
- How to complete the questionnaires (Anthropometry and IYCF)
- Correct age in months estimation or validation using the calendar of local events
- How to make correct anthropometric measurements.
- The standardization of anthropometric measures: Each measurer will have to measure 10 children less than five years of age twice (height, weight and MUAC). The results of the standardization test

by interviewer will be produced immediately to determine if further training and standardization is needed.
- The identification of bilateral oedema and how to refer children with acute malnutrition to the nearest health centre
- The data entry using the ENA (Emergency Nutrition Assessment) software, the data quality analysis and daily review and the daily back-up of data (only for the team leaders and the supervisors).

**Standardization of the anthropometric tools**
Before testing the enumerators for accuracy and precision of measurements, all anthropometric tools have been tested to ensure that each tool produce the same measure of a standard object (standard weight, wooden stick and plastic pipe). The scales or height boards that not produced exact measures were marked and eliminated before the standardization test and data collection.
Every day, before the start of fieldwork, the measurers were responsible to review their anthropometric equipment for damage and to measure the standard objects to ensure that the tools were still in good working order. Results were recorded daily on the standardization of anthropometric tools form.

**Standardization of the enumerators**
The standardization of anthropometry measurers was conducted in six sessions (16-18 enumerators per session – 3 days). Enumerators with good skills of measurement were assigned as a measurer within a team. Conducting a standardization test for anthropometric measures is a fundamental step in the training of interviewers for an anthropometric survey. It allows for judging objectively the precision and accuracy of the measurements made by the enumerators.

**Pilot test**
The survey tools were tested in one day. The enumerators were divided into teams. The teams were divided into groups (10 groups). Five EAs, not included in the sample (selected EAs/clusters), have been selected for the pilot test. Two groups were assigned to one EA, in two different corners. Each team selected a number of households to investigate among households listed in the EA. This process allowed to ensure that the methodology and survey equipment were adapted, but also to complete the training of enumerators.

**Final selection of the enumerators**
At the end of the survey training, among the 99 potential enumerators, only 71 have been retained for data collection. Selection has been done based on the results of the standardization test and the pre- and post-test assessments. 24 survey teams were devised to do data collection in Dar-Es-Salaam region.

**Second survey training for additional Enumerators**
The survey training for additional enumerators organized by TFNC and UNICEF took place from Thursday 25$^{th}$ to Saturday 27$^{th}$ of September (3 days), at TFNC in Dar-Es-Salaam, Tanzania, bringing together some students from the Tanzanian Universities, selected by the Technical Committee at the end of the first survey training in order to complete the 24 survey teams to 30 survey teams.

The purpose of this training was to train additional enumerators on the National Nutrition Survey methodology and on the different tools that will be used during data collection in order to compose 30 survey teams for data collection in the regions and to have some additional trained enumerators in case of problems during data collection (health problem, resignation, etc.)

This second survey training has been done by the SMART Survey Consultant and by one Technical Committee member from TFNC.

For this second survey training, it was not possible to organize a standardization test as well as the pilot test during one day because of budget and time constraints. Nevertheless the additional enumerators received a closely supervision during the first days of data collection when they joined the other teams members that had already participated in data collection in Dar-Es-Salaam region.

At the end of this second survey training, among the 25 participants, 19 have been retained to complete the teams. Selection has been done based on the results of the pre- and post-test assessments.

**Third survey training for additional Enumerators**
A third survey training for additional enumerators has been organized by TFNC from Monday 27th to Tuesday 28th of October (2 days), at NIMR Conference Room, in Dar-Es-Salaam, Tanzania, bringing together some students from the Tanzanian Universities, selected by TFNC in order to complete the 30 survey teams after that some enumerators drop out for money shortage issues.

This third survey training has been done by two Technical Committee members from TFNC, with the same agenda that the second survey training.

At the end of this third survey training, among the 42 participants, 8 have been retained to complete the teams. Selection has been done based on the results of the pre- and post-test assessments.

## 4.8 Implementation of Fieldwork

**Communication/Sensitization on the survey**
A communication plan has been developed and implemented in order to ensure that the government and health authorities on the national, regional and district level, and cooperating partners know the objectives and implementation dates of the survey.

**Fieldwork plan**
Fieldwork began with 24 teams in Dar-Es-Salaam for 5 days (from Wednesday 24th to Monday 29th of September), allowing the supervision teams to review the skills and implementation of all the survey teams before deploying them to remaining regions of the country.
After Dar-Es-Salaam, the survey teams evolved by group of 2 (or 3) teams with 1 (or 2) supervisor(s), as described in the table below. They covered 2 (or 3) regions and completed one cluster in one day.
Teams in Arusha, Singida, Pwani and Lindi received help from other teams at the end of data collection to avoid delays in fieldwork plan.

Data collection for Mainland started on the 2nd of October and finished the 21st of November 2014. In Zanzibar, data collection started on the 8th of October and finished on the 12th of November 2014.

**Supervision**
The enumerators for the survey were assessed before the launch of the survey and continually throughout the data collection.
Supervision of fieldwork was conducted by the supervisors, the Technical Committee members and the SMART survey consultant. The team leader was responsible of the quality for his/her team. The supervisor was responsible of the quality for the two (or three) supervised teams. Each evening, after the end of data collection, the team leader sent data to his/her supervisor, then the supervisor sent the data to the SMART survey consultant. The SMART survey consultant sent bi-weekly report to all supervisors during data collection regarding the data quality, the back-up process and the calendar of fieldwork.

The SMART survey consultant did supervision visits with the teams 27, 28, 29, 5, 6, 7, 8, 19 and 20 in Unguja, Geita, Mara and Arusha respectively from Tuesday 14th of October to Friday 31st of October.

## 4.9 Data entry and Data Analysis

**Data entry plan**
ENA software (ENA for SMART 2011, Nov. 2nd 2014) and EpiData (Version 3.1) were used for data entry. The first round of data entry (anthropometric data for children, vitamin A and deworming) was completed in the field in order to facilitate quick review with the objective to improve the quality of data. The second round of data entry (anthropometric data for children and women, IYCF, handwashing practices and iodized salt data) was completed in Dar-Es-Salaam from Tuesday 18th of November to Saturday 29th of November. EpiData software was used to enter anthropometric data for women, IYCF, handwashing practices and information on salt.

**Analysis plan**
The nutrition results are presented in the standard format following the report template from the ENA software (ENA for SMART 2011, Nov. 2nd 2014). This format includes GAM, SAM, Stunting, Underweight and Overweight with 95% confidence intervals. The report has estimates of malnutrition calculated with the WHO

2006 growth references. These and all other data were loaded in STATA (version 11.1) for further analysis (results at national level, IYCF practices, etc.). The data quality report is included in the annexes of the final report.

### Nutritional Anthropometric Indicators

The following cut-offs were used to determine the prevalence of wasting, stunting and underweight (Z-scores) using the WHO 2006 growth references.

**Table 2: Cut-offs for definition of wasting, stunting and underweight**

| Classification | Acute Malnutrition or Wasting (WHZ) | Chronic Malnutrition or Stunting (HAZ) | Underweight (WAZ) |
|---|---|---|---|
| Global | <-2SD &/or bilateral edema | <-2 SD | <-2 SD |
| Moderate | ≥-3 SD & <-2 SD | ≥-3 SD & <-2 SD | ≥-3 SD & <-2 SD |
| Severe | <-3 SD &/or bilateral edema | <-3 SD | <-3 SD |

Stunting or low Height-for-Age is an indicator of linear growth retardation and cumulative growth deficits. Stunting reflects the failure to receive adequate nutrition over a long period of time and is also affected by recurrent and chronic illness. Height-for-Age represents the long-term effects of malnutrition in a population and is not sensitive to recent, short-term changes in dietary intake.

Wasting or low Weight-for-Height measures body mass in relation to body height or length to describe the current or acute nutritional status. Wasting represents the failure to receive adequate nutrition in the period immediately before the measurements and may be the result of inadequate food intake or a recent episode of illness causing loss of weight and the onset of malnutrition.

Low Weight-for-Age is a composite index of low Height-for-Age and low Weight-for-Height. It takes into account both acute and chronic malnutrition. Weight measures with digital scales are very accurate likely causing the underweight index to be preferred in the past. While underweight or low Weight-for-Age is used for monitoring the Millennium Development Goals, it is no longer in use for monitoring individual children as it cannot detect children who are stunted but of normal weight.

Body mass Index (BMI) is used to classify underweight, overweight and obesity. It is defined as the weight in kilograms divided by the square of the height in metres (kg/m$^2$). BMI is not age dependent and same cut-offs are used for both sex. Maternal under nutrition is one of the main contributory factors for low birth weight babies. Babies who are undernourished in the womb face risk of dying during their early months and years. Those who survive are likely to remain undernourished throughout their lives, and to suffer higher incidences of chronic diseases. International classification of adult underweight, overweight and obesity according to BMI, WHO 2004 Standard, was employed for calculation of BMI.

**Table 3: Cut-offs for definition of adult thinness, overweight and obesity by BMI**

| Classification | BMI (kg/m$^2$) Cut-offs |
|---|---|
| Severe thinness | <16.0 |
| Thinness | <18.5 |
| Normal range | 18.5≤ BMI <25.0 |
| Overweight | ≥25.0 |
| Obese | ≥30.0 |

### Vitamin A Supplementation and Deworming

To estimate vitamin A supplementation and deworming coverage, the following formula presented in table 13 were used.

**Table 4: Vitamin A Supplementation Coverage and Deworming Coverage**

| Indicator | Numerator | Denominator |
|---|---|---|
| Vitamin A Supplementation | Number of children aged 6-59 months who received at least one high-dose vitamin A supplement in the six months preceding the survey | Total number of children age 6-59 months x 100 |
| Deworming | Number of children 12-59 months dewormed in the six months preceding the interview | Total number of children age 12-59 months x 100 |

**Iron/Folic acid supplementation**
The analysis used by TDHS to estimate iron/folic acid supplementation coverage was followed: percentage of women with children under five years of age who took iron tablets or syrup during pregnancy for past birth, disaggregated by number of days (None, <60, 60-89, 90+).

**Infant and Young Child Feeding Practices (IYCF)**
IYCF indicators and formula that were used to calculate them are detailed below. These indicators and formula follow the guidelines from WHO "Indicators for assessing IYCF practices".

*Children ever breastfed*: Proportion of children born in the last 24 months who ever breastfed.

$$\frac{\text{Children born in the last 24 months who were ever breastfed}}{\text{Children born in the last 24 months}}$$

*Early initiation of breastfeeding*: Proportion of children born in the last 24 months who were put to the breast within one hour of birth.

$$\frac{\text{Children born in the last 24 months who were put to the breast within one hour after birth}}{\text{Children born in the last 24 months}}$$

*Exclusive breastfeeding under 6 months*: Proportion of infants 0-5 months of age who are fed exclusively with breast milk.

$$\frac{\text{Infants 0-5 months of age who received only breast milk during the previous day}}{\text{Infants 0-5 months of age}}$$

Exclusive breastfeeding means that the infant receives only breast milk. No other liquids or solids are given – not even water – with the exception of oral rehydration solution, or drops/syrups of vitamins, minerals or medicines.

*Continued breastfeeding at 1 year*: Proportion of children 12-15 months of age who are fed breast milk.

$$\frac{\text{Children 12-15 months of age who received breast milk during the previous day}}{\text{Children 12-15 months of age}}$$

*Introduction of complementary foods*: Proportion of infants 6-8 months of age who receive solid, semi-solid or soft foods.

$$\frac{\text{Infants 6-8 months of age who received solid, semi-solid or soft foods during the previous day}}{\text{Infants 6-8 months of age}}$$

*Minimum dietary diversity*: Proportion of children 6-23 months of age who receive foods from 4 or more food groups.

$$\frac{\text{Children 6-23 months of age who received foods from} \geq 4 \text{ food groups during the previous day}}{\text{Children 6-23 months of age}}$$

The 7 foods groups used for tabulation of this indicator are:

- Grains, roots and tubers
- Legumes and nuts
- Dairy products (milk, yogurt, cheese)
- Flesh foods (meat, fish, poultry and liver/organ meats)
- Eggs
- Vitamin-A rich fruits and vegetables
- Other fruits and vegetables

*Minimum meal frequency:* Proportion of breastfed and non-breastfed children 6-23 months of age who receive solid, semi-solid, or soft foods (but also including milk feeds for non-breastfed children) the minimum number of times or more.

The indicator is calculated from the following two fractions:

$$\frac{\text{Breastfed children 6-23 months of age who received solid, semi-solid or soft food the minimum number of times during the previous day}}{\text{Breastfed children 6-23 months of age}}$$

And

$$\frac{\text{Non-breastfed children 6-23 months of age who received solid, semi-solid or soft food the minimum number of times during the previous day}}{\text{Non-breastfed children 6-23 months of age}}$$

Minimum is defined as:

- 2 times for breastfed infants 6-8 months
- 3 times for breastfed children 9-23 months
- 4 times for non-breastfed children 6-23 months

*Minimum acceptable diet:* Proportion of children 6-23 months of age who receive a minimum acceptable diet (apart from breast milk)

This composite indicator will be calculated from the following two fractions:

$$\frac{\text{Breastfed children 6-23 months of age who had at least the minimum dietary diversity and the minimum meal frequency during the previous day}}{\text{Breastfed children 6-23 months of age}}$$

And

$$\frac{\text{Non-breastfed children 6-23 months of age who had at least the minimum dietary diversity and the minimum meal frequency during the previous day}}{\text{Non-breastfed children 6-23 months of age}}$$

**Handwashing practices**

*Availability of soap at household level:* Proportion of household that have soap

$$\frac{\text{Household that have soap}}{\text{Total number of household}}$$

*Handwashing at critical times:* Proportion of mothers/caretakers of children 0-59 months who report having used soap for handwashing at least at two critical times during past 24 hours

$$\frac{\text{Mothers/caretakers of children 0-59 months of age who mentioned handwashing at appropriate times during the previous day}}{\text{Total number of mothers/caretakers of children 0-59 months of age}}$$

Critical moments that WHO lists as the instances for maximum effect on diarrheal disease reduction include the following:

- After defecation
- After handling child's feces or cleaning a child's bottom
- Before preparing food
- Before feeding a child
- Before eating

## 4.10 Ethical Considerations

The study has been approved by National Institute of Medical Research Coordinating Committee of the Ministry of Health and Social Welfare and Ethical Committee of the Ministry of Health Zanzibar. All the logistical arrangements of visiting the sites in the study have been made by Regional Administrative Secretary for the respective regions.

This study carried no risk for participating respondents. Privacy of respondents of the study was not put in public. To ensure privacy and confidentiality all interviews were undertaken in a convenient place where other people were not able to listen or follow the proceedings. All respondents were informed about the nature of the study, its risks and benefits, rights to terminate interview at any time, refusal to answer to any question that they deem sensitive, the data collection procedures and confidentiality. A consent statement was read

by the enumerator prior to the interview and the respondent was required to give a verbal consent before the commencement of the interview. No financial compensation was given to the participating households.
Questionnaires were given unique identification number and confidentiality was observed for the names of the respondents. The names of the respondents were not used in the report and any communication emanating from the study.

Results of weight, height and Mid Upper Arm Circumference (MUAC) measurements were verbally communicated to the mother/caregivers of the children. All children with signs of acute malnutrition were given referral form to go to the nearest health facility for immediate management of their situation. The team leader filled out two copies of the referral form (one for the mother/caregiver and one for the supervisor).

## 4.11 Limitations of the survey

**Reliability of sample frame**
The master sample frame used for the random selection of clusters (Enumeration Areas) was created in 2012 by NBS. As the projections at EA level were technically difficult to obtain, the choice was made to use the original population to estimate for the cluster selection when applying the PPS method.

**Reliability of EA maps**
The mapping of the enumeration areas dated from the 2012 Census, which means that the boundaries might have change since then.

**Reserve Clusters**
In the case that several of the selected clusters cannot be surveyed due to refusal or insecurity for example, the ENA software automatically selected reserve clusters at the planning stage. 10% of the required clusters + 1 were pre-selected. All these reserve clusters should only be used if the total number of surveyed clusters is less than 26 or if less than 80% of the sample size in terms of children is reached, in order to keep an acceptable precision for the results (narrower Confidence Intervals).Following SMART Methodology, there is never replacement of one cluster with another one.
During data collection, some teams made some reserve clusters (RC) before that they be informed to not use them:

- ✓ 2 RC in Kilimanjaro
- ✓ 2 RC in Mtwara
- ✓ 1 RC in Shinyanga

As all samples in all regions reached the planned sample sizes and as total number of clusters per region is always higher than 26 clusters, data from reserve clusters have been cancelled.

**Clusters Selection in Dar-Es-Salaam Region**
A mistake has been observed during clusters selection for Dar-Es-Salaam region. The clusters have been selected in only one district among 3 districts which compose Dar-Es-Salaam Region. Results are representative for Kinondoni District. Reasons for this mistake can be due to the ENA software during the clusters selection process (too much lines in the Enumeration Areas list) or due to the file (file not complete for Dar-Es-Salaam).

**Reserve Teams and additional survey trainings**
The field work was planned without reserve teams and when 12 enumerators dropped out during data collection, the field work suffered significant challenges. Two additional survey training were conducted and persons retained were subsequently recruited as Measurers. This contributed to increase duration of data collection. In order to overcome such problems in future surveys it is recommended to train reserve teams to accomplish the survey timely and reduce associated costs.

# 4. Results

## 5.1 Children Nutritional Status (0-59 months)

**Description of sample**

The number of cluster scheduled and number of clusters completed is included in Table 5. The percentage of completed clusters was ranging from 88% to 100%, with 98% overall.23 clusters haven't been surveyed due to the following reasons:

- ✓ Refusal (1 cluster in Arusha, 1 cluster in Kilimanjaro and 1 cluster in Mara)
- ✓ Time and distance constraints (2 clusters in Pwani (Mafia Island) and 1 cluster in Arusha)
- ✓ Inaccessibility (1 cluster in Kilimanjaro, 1 cluster in Pwani, 4 clusters in Tanga, 1 cluster in Lindi, 1 cluster in Iringa, 2 clusters in Rukwa, 1 cluster in Kigoma and 2 clusters in Kagera)
- ✓ Insecurity (1 cluster in Manyara).
- ✓ No EA maps (1 cluster in Manyara)
- ✓ Two clusters haven't been surveyed in Geita: one was not found by the Administrative Officer and no local leader was found to give permission to enter the community for the second

These missing clusters are randomly distributed among the different regions and the minimum total number of clusters per region is 27 (SMART recommends to have a minimum of 26 clusters per domain). There is no selection bias regarding the representativeness of the sample, the results and statistical analysis.

Regarding the number of children surveyed versus the number of children planned during sample size calculations, in all 30 regions there response rate was above 80% which is acceptable in surveys. The response rate was ranging from 81% in Kilimanjaro to 145% in Iringa, with 109% overall at national level.

**Table 5: Number and percentage of surveyed clusters and assessed children as compared to number of planned clusters and number of children by region, Mainland, Zanzibar and National**

| | Region/Overall | Number of cluster planned | Number of cluster surveyed | % | Number of children planned | Number of children assessed | % |
|---|---|---|---|---|---|---|---|
| | **Mainland** | **854** | **831** | **97.3%** | **12,942** | **14,286** | **110.4%** |
| 1 | Dodoma | 31 | 31 | 100% | 495 | 697 | 141% |
| 2 | Arusha | 39 | 37 | 95% | 599 | 516 | 86% |
| 3 | Kilimanjaro | 34 | 32 | 94% | 504 | 406 | 81% |
| 4 | Tanga | 32 | 28 | 88% | 522 | 599 | 115% |
| 5 | Morogoro | 33 | 33 | 100% | 504 | 547 | 109% |
| 6 | Pwani | 43 | 40 | 93% | 631 | 864 | 137% |
| 7 | Dar-Es-Salaam | 60 | 60 | 100% | 636 | 555 | 87% |
| 8 | Lindi | 47 | 46 | 98% | 617 | 730 | 118% |
| 9 | Mtwara | 31 | 31 | 100% | 397 | 430 | 108% |
| 10 | Ruvuma | 46 | 46 | 100% | 717 | 846 | 118% |
| 11 | Iringa | 30 | 29 | 97% | 307 | 444 | 145% |
| 12 | Mbeya | 30 | 30 | 100% | 352 | 508 | 144% |
| 13 | Singida | 32 | 32 | 100% | 582 | 644 | 111% |
| 14 | Tabora | 29 | 29 | 100% | 588 | 547 | 93% |
| 15 | Rukwa | 33 | 31 | 94% | 573 | 583 | 102% |
| 16 | Kigoma | 31 | 30 | 97% | 486 | 583 | 120% |
| 17 | Shinyanga | 28 | 28 | 100% | 382 | 379 | 99% |
| 18 | Kagera | 30 | 28 | 93% | 477 | 665 | 139% |
| 19 | Mwanza | 31 | 31 | 100% | 588 | 760 | 129% |
| 20 | Mara | 30 | 29 | 97% | 477 | 389 | 82% |
| 21 | Manyara | 39 | 37 | 95% | 688 | 598 | 87% |
| 22 | Njombe | 28 | 28 | 100% | 277 | 280 | 101% |
| 23 | Katavi | 30 | 30 | 100% | 573 | 493 | 86% |
| 24 | Simiyu | 28 | 28 | 100% | 382 | 503 | 132% |
| 25 | Geita | 29 | 27 | 93% | 588 | 720 | 122% |
| | **Zanzibar** | **160** | **160** | **100%** | **2,677** | **2,698** | **100.8%** |
| 26 | Unguja North | 33 | 33 | 100% | 538 | 507 | 94% |
| 27 | Unguja South | 33 | 33 | 100% | 485 | 461 | 95% |
| 28 | Town West | 30 | 30 | 100% | 521 | 506 | 97% |
| 29 | Pemba North | 32 | 32 | 100% | 568 | 564 | 99% |
| 30 | Pemba South | 32 | 32 | 100% | 565 | 660 | 117% |
| | **National** | **1,014** | **991** | **98%** | **15,618** | **16,984** | **109%** |

The sample of the anthropometry part included 16,984 children below 5 years. This sample consisted of 14,928 children aged 6-59 months which is 87.9% and 12.1% of children were aged 0 to 5 months of age. Children less than 2 years (0-23 months) were 7,770 (45.7%) of less than 5 years. There was a lack of information on the age for 5 children in the sample including 1 children on age and sex.

Boys and girls are represented in the same proportion in the sample with an overall sex ratio equal to 1.0. At the level of the regions the sex ratio varies from 0.8 to 1.2 which is within acceptable range.

**Table 6: Distribution of children by sex and sex-ratio by region, Mainland, Zanzibar and National**

| | Region/Overall | N | Boys (%) | Girls (%) | Ratio: Boys /Girls |
|---|---|---|---|---|---|
| | **Mainland** | **14,280** | **50.1** | **49.9** | **1.0** |
| 1 | Dodoma | 697 | 52.9 | 47.1 | 1.1 |
| 2 | Arusha | 515 | 50.9 | 49.1 | 1.0 |
| 3 | Kilimanjaro | 406 | 53.9 | 46.1 | 1.2 |
| 4 | Tanga | 598 | 47.2 | 52.8 | 0.9 |
| 5 | Morogoro | 547 | 51.9 | 48.1 | 1.1 |
| 6 | Pwani | 864 | 51.2 | 48.8 | 1.0 |
| 7 | Dar-Es-Salaam | 555 | 50.3 | 49.7 | 1.0 |
| 8 | Lindi | 729 | 46.9 | 53.1 | 0.9 |
| 9 | Mtwara | 430 | 51.6 | 48.4 | 1.1 |
| 10 | Ruvuma | 846 | 50.1 | 49.9 | 1.0 |
| 11 | Iringa | 444 | 45.7 | 54.3 | 0.8 |
| 12 | Mbeya | 508 | 49.8 | 50.2 | 1.0 |
| 13 | Singida | 644 | 50.5 | 49.5 | 1.0 |
| 14 | Tabora | 547 | 52.7 | 47.3 | 1.1 |
| 15 | Rukwa | 582 | 49.5 | 50.5 | 1.0 |
| 16 | Kigoma | 582 | 51.7 | 48.3 | 1.1 |
| 17 | Shinyanga | 379 | 44.3 | 55.7 | 0.8 |
| 18 | Kagera | 665 | 53.7 | 46.3 | 1.2 |
| 19 | Mwanza | 686 | 51.5 | 48.5 | 1.1 |
| 20 | Mara | 389 | 51.4 | 48.6 | 1.1 |
| 21 | Manyara | 598 | 47.8 | 52.2 | 0.9 |
| 22 | Njombe | 280 | 51.1 | 48.9 | 1.0 |
| 23 | Katavi | 492 | 51.2 | 48.8 | 1.0 |
| 24 | Simiyu | 503 | 45.5 | 54.5 | 0.8 |
| 25 | Geita | 720 | 47.9 | 52.1 | 0.9 |
| | **Zanzibar** | **2,696** | **50.6** | **49.4** | **1.0** |
| 26 | Unguja North | 507 | 51.5 | 48.5 | 1.1 |
| 27 | Unguja South | 461 | 48.8 | 51.2 | 1.0 |
| 28 | Town West | 506 | 52.4 | 47.6 | 1.1 |
| 29 | Pemba North | 563 | 52.2 | 47.8 | 1.1 |
| 30 | Pemba South | 659 | 48.6 | 51.4 | 0.9 |
| | **National** | **16,976** | **50.2** | **49.8** | **1.0** |

The Table 7 presents the distribution by age group and sex of the sample of children below 5 years assessed in anthropometry part of the survey. All age groups are represented in proportions between 18.4% and 24.3%. Only the 48-59 months age group is slightly less represented since it represents only 14.9% of the overall sample. In the two last age groups (36-47 months and 48-59 months) there are fewer children than expected. There was no differences by age group regarding the sex-ratio.

**Table 7: Distribution of children by sex and by age group at national level**

| Age group in months | N | Boys (%) | Girls (%) | Ratio: Boys /Girls |
|---|---|---|---|---|
| 0-11 | 4,123 | 50.1 | 49.9 | 1.0 |
| 12-23 | 3,645 | 50.1 | 49.9 | 1.0 |
| 24-35 | 3,561 | 49.9 | 50.1 | 1.0 |
| 36-47 | 3,121 | 50.8 | 49.2 | 1.0 |
| 48-59 | 2,526 | 49.9 | 50.1 | 1.0 |
| **National** | **16,976** | **50.2** | **49.8** | **1.0** |

**Review of data quality**

In the raw data, 96% of the children were found to have an age calculated from an exact day, month and year of birth. The quality of age is excellent.

**Table 8: Proportion of children with an exact date of birth by region, Mainland, Zanzibar and National**

| | Region/Overall | Percentage of exact date of birth |
|---|---|---|
| | **Mainland** | **96%** |
| 1 | Dodoma | 96% |
| 2 | Arusha | 91% |
| 3 | Kilimanjaro | 97% |
| 4 | Tanga | 100% |
| 5 | Morogoro | 97% |
| 6 | Pwani | 100% |
| 7 | Dar-Es-Salaam | 97% |
| 8 | Lindi | 100% |
| 9 | Mtwara | 100% |
| 10 | Ruvuma | 98% |
| 11 | Iringa | 100% |
| 12 | Mbeya | 100% |
| 13 | Singida | 92% |
| 14 | Tabora | 100% |
| 15 | Rukwa | 82% |
| 16 | Kigoma | 99% |
| 17 | Shinyanga | 97% |
| 18 | Kagera | 98% |
| 19 | Mwanza | 100% |
| 20 | Mara | 99% |
| 21 | Manyara | 86% |
| 22 | Njombe | 96% |
| 23 | Katavi | 86% |
| 24 | Simiyu | 98% |
| 25 | Geita | 99% |
| | **Zanzibar** | **95%** |
| 26 | Unguja North | 100% |
| 27 | Unguja South | 100% |
| 28 | Town West | 100% |
| 29 | Pemba North | 90% |
| 30 | Pemba South | 87% |
| | **National** | **96%** |

The overall age distribution (Figure 3) shows fewer older children were measured compared to younger children but this difference was not significant.

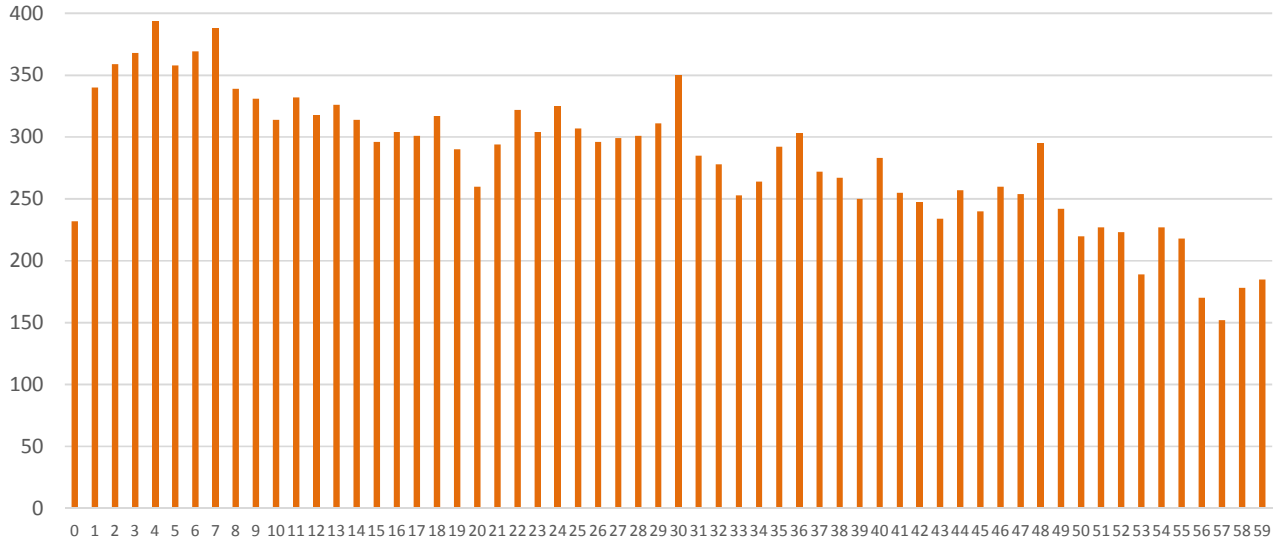


**Figure 3: Age distribution in months**

The data quality report (plausibility check report) at national level is included in the Annexes of the report (Annex 4). The data quality review was done after applying the SMART flags to the data at regional level and WHO flags to the data at Mainland, Zanzibar and National level. At National level, distributions of curves of Weight/Height, Height/Age and Weight/Age all follow bell shaped curves. The curve of Height/Age is flatter than normal. This may be due to poor height measures and/or the not optimal age distribution.

The Plausibility Check report at national level highlighted the "Excellent" quality of the anthropometric data, both in terms of sample representativeness and quality of anthropometric measurements. There were no significant digit preferences for weight, height and MUAC measures.

The Table 9 shows the overall data quality score by region. Data quality was "Excellent" or "Good" in all regions except for Pwani and Katavi where quality was "Acceptable".

**Table 9: Overall data quality score by region**

| | Region/Overall | Missing and flagged data | Overall Sex Ratio | Overall Age Distrib | DPS Weight | DPS Height | DPS MUAC | SD WHZ | Skewness WHZ | Kurtosis WHZ | Poisson Dist. | Overall Data Quality Score |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **Mainland** | | | | | | | | | | | |
| 1 | Dodoma | | | | | | | | | | | 11% |
| 2 | Arusha | | | | | | | | | | | 9% |
| 3 | Kilimanjaro | | | | | | | | | | | 8% |
| 4 | Tanga | | | | | | | | | | | 8% |
| 5 | Morogoro | | | | | | | | | | | 5% |
| 6 | Pwani | | | | | | | | | | | 19% |
| 7 | Dar-es-Salaam | | | | | | | | | | | 13% |
| 8 | Lindi | | | | | | | | | | | 1% |
| 9 | Mtwara | | | | | | | | | | | 7% |
| 10 | Ruvuma | | | | | | | | | | | 14% |
| 11 | Iringa | | | | | | | | | | | 2% |
| 12 | Mbeya | | | | | | | | | | | 4% |
| 13 | Singida | | | | | | | | | | | 5% |
| 14 | Tabora | | | | | | | | | | | 2% |
| 15 | Rukwa | | | | | | | | | | | 12% |
| 16 | Kigoma | | | | | | | | | | | 2% |
| 17 | Shinyanga | | | | | | | | | | | 8% |
| 18 | Kagera | | | | | | | | | | | 4% |
| 19 | Mwanza | | | | | | | | | | | 4% |
| 20 | Mara | | | | | | | | | | | 6% |
| 21 | Manyara | | | | | | | | | | | 0% |
| 22 | Njombe | | | | | | | | | | | 7% |
| 23 | Katavi | | | | | | | | | | | 18% |
| 24 | Simiyu | | | | | | | | | | | 11% |
| 25 | Geita | | | | | | | | | | | 6% |
| | **Zanzibar** | | | | | | | | | | | |
| 26 | Unguja North | | | | | | | | | | | 12% |
| 27 | Unguja South | | | | | | | | | | | 8% |
| 28 | Town West | | | | | | | | | | | 11% |
| 29 | Pemba North | | | | | | | | | | | 12% |
| 30 | Pemba South | | | | | | | | | | | 8% |
| | **National** | | | | | | | | | | | |

Excellent (Overall score 0-9)
Good (Overall score 10-14)
Acceptable (Overall score 15-24)
Problematic (Overall score >25)

Children with missing data for sex, weight, height, edema or MUAC were automatically excluded from the analysis by the ENA software for their respective estimation of prevalence.

The standard deviation for the distribution of Height/Age z-score was found to be above 1.2 in Arusha, Kilimanjaro, Pwani, Rukwa, Manyara, Katavi, Mainland, Zanzibar and at national level. The standard deviation of Weight/Height z-score and Weight/Age z-scores for the 30 regions was inside the acceptable range of standard deviation from good quality data (Table 10).

**Table 10: Mean z-scores, Design Effects and excluded subjects following SMART flags application by region, Mainland, Zanzibar and National (WHO 2006 Growth References)**

| | Indicator | Total | Mean z-scores ± SD | Design Effect (z-score < -2) | z-scores not available | z-scores out of range |
|---|---|---|---|---|---|---|
| **1** | **Dodoma** | | | | | |
| | Weight-for-Height | 677 | -0.30 ± 1.04 | 1.37 | 14 | 6 |
| | Height-for-Age | 673 | -1.78 ± 1.13 | 1.86 | 15 | 9 |
| | Weight-for-Age | 675 | -1.22 ± 1.03 | 1.50 | 13 | 9 |
| **2** | **Arusha** | | | | | |
| | Weight-for-Height | 499 | -0.22 ± 1.01 | 1.12 | 3 | 14 |
| | Height-for-Age | 475 | -1.21 ± 1.27 | 1.15 | 3 | 38 |
| | Weight-for-Age | 504 | -0.80 ± 1.11 | 1.01 | 2 | 10 |
| **3** | **Kilimanjaro** | | | | | |
| | Weight-for-Height | 397 | -0.02 ± 1.03 | 1.00 | 0 | 9 |
| | Height-for-Age | 388 | -0.85 ± 1.26 | 1.97 | 0 | 18 |
| | Weight-for-Age | 399 | -0.46 ± 1.12 | 1.34 | 0 | 7 |
| **4** | **Tanga** | | | | | |
| | Weight-for-Height | 584 | -0.12 ± 1.12 | 1.19 | 1 | 14 |
| | Height-for-Age | 571 | -1.18 ± 1.16 | 2.21 | 1 | 27 |
| | Weight-for-Age | 590 | -0.73 ± 1.04 | 2.07 | 1 | 8 |
| **5** | **Morogoro** | | | | | |
| | Weight-for-Height | 529 | 0.04 ± 1.01 | 1.00 | 16 | 2 |
| | Height-for-Age | 518 | -1.58 ± 1.13 | 1.38 | 14 | 15 |
| | Weight-for-Age | 520 | -0.85 ± 0.99 | 1.00 | 15 | 12 |
| **6** | **Pwani** | | | | | |
| | Weight-for-Height | 835 | 0.04 ± 1.12 | 1.00 | 1 | 28 |
| | Height-for-Age | 820 | -1.44 ± 1.22 | 1.53 | 0 | 44 |
| | Weight-for-Age | 850 | -0.73 ± 1.08 | 1.08 | 0 | 14 |
| **7** | **Dar-Es-Salaam** | | | | | |
| | Weight-for-Height | 535 | -0.07 ± 1.11 | 1.27 | 14 | 6 |
| | Height-for-Age | 529 | -0.88 ± 1.11 | 1.47 | 13 | 13 |
| | Weight-for-Age | 543 | -0.48 ± 1.06 | 1.03 | 12 | 0 |
| **8** | **Lindi** | | | | | |
| | Weight-for-Height | 725 | 0.06 ± 1.06 | 1.00 | 0 | 5 |
| | Height-for-Age | 710 | -1.59 ± 1.16 | 1.32 | 1 | 19 |
| | Weight-for-Age | 715 | -0.83 ± 1.00 | 1.00 | 1 | 14 |
| **9** | **Mtwara** | | | | | |
| | Weight-for-Height | 419 | 0.14 ± 1.00 | 1.15 | 6 | 5 |
| | Height-for-Age | 408 | -1.56 ± 1.10 | 1.00 | 6 | 16 |
| | Weight-for-Age | 420 | -0.76 ± 0.99 | 1.19 | 6 | 4 |
| **10** | **Ruvuma** | | | | | |
| | Weight-for-Height | 835 | 0.22 ± 1.04 | 1.00 | 0 | 11 |
| | Height-for-Age | 818 | -1.93 ± 1.14 | 2.01 | 0 | 28 |
| | Weight-for-Age | 837 | -0.94 ± 1.02 | 1.58 | 0 | 9 |
| **11** | **Iringa** | | | | | |
| | Weight-for-Height | 440 | 0.29 ± 0.96 | 1.00 | 1 | 3 |
| | Height-for-Age | 425 | -2.03 ± 1.15 | 2.11 | 0 | 19 |
| | Weight-for-Age | 440 | -0.94 ± 1.04 | 1.38 | 0 | 4 |
| **12** | **Mbeya** | | | | | |
| | Weight-for-Height | 505 | 0.20 ± 1.04 | 1.46 | 0 | 3 |
| | Height-for-Age | 480 | -1.60 ± 1.14 | 1.70 | 0 | 28 |
| | Weight-for-Age | 498 | -0.76 ± 1.02 | 1.54 | 0 | 10 |
| **13** | **Singida** | | | | | |
| | Weight-for-Height | 623 | -0.16 ± 1.08 | 1.00 | 3 | 18 |
| | Height-for-Age | 605 | -1.52 ± 1.20 | 1.80 | 2 | 37 |
| | Weight-for-Age | 637 | -0.98 ± 1.07 | 1.35 | 1 | 6 |
| **14** | **Tabora** | | | | | |
| | Weight-for-Height | 541 | 0.05 ± 1.00 | 1.41 | 0 | 6 |
| | Height-for-Age | 534 | -1.51 ± 1.16 | 1.00 | 0 | 13 |
| | Weight-for-Age | 544 | -0.79 ± 0.97 | 1.15 | 0 | 3 |
| **15** | **Rukwa** | | | | | |
| | Weight-for-Height | 576 | 0.06 ± 1.16 | 1.00 | 2 | 5 |
| | Height-for-Age | 541 | -1.95 ± 1.28 | 1.84 | 1 | 41 |
| | Weight-for-Age | 569 | -1.04 ± 1.04 | 1.65 | 1 | 13 |
| **16** | **Kigoma** | | | | | |
| | Weight-for-Height | 565 | -0.09 ± 1.02 | 1.22 | 7 | 11 |
| | Height-for-Age | 558 | -1.89 ± 1.18 | 1.00 | 7 | 18 |
| | Weight-for-Age | 573 | -1.09 ± 1.06 | 1.10 | 5 | 5 |

| | Indicator | Total | Mean z-scores ± SD | Design Effect (z-score < -2) | z-scores not available | z-scores out of range* |
|---|---|---|---|---|---|---|
| **17** | **Shinyanga** | | | | | |
| | Weight-for-Height | 372 | -0.09 ± 1.03 | 1.00 | 1 | 6 |
| | Height-for-Age | 360 | -1.37 ± 1.14 | 1.00 | 0 | 19 |
| | Weight-for-Age | 372 | -0.78 ± 0.99 | 1.09 | 1 | 6 |
| **18** | **Kagera** | | | | | |
| | Weight-for-Height | 649 | -0.10 ± 1.00 | 1.12 | 7 | 9 |
| | Height-for-Age | 632 | -2.07 ± 1.08 | 2.01 | 6 | 27 |
| | Weight-for-Age | 653 | -1.25 ± 1.06 | 1.55 | 4 | 8 |
| **19** | **Mwanza** | | | | | |
| | Weight-for-Height | 679 | 0.15 ± 1.04 | 1.34 | 2 | 5 |
| | Height-for-Age | 666 | -1.53 ± 1.11 | 1.13 | 1 | 19 |
| | Weight-for-Age | 675 | -0.75 ± 0.98 | 1.07 | 0 | 11 |
| **20** | **Mara** | | | | | |
| | Weight-for-Height | 387 | -0.05 ± 1.09 | 1.39 | 2 | 0 |
| | Height-for-Age | 383 | -1.45 ± 1.16 | 1.69 | 0 | 6 |
| | Weight-for-Age | 387 | -0.84 ± 1.02 | 1.03 | 2 | 0 |
| **21** | **Manyara** | | | | | |
| | Weight-for-Height | 587 | -0.03 ± 1.07 | 1.32 | 4 | 7 |
| | Height-for-Age | 570 | -1.59 ± 1.21 | 1.10 | 4 | 24 |
| | Weight-for-Age | 588 | -0.91 ± 1.06 | 1.64 | 3 | 7 |
| **22** | **Njombe** | | | | | |
| | Weight-for-Height | 278 | 0.22 ± 1.07 | 1.09 | 1 | 1 |
| | Height-for-Age | 264 | -2.03 ± 1.15 | 1.40 | 0 | 16 |
| | Weight-for-Age | 277 | -0.96 ± 1.06 | 1.19 | 0 | 3 |
| **23** | **Katavi** | | | | | |
| | Weight-for-Height | 478 | 0.34 ± 1.13 | 1.20 | 3 | 12 |
| | Height-for-Age | 468 | -1.71 ± 1.26 | 1.03 | 1 | 24 |
| | Weight-for-Age | 484 | -0.70 ± 1.08 | 1.26 | 2 | 7 |
| **24** | **Simiyu** | | | | | |
| | Weight-for-Height | 497 | -0.15 ± 0.99 | 1.27 | 5 | 1 |
| | Height-for-Age | 498 | -1.28 ± 1.10 | 1.19 | 0 | 5 |
| | Weight-for-Age | 496 | -0.84 ± 0.94 | 1.02 | 4 | 3 |
| **25** | **Geita** | | | | | |
| | Weight-for-Height | 718 | 0.20 ± 0.96 | 1.00 | 0 | 2 |
| | Height-for-Age | 715 | -1.87 ± 1.07 | 1.47 | 0 | 5 |
| | Weight-for-Age | 716 | -0.92 ± 0.94 | 1.12 | 0 | 4 |
| **26** | **Unguja North** | | | | | |
| | Weight-for-Height | 493 | -0.45 ± 1.02 | 1.04 | 7 | 7 |
| | Height-for-Age | 483 | -1.34 ± 1.09 | 1.53 | 7 | 17 |
| | Weight-for-Age | 491 | -1.05 ± 0.98 | 1.81 | 5 | 11 |
| **27** | **Unguja South** | | | | | |
| | Weight-for-Height | 452 | -0.38 ± 1.07 | 1.28 | 7 | 2 |
| | Height-for-Age | 448 | -1.16 ± 1.16 | 1.28 | 7 | 6 |
| | Weight-for-Age | 451 | -0.92 ± 0.99 | 1.40 | 7 | 3 |
| **28** | **Town West** | | | | | |
| | Weight-for-Height | 496 | -0.32 ± 1.08 | 1.00 | 4 | 6 |
| | Height-for-Age | 481 | -0.99 ± 1.19 | 1.49 | 4 | 21 |
| | Weight-for-Age | 498 | -0.73 ± 1.00 | 1.00 | 3 | 5 |
| **29** | **Pemba North** | | | | | |
| | Weight-for-Height | 547 | -0.50 ± 1.04 | 1.00 | 10 | 6 |
| | Height-for-Age | 534 | -1.29 ± 1.09 | 1.31 | 9 | 20 |
| | Weight-for-Age | 546 | -1.09 ± 1.00 | 1.48 | 8 | 9 |
| **30** | **Pemba South** | | | | | |
| | Weight-for-Height | 641 | -0.50 ± 1.00 | 1.06 | 13 | 6 |
| | Height-for-Age | 628 | -1.31 ± 1.11 | 1.86 | 12 | 20 |
| | Weight-for-Age | 641 | -1.07 ± 1.03 | 1.24 | 11 | 8 |
| | **Mainland** | | | | | |
| | Weight-for-Height | 14,182 | 0.02 ± 1.14 | 1.00 | 94 | 10 |
| | Height-for-Age | 14,176 | -1.54 ± 1.40 | 1.19 | 75 | 35 |
| | Weight-for-Age | 14,198 | -0.87 ± 1.11 | 1.03 | 73 | 15 |
| | **Zanzibar** | | | | | |
| | Weight-for-Height | 2,655 | -0.45 ± 1.10 | 1.00 | 41 | 1 |
| | Height-for-Age | 2,651 | -1,19 ± 1.32 | 1.74 | 39 | 7 |
| | Weight-for-Age | 2,661 | -0.99 ± 1.09 | 1.17 | 34 | 2 |
| | **National Overall** | | | | | |
| | Weight-for-Height | 16,837 | -0.05 ± 1.15 | 1.38 | 135 | 11 |
| | Height-for-Age | 16,827 | -1.48 ± 1.40 | 1.49 | 114 | 42 |
| | Weight-for-Age | 16,859 | -0.89 ± 1.11 | 1.44 | 107 | 17 |

**Anthropometry Results**

The results presented in this report applied the WHO growth reference standards of 2006. The estimates of malnutrition are presented for children from 0-59 months of age.

As recommended by the SMART Methodology, SMART flags (exclusion of z-scores from observed mean) were used for analysis at regional level to exclude extreme values that were likely resulted from incorrect anthropometric measurements (-4 z-scores/+3 z-scores for WHZ in Dar-Es-Salaam, Lindi, Mtwara, Iringa, Rukwa, Mwanza, Manyara, Njombe, Katavi, Geita and Unguja South in order to avoid to exclude some severely acute malnourished children ; -3 z-scores/+3 z-scores for WHZ in Dodoma, Arusha, Kilimanjaro, Tanga, Morogoro, Pwani, Ruvuma, Mbeya, Singida, Tabora, Kigoma, Shinyanga, Kagera, Mara, Simiyu, Unguja North, Town West, Pemba North and Pemba South ; -3 z-scores/+3 z-scores for HAZ and WAZ in all regions).

WHO flags (exclusion of z-scores from reference mean (zero) were used for Mainland, for Zanzibar and for the 30 regions together. WHO flags were also used for overweight prevalence.

**Prevalence of Chronic Malnutrition**

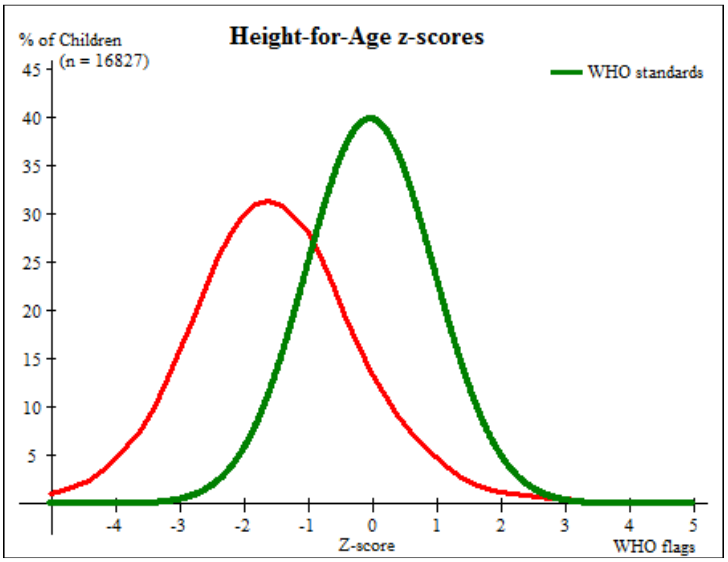


**Figure 4: Height-for-Age z-score (WHO 2006)**

The figure 4 above shows that the distribution of Height-for-Age of the assessed children in Tanzania was shifted to the left and was flatter as compared to the WHO standard normal distribution of reference population even when WHO flags are applied. The mean HAZ was -1.48±1.40 SD. The distribution was flattened may be due to “poor” height measures during data collection and/or age distribution not optimal.

**Table 11: Prevalence of Global, Moderate and Severe Chronic Malnutrition (Heigh-for-Age Z-score) in children 0 to 59 months of age by age group and sex in Tanzania (WHO 2006)**

| Background characteristic | N | Stunting (HAZ <-2) | | Moderate Stunting (HAZ <-2 and >=-3) | | Severe Stunting (HAZ <-3) | |
|---|---|---|---|---|---|---|---|
| | | n | % [CI 95%] | n | % [CI 95%] | n | % [CI 95%] |
| **Age** | | | | | | | |
| 0-5 months | 2,036 | 341 | 16.6% [14.5-18.6] | 229 | 11.4% [9.7-13.1] | 112 | 5.1% [4.0-6.3] |
| 6-11 months | 2,049 | 545 | 25.4% [23.2-27.6] | 372 | 17.6% [15.6-19.5] | 173 | 7.9% [6.6-9.1] |
| 12-23 months | 3,626 | 1,490 | 39.3% [37.3-41.4] | 963 | 25.2% [23.5-26.9] | 527 | 14.1% [12.8-15.5] |
| 24-35 months | 3,529 | 1,567 | 43.6% [41.6-45.7] | 973 | 27.4% [25.6-29.2] | 594 | 16.2% [14.8-17.6] |
| 36-47 months | 3,087 | 1,205 | 38.7% [36.6-40.8] | 821 | 26.9% [25.1-28.8] | 384 | 11.8% [10.5-13.0] |
| 48-59 months | 2,500 | 826 | 31.9% [29.7-34.1] | 604 | 23.2% [21.3-25.1] | 222 | 8.7% [7.3-10.0] |
| **Sex** | | | | | | | |
| Male | 8,438 | 3,257 | 37.9% [36.6-39.3] | 2,106 | 24.7% [23.6-25.8] | 1,151 | 13.2% [12.3-14.1] |
| Female | 8,389 | 2,717 | 31.4% [30.1-32.8] | 1,856 | 21.6% [20.5-22.7] | 861 | 9.8% [9.0-10.6] |

**Table 12: Prevalence of Global, Moderate and Severe Chronic Malnutrition (Heigh-for-Age Z-score) in children 0 to 59 months of age by region, Mainland, Zanzibar and National (WHO 2006)**

| # | Region/Overall | N | Stunting (HAZ <-2) | | | | | | Moderate Stunting (HAZ <-2 and >=-3) | | Severe Stunting (HAZ <-3) | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | All | | Boys | | Girls | | All | | All | |
| | | | n | % [CI 95%] | n | % [CI 95%] | n | % [CI 95%] | n | % [CI 95%] | n | % [CI 95%] |
| | **Mainland** | **14,176** | **5,282** | **35.0% [34.0-36.1]** | **2,876** | **38.3% [36.9-39.6]** | **2,406** | **31.7% [30.3-33.1]** | **3,453** | **23.4% [22.5-24.2]** | **1,829** | **11.7% [11.0-12.3]** |
| 1 | Dodoma | 673 | 304 | 45.2% [39.9-50.6] | 181 | 50.4% [43.4-57.4] | 123 | 39.2% [33.4-45.3] | 203 | 30.2% [26.7-33.9] | 101 | 15.0% [11.8-18.8] |
| 2 | Arusha | 475 | 130 | 27.4% [23.1-32.0] | 71 | 29.5% [23.9-35.8] | 59 | 25.2% [19.5-31.9] | 88 | 18.5% [15.4-22.1] | 42 | 8.8% [5.9-13.0] |
| 3 | Kilimanjaro | 388 | 71 | 18.3% [13.3-24.6] | 44 | 21.1% [16.0-27.2] | 27 | 15.1% [8.9-24.4] | 56 | 14.4% [10.2-20.0] | 15 | 3.9% [2.2-6.8] |
| 4 | Tanga | 571 | 136 | 23.8% [18.8-29.7] | 65 | 23.7% [18.3-30.2] | 71 | 23.9% [17.6-31.5] | 106 | 18.6% [14.2-23.9] | 30 | 5.3% [3.0-8.9] |
| 5 | Morogoro | 518 | 191 | 36.9% [32.0-42.1] | 110 | 40.7% [33.6-48.3] | 81 | 32.7% [24.7-41.8] | 132 | 25.5% [21.3-30.2] | 59 | 11.4% [8.9-14.5] |
| 6 | Pwani | 820 | 276 | 33.7% [29.7-37.9] | 144 | 33.9% [29.1-39.1] | 132 | 33.4% [28.3-39.0] | 196 | 23.9% [20.6-27.5] | 80 | 9.8% [7.4-12.8] |
| 7 | Dar-Es-Salaam | 529 | 86 | 16.3% [12.7-20.5] | 54 | 20.3% [15.2-26.5] | 32 | 12.2% [8.4-17.2] | 75 | 14.2% [11.0-18.1] | 11 | 2.1% [1.2-3.7] |
| 8 | Lindi | 710 | 257 | 36.2% [32.1-40.5] | 137 | 41.6% [35.1-48.5] | 120 | 31.5% [26.5-37.0] | 179 | 25.2% [22.0-28.7] | 78 | 11.0% [8.6-14.0] |
| 9 | Mtwara | 408 | 148 | 36.3% [31.9-40.9] | 79 | 37.3% [30.3-44.8] | 69 | 35.2% [29.0-41.9] | 110 | 27.0% [23.8-30.4] | 38 | 9.3% [6.5-13.1] |
| 10 | Ruvuma | 818 | 396 | 48.4% [43.4-53.4] | 203 | 49.9% [44.5-55.3] | 193 | 47.0% [40.6-53.4] | 260 | 31.8% [28.1-35.7] | 136 | 16.6% [13.7-20.1] |
| 11 | Iringa | 425 | 218 | 51.3% [44.1-58.4] | 115 | 59.0% [47.9-69.2] | 103 | 44.8% [37.7-52.1] | 132 | 31.1% [26.3-36.3] | 86 | 20.2% [15.3-26.3] |
| 12 | Mbeya | 480 | 173 | 36.0% [30.4-42.1] | 101 | 41.7% [34.8-49.0] | 72 | 30.3% [23.6-37.8] | 124 | 25.8% [21.4-30.8] | 49 | 10.2% [7.3-14.1] |
| 13 | Singida | 605 | 206 | 34.0% [29.0-39.5] | 116 | 38.3% [31.6-45.5] | 90 | 29.8% [24.2-36.1] | 135 | 22.3% [18.5-26.7] | 71 | 11.7% [8.9-15.4] |
| 14 | Tabora | 534 | 170 | 31.8% [28.3-35.6] | 100 | 35.7% [30.8-40.9] | 70 | 27.6% [22.1-33.7] | 116 | 21.7% [19.0-24.7] | 54 | 10.1% [7.6-13.3] |
| 15 | Rukwa | 541 | 257 | 47.5% [41.6-53.5] | 135 | 50.6% [44.5-56.6] | 122 | 44.5% [36.2-53.2] | 130 | 24.0% [20.4-28.1] | 127 | 23.5% [18.7-29.1] |
| 16 | Kigoma | 588 | 271 | 48.6% [44.3-52.9] | 135 | 47.0% [40.3-53.8] | 136 | 50.2% [44.1-56.3] | 174 | 31.2% [27.7-34.9] | 197 | 17.4% [13.8-21.6] |
| 17 | Shinyanga | 360 | 108 | 30.0% [26.4-33.9] | 52 | 32.7% [28.8-36.9] | 56 | 27.9% [22.4-34.1] | 84 | 23.3% [20.2-26.7] | 24 | 6.7% [4.5-9.8] |

| # | Region/Overall | N | Stunting (HAZ <-2) | | | | | | Moderate Stunting (HAZ <-2 and >=-3) | | Severe Stunting (HAZ <-3) | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | All | | Boys | | Girls | | All | | All | |
| | | | n | % [CI 95%] | n | % [CI 95%] | n | % [CI 95%] | n | % [CI 95%] | n | % [CI 95%] |
| 18 | Kagera | 632 | 328 | 51.9% [46.1-57.6] | 184 | 54.4% [49.7-59.1] | 144 | 49.0% [40.2-57.8] | 210 | 33.2% [28.7-38.0] | 118 | 18.7% [15.3-22.6] |
| 19 | Mwanza | 666 | 228 | 34.2% [30.3-38.4] | 126 | 36.7% [30.7-43.2] | 102 | 31.6% [27.9-35.5] | 164 | 24.6% [21.1-28.5] | 64 | 9.6% [7.1-13.0] |
| 20 | Mara | 383 | 123 | 32.1% [26.1-38.8] | 64 | 32.7% [26.0-40.1] | 59 | 31.6% [23.1-41.4] | 90 | 23.5% [19.0-28.7] | 33 | 8.6% [5.6-13.0] |
| 21 | Manyara | 570 | 213 | 37.4% [33.2-41.8] | 104 | 38.5% [33.7-43.5] | 109 | 36.3% [30.1-43.1] | 142 | 24.9% [21.3-28.9] | 71 | 12.5% [10.1-15.3] |
| 22 | Njombe | 264 | 136 | 51.5% [44.1-58.9] | 74 | 54.8% [45.4-63.9] | 62 | 48.1% [37.2-58.5] | 82 | 31.1% [25.3-37.5] | 54 | 20.5% [15.2-27.0] |
| 23 | Katavi | 468 | 205 | 43.8% [39.1-48.6] | 123 | 51.5% [45.1-57.8] | 82 | 35.8% [29.0-43.2] | 138 | 29.5% [26.1-33.1] | 67 | 14.3% [11.3-18.0] |
| 24 | Simiyu | 498 | 130 | 26.1% [21.9-30.8] | 68 | 30.4% [24.0-37.5] | 62 | 22.6% [18.0-28.0] | 100 | 20.1% [16.8-23.8] | 30 | 6.0% [4.0-8.9] |
| 25 | Geita | 715 | 329 | 46.0% [41.4-50.7] | 176 | 51.6% [44.4-58.8] | 153 | 40.9% [34.7-47.4] | 219 | 30.6% [26.9-19.2] | 110 | 15.4% [12.2-19.2] |
| | **Zanzibar** | **2,651** | **692** | **24.4% [22.1-26.6]** | **381** | **26.7% [24.0-29.5]** | **311** | **21.9% [19.1-24.6]** | **509** | **17.5% [15.5-19.4]** | **183** | **6.9% [5.8-8.0]** |
| 26 | Unguja North | 483 | 147 | 30.4% [25.4-36.0] | 83 | 33.3% [27.2-40.1] | 64 | 27.4% [21.0-34.8] | 122 | 25.3% [20.3-30.9] | 125 | 5.2% [3.7-7.2] |
| 27 | Unguja South | 448 | 110 | 24.6% [20.2-29.5] | 59 | 27.2% [20.9-34.6] | 51 | 22.1% [16.0-29.7] | 79 | 17.6% [14.1-21.8] | 31 | 6.9% [4.3-11.6] |
| 28 | Town West | 481 | 99 | 20.6% [16.4-25.6] | 59 | 23.2% [18.4-28.8] | 40 | 17.6% [12.5-24.3] | 64 | 13.3% [10.4-16.9] | 35 | 7.3% [4.8-10.9] |
| 29 | Pemba North | 534 | 131 | 24.5% [20.4-29.1] | 74 | 26.4% [21.3-32.3] | 57 | 22.4% [17.6-28.2] | 103 | 19.3% [15.9-23.2] | 28 | 5.2% [3.7-7.4] |
| 30 | Pemba South | 628 | 177 | 28.2% [23.5-33.4] | 89 | 29.0% [22.8-36.0] | 88 | 27.4% [22.2-33.3] | 136 | 21.7% [18.1-25.7] | 41 | 6.5% [4.8-8.8] |
| | **National** | **16,827** | **5,974** | **34.7% [33.7-35.7]** | **3,257** | **37.9% [36.6-39.3]** | **2,717** | **31.4% [30.1-32.8]** | **3,962** | **23.2% [22.4-24.0]** | **2,012** | **11.5% [10.9-12.2]** |

**Table 13: Number of children 0-59 months suffering from stunting by region, Mainland, Zanzibar and National**

| | Region/Overall | Estimated Population (Census 2012) | Estimated Population 2015[2] | Population 0-59 months | Stunting | |
|---|---|---|---|---|---|---|
| | | | | | Prevalence (%) | Number of children |
| | **Mainland** | | | | | **2,673,719** |
| 1 | Dodoma | 2,083,588 | 2,217,630 | 359,256 | 45.2 | 162,384 |
| 2 | Arusha | 1,694,310 | 1,835,288 | 297,317 | 27.4 | 81,465 |
| 3 | Kilimanjaro | 1,640,087 | 1,730,255 | 280,301 | 18.3 | 51,295 |
| 4 | Tanga | 2,045,205 | 2,183,180 | 353,675 | 23.8 | 84,175 |
| 5 | Morogoro | 2,218,492 | 2,382,088 | 385,898 | 36.9 | 142,396 |
| 6 | Pwani | 1,098,668 | 1,172,787 | 189,992 | 33.7 | 64,027 |
| 7 | Dar-Es-Salaam | 4,364,541 | 5,139,612 | 832,617 | 16.3 | 135,717 |
| 8 | Lindi | 864,652 | 888,208 | 143,890 | 36.2 | 52,088 |
| 9 | Mtwara | 1,270,854 | 1,317,156 | 213,379 | 36.3 | 77,457 |
| 10 | Ruvuma | 1,376,891 | 1,465,470 | 237,406 | 48.4 | 114,905 |
| 11 | Iringa | 941,238 | 972,642 | 157,568 | 51.3 | 80,832 |
| 12 | Mbeya | 2,707,410 | 2,932,685 | 475,095 | 36 | 171,034 |
| 13 | Singida | 1,370,637 | 1,467,403 | 237,719 | 34 | 80,825 |
| 14 | Tabora | 2,291,623 | 2,496,832 | 404,487 | 31.8 | 128,627 |
| 15 | Rukwa | 1,004,539 | 1,104,094 | 178,863 | 47.5 | 84,960 |
| 16 | Kigoma | 217,930 | 234,001 | 37,908 | 48.6 | 18,423 |
| 17 | Shinyanga | 1,534,808 | 1,633,546 | 264,634 | 30 | 79,390 |
| 18 | Kagera | 2,458,023 | 2,701,625 | 437,663 | 51.9 | 227,147 |
| 19 | Mwanza | 2,772,509 | 3,029,595 | 490,794 | 34.2 | 167,852 |
| 20 | Mara | 1,743,830 | 1,877,914 | 304,222 | 32.1 | 97,655 |
| 21 | Manyara | 1,425,131 | 1,566,368 | 253,752 | 37.4 | 94,903 |
| 22 | Njombe | 702,097 | 719,082 | 116,491 | 51.5 | 59,993 |
| 23 | Katavi | 564,604 | 620,559 | 100,531 | 43.8 | 44,032 |
| 24 | Simiyu | 1,584,157 | 1,671,251 | 270,743 | 26.1 | 70,664 |
| 25 | Geita | 1,739,530 | 1,878,772 | 304,361 | 46 | 140,006 |
| | **Zanzibar** | | | | | **53,376** |
| 26 | Unguja North | 187,455 | 206033 | 32,141 | 30.4 | 9,771 |
| 27 | Unguja South | 115,588 | 122663 | 19,135 | 24.6 | 4,707 |
| 28 | Town West | 593,678 | 671667 | 104,780 | 20.6 | 21,585 |
| 29 | Pemba North | 211,732 | 220097 | 34,335 | 24.5 | 8,412 |
| 30 | Pemba South | 195,116 | 201626 | 31,454 | 28.3 | 8,901 |
| | **Total** | | | | | **2,727,096** |

According to those results, more than 2,700,000 children under five years of age are stunted in Tanzania. Nutrition interventions should be prioritized in the regions with the higher number of stunted children and the higher prevalence of chronic malnutrition. These regions are Kagera, Kigoma, Dodoma, Mbeya and Mwanza.

[2] Based on the Average Annual Rate 2002-2012 by region from the Census General Report

### Prevalence of Global Acute Malnutrition

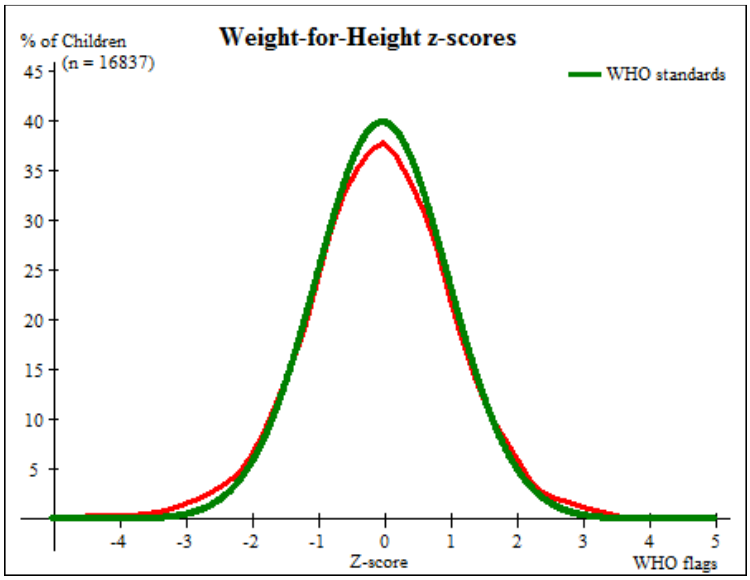


**Figure 5: Weight-for-Height z-score (WHO 2006)**

The above graph shows that the distribution of Weight-for-Height follows very closely to the WHO standard normal distribution of reference population, with mean WHZ -0.05±1.15 SD. The standard deviation indicates the good quality of weight and height measurements during data collection.

**Table 14: Prevalence of Global, Moderate and Severe Acute Malnutrition (Weigh-for-Height Z-score) in children 0 to 59 months of age by age group and sex in Tanzania (WHO 2006)**

| Background characteristic | N | Global Acute Malnutrition (WHZ <-2 and/or edema) | | Moderate Acute Malnutrition (WHZ <-2 and >=-3) | | Severe Acute Malnutrition (WHZ <-3 and/or edema) | |
|---|---|---|---|---|---|---|---|
| | | n | % [CI 95%] | n | % [CI 95%] | n | % [CI 95%] |
| **Age** | | | | | | | |
| 0-5 months | 2,029 | 126 | 5.4% [4.2-6.5] | 84 | 3.7% [2.8-4.5] | 42 | 1.7% [1.1-2.3] |
| 6-11 months | 2,056 | 112 | 5.1% [3.9-6.2] | 87 | 3.9% [2.9-4.9] | 25 | 1.1% [0.6-1.6] |
| 12-23 months | 3,636 | 189 | 4.9% [4.0-5.8] | 136 | 3.6% [2.8-4.4] | 53 | 1.3% [0.9-1.7] |
| 24-35 months | 3,531 | 113 | 2.8% [1.8-3.0] | 83 | 2.0% [1.5-2.6] | 30 | 0.8% [0.4-1.1] |
| 36-47 months | 3,087 | 85 | 2.4% [1.8-3.1] | 73 | 2.0% [1.4-2.5] | 12 | 0.5% [0.1-0.8] |
| 48-59 months | 2,502 | 99 | 3.4% [2.5-4.3] | 84 | 2.9% [2.1-3.8] | 15 | 0.4% [0.2-0.7] |
| **Sex** | | | | | | | |
| Male | 8,451 | 414 | 4.7% [4.1-5.2] | 307 | 3.5% [3.0-4.0] | 107 | 1.2% [0.9-1.4] |
| Female | 8,394 | 310 | 3.0% [2.5-3.4] | 240 | 2.3% [1.9-2.7] | 70 | 0.7% [0.5-0.9] |

**Table 15: Prevalence of Global, Moderate and Severe Acute Malnutrition (Weigh-for-Height Z-score) in children 0 to 59 months of age by region, Mainland, Zanzibar and National (WHO 2006)**

| # | Region | N | Global Acute Malnutrition (WHZ <-2 and/or edema) | | | | | | Moderate Acute Malnutrition (WHZ <-2 and >=-3) | | Severe Acute Malnutrition (WHZ <-3 and/or edema) | | Edema |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | All | | Boys | | Girls | | All | | All | | All |
| | | | n | % [CI 95%] | n | % [CI 95%] | n | % [CI 95%] | n | % [CI 95%] | n | % [CI 95%] | % |
| | **Mainland** | **14,191** | **526** | **3.7% [3.3-4.1]** | **311** | **4.6% [4.0-5.2]** | **215** | **2.8% [2.4-3.3]** | **389** | **2.8% [2.5-3.2]** | **137** | **0.9% [0.7-1.1]** | **0.07%** |
| 1 | Dodoma | 677 | 35 | 5.2% [3.5-7.6] | 24 | 6.7% [4.3-10.2] | 11 | 3.5% [1.7-7.1] | 32 | 4.7% [3.1-7.2] | 3 | 0.4% [0.1-1.4] | 0.0% |
| 2 | Arusha | 499 | 23 | 4.6% [3.0-7.1] | 13 | 5.2% [3.0-8.7] | 10 | 4.0% [2.0-7.9] | 21 | 4.2% [2.6-6.7] | 2 | 0.4% [0.1-1.7] | 0.0% |
| 3 | Kilimanjaro | 397 | 16 | 4.0% [2.5-6.4] | 9 | 4.2% [2.2-7.9] | 7 | 3.8% [2.0-7.3] | 16 | 4.0% [2.5-6.4] | 0 | 0.0% [0.0-0.0] | 0.0% |
| 4 | Tanga | 584 | 28 | 4.8% [3.2-7.2] | 18 | 6.5% [3.7-11.0] | 10 | 3.3% [1.6-6.5] | 27 | 4.6% [3.1-6.9] | 1 | 0.2% [0.0-1.4] | 0.0% |
| 5 | Morogoro | 530 | 20 | 3.8% [2.4-5.8] | 12 | 4.3% [2.6-7.1] | 8 | 3.2% [1.6-6.3] | 19 | 3.6% [2.3-5.5] | 1 | 0.2% [0.0-1.4] | 0.2% |
| 6 | Pwani | 835 | 26 | 3.1% [2.2-4.4] | 12 | 2.8% [1.5-5.2] | 14 | 3.4% [2.1-5.5] | 26 | 3.1% [2.2-4.4] | 0 | 0.0% [0.0-0.0] | 0.0% |
| 7 | Dar-Es-Salaam | 535 | 20 | 3.7% [2.3-6.1] | 16 | 6.0% [3.6-9.9] | 4 | 1.5% [0.6-4.0] | 14 | 2.6% [1.4-4.9] | 6 | 1.1% [0.4-3.5] | 0.0% |
| 8 | Lindi | 725 | 21 | 2.9% [1.9-4.3] | 10 | 2.9% [1.6-5.5] | 11 | 2.9% [1.6-5.1] | 17 | 2.3% [1.4-3.8] | 4 | 0.6% [0.2-1.4] | 0.0% |
| 9 | Mtwara | 419 | 10 | 2.4% [1.2-4.7] | 6 | 2.8% [1.3-5.9] | 4 | 2.0% [0.7-5.1] | 8 | 1.9% [0.9-4.0] | 2 | 0.5% [0.1-1.9] | 0.0% |
| 10 | Ruvuma | 835 | 22 | 2.6% [1.8-3.9] | 14 | 3.3% [2.1-5.3] | 8 | 1.9% [1.0-3.6] | 20 | 2.4% [1.6-3.6] | 2 | 0.2% [0.1-1.0] | 0.0% |
| 11 | Iringa | 440 | 3 | 0.7% [0.2-2.1] | 1 | 0.5% [0.1-3.8] | 2 | 0.8% [0.2-3.4] | 2 | 0.5% [0.1-1.9] | 1 | 0.2% [0.0-1.7] | 0.0% |
| 12 | Mbeya | 550 | 10 | 2.0% [0.9-4.3] | 6 | 2.4% [1.1-5.3] | 4 | 1.6% [0.5-5.3] | 10 | 2.0% [0.9-4.3] | 0 | 0.0% [0.0-0.0] | 0.0% |
| 13 | Singida | 623 | 29 | 4.7% [3.4-6.4] | 16 | 5.1% [3.3-7.9] | 13 | 4.2% [2.5-7.0] | 26 | 4.2% [2.9-5.9] | 3 | 0.5% [0.2-1.5] | 0.0% |
| 14 | Tabora | 541 | 11 | 2.0% [1.0-4.2] | 7 | 2.5% [10.9-6.8] | 4 | 1.5% [0.6-4.0] | 11 | 2.0% [1.0-4.2] | 0 | 0.0% [0.0-0.0] | 0.0% |
| 15 | Rukwa | 576 | 22 | 3.8% [2.5-5.7] | 9 | 3.2% [1.7-5.7] | 13 | 4.5% [2.6-7.4] | 13 | 2.3% [1.2-4.2] | 9 | 1.6% [0.9-2.8] | 0.0% |
| 16 | Kigoma | 565 | 22 | 3.9% [2.4-6.2] | 13 | 4.5% [2.3-8.7] | 9 | 3.2% [1.8-5.8] | 20 | 3.5% [2.1-6.0] | 2 | 0.4% [0.1-1.4] | 0.0% |

| # | Region | N | Global Acute Malnutrition (WHZ <-2 and/or edema) | | | | | | Moderate Acute Malnutrition (WHZ <-2 and >=-3) | | Severe Acute Malnutrition (WHZ <-3 and/or edema) | | Edema |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | All | | Boys | | Girls | | All | | All | | All |
| | | | n | % [CI 95%] | n | % [CI 95%] | n | % [CI 95%] | n | % [CI 95%] | n | % [CI 95%] | % |
| 17 | Shinyanga | 373 | 9 | 2.4% [1.3-4.4] | 6 | 3.7% [1.7-7.7] | 3 | 1.4% [0.4-4.5] | 8 | 2.1% [1.1-4.1] | 1 | 0.3% [0.0-2.1] | 0.3% |
| 18 | Kagera | 650 | 20 | 3.1% [1.9-4.8] | 11 | 3.2% [1.7-6.0] | 9 | 3.0% [1.5-5.6] | 18 | 2.8% [1.6-4.6] | 2 | 0.3% [0.1-1.3] | 0.2% |
| 19 | Mwanza | 679 | 10 | 1.5% [0.7-3.1] | 5 | 1.4% [0.6-3.5] | 5 | 1.5% [0.5-4.1] | 8 | 1.2% [0.6-2.5] | 2 | 0.3% [0.1-1.2] | 0.0% |
| 20 | Mara | 389 | 19 | 4.9% [2.8-8.3] | 14 | 7.0% [3.8-12.4] | 5 | 2.6% [0.9-7.3] | 16 | 4.1% [2.4-7.0] | 3 | 0.8% [0.2-3.5] | 0.0% |
| 21 | Manyara | 587 | 21 | 3.6% [2.2-5.9] | 13 | 4.6% [2.5-8.4] | 8 | 2.6% [1.3-5.0] | 17 | 2.9% [1.7-4.9] | 4 | 0.7% [0.3-1.8] | 0.0% |
| 22 | Njombe | 278 | 7 | 2.5% [1.1-5.5] | 5 | 3.5% [1.3-9.2] | 2 | 1.5% [0.3-6.2] | 6 | 2.2% [1.0-4.6] | 1 | 0.4% [0.0-2.7] | 0.0% |
| 23 | Katavi | 478 | 8 | 1.7% [0.8-3.6] | 1 | 0.4% [0.1-3.2] | 7 | 3.0% [1.2-7.0] | 6 | 1.3% [0.6-2.8] | 2 | 0.4% [0.1-3.3] | 0.0% |
| 24 | Simiyu | 503 | 15 | 3.0% [1.7-5.3] | 10 | 4.4% [2.2-8.7] | 5 | 1.8% [0.7-4.4] | 11 | 2.2% [1.1-4.2] | 4 | 0.8% [0.3-2.1] | 0.6% |
| 25 | Geita | 718 | 9 | 1.3% [0.7-2.4] | 6 | 1.7% [0.8-3.6] | 3 | 0.8% [0.2-3.7] | 8 | 1.1% [0.5-2.3] | 1 | 0.1% [0.0-1.1] | 0.0% |
| | **Zanzibar** | **2,654** | **198** | **7.2% [6.3-8.2]** | **103** | **7.0% [5.4-8.6]** | **95** | **7.5% [6.0-9.1]** | **158** | **5.7% [4.9-6.6]** | **40** | **1.5% [1.0-2.1]** | **0.0%** |
| 26 | Unguja North | 493 | 33 | 6.7% [4.7-9.4] | 20 | 7.9% [5.0-12.2] | 13 | 5.4% [3.5-8.3] | 28 | 5.7% [3.9-8.3] | 5 | 1.0% [0.4-2.4] | 0.0% |
| 27 | Unguja South | 452 | 34 | 7.5% [5.1-10.9] | 17 | 7.7% [4.5-12.8] | 17 | 7.4% [4.1-12.9] | 32 | 7.1% [4.9-10.2] | 2 | 0.4% [0.1-1.8] | 0.0% |
| 28 | Town West | 496 | 31 | 6.3% [4.7-8.2] | 12 | 4.6% [2.6-8.0] | 19 | 8.0% [5.5-11.6] | 26 | 5.2% [3.7-7.3] | 5 | 1.0% [0.4-2.3] | 0.0% |
| 29 | Pemba North | 547 | 40 | 7.3% [5.4-9.8] | 19 | 6.7% [4.0-11.0] | 21 | 8.0% [5.4-11.7] | 35 | 6.4% [4.7-8.7] | 5 | 0.9% [0.4-2.1] | 0.0% |
| 30 | Pemba South | 641 | 43 | 6.7% [4.9-9.1] | 24 | 7.6% [5.2-11.1] | 19 | 5.8% [3.7-9.2] | 38 | 5.9% [4.2-8.2] | 5 | 0.8% [0.3-1.8] | 0.0% |
| | **National** | **16,845** | **724** | **3.8% [3.5-4.2]** | **414** | **4.7% [4.1-5.2]** | **310** | **3.0% [2.5-3.4]** | **547** | **2.9% [2.6-3.2]** | **177** | **0.9% [0.8-1.1]** | **0.07%** |

**Table 16: Number of children 0-59 months suffering from moderate acute malnutrition or severe acute malnutrition by region, Mainland, Zanzibar and National**

| Region | Estimated Population (Census 2012) | Estimated Population 2015[3] | Population 0-59 months | Moderate Acute Malnutrition | | Severe Acute Malnutrition | |
|---|---|---|---|---|---|---|---|
| | | | | Prevalence (%) | Number of MAM children* | Prevalence (%) | Number of SAM children** |
| **Mainland** | | | | | **320,227** | | **101,195** |
| Dodoma | 2,083,588 | 2,217,630 | 359,256 | 4.7 | 25,328 | 0.4 | 3,736 |
| Arusha | 1,694,310 | 1,835,288 | 297,317 | 4.2 | 18,731 | 0.4 | 3,092 |
| Kilimanjaro | 1,640,087 | 1,730,255 | 280,301 | 4.0 | 16,818 | 0 | 5,275*** |
| Tanga | 2,045,205 | 2,183,180 | 353,675 | 4.6 | 24,404 | 0.2 | 1,839 |
| Morogoro | 2,218,492 | 2,382,088 | 385,898 | 3.6 | 20,838 | 0.2 | 2,007 |
| Pwani | 1,098,668 | 1,172,787 | 189,992 | 3.1 | 8,835 | 0 | 2,771*** |
| Dar-Es-Salaam | 4,364,541 | 5,139,612 | 832,617 | 2.6 | 32,472 | 1.1 | 23,813 |
| Lindi | 864,652 | 888,208 | 143,890 | 2.3 | 4,964 | 0.6 | 2,245 |
| Mtwara | 1,270,854 | 1,317,156 | 213,379 | 1.9 | 6,081 | 0.5 | 2,774 |
| Ruvuma | 1,376,891 | 1,465,470 | 237,406 | 2.4 | 8,547 | 0.2 | 1,235 |
| Iringa | 941,238 | 972,642 | 157,568 | 0.5 | 1,182 | 0.2 | 819 |
| Mbeya | 2,707,410 | 2,932,685 | 475,095 | 2.0 | 14,253 | 0 | 4,470*** |
| Singida | 1,370,637 | 1,467,403 | 237,719 | 4.2 | 14,976 | 0.5 | 3,090 |
| Tabora | 2,291,623 | 2,496,832 | 404,487 | 2.0 | 12,135 | 0 | 3,806*** |
| Rukwa | 1,004,539 | 1,104,094 | 178,863 | 2.3 | 6,171 | 1.6 | 7,441 |
| Kigoma | 217,930 | 2,284,847 | 370,145 | 3.5 | 19,433 | 0.4 | 3,850 |
| Shinyanga | 1,534,808 | 1,633,546 | 264,634 | 2.1 | 8,336 | 0.3 | 2,064 |
| Kagera | 2,458,023 | 2,701,625 | 437,663 | 2.8 | 18,382 | 0.3 | 3,414 |
| Mara | 2,772,509 | 3,029,595 | 490,794 | 1.2 | 8,834 | 0.3 | 3,828 |
| Mwanza | 1,743,830 | 1,877,914 | 304,222 | 4.1 | 18,710 | 0.8 | 6,328 |
| Manyara | 1,425,131 | 1,566,368 | 253,752 | 2.9 | 11,038 | 0.7 | 4,618 |
| Njombe | 702,097 | 719,082 | 116,491 | 2.2 | 3,844 | 0.4 | 1,212 |
| Katavi | 564,604 | 620,559 | 100,531 | 1.3 | 1,960 | 0.4 | 1,046 |
| Simiyu | 1,584,157 | 1,671,251 | 270,743 | 2.2 | 8,935 | 0.8 | 5,631 |
| Geita | 1,739 530 | 1,878,772 | 304,361 | 1.1 | 5,022 | 0.1 | 791 |
| **Zanzibar** | | | | | **19,039** | | **5,217** |
| Unguja North | 187,455 | 206,033 | 32,141 | 5.7 | 2,748 | 1 | 836 |
| Unguja South | 115,588 | 122,663 | 19,135 | 7.1 | 2,038 | 0.4 | 199 |
| Town West | 593,678 | 671,667 | 104,780 | 5.2 | 8,173 | 1 | 2,724 |
| Pemba North | 211,732 | 220,097 | 34,335 | 6.4 | 3,296 | 0.9 | 803 |
| Pemba South | 195,116 | 201,626 | 31,454 | 5.9 | 2,784 | 0.8 | 654 |
| **Total** | | | | | **339,266** | | **106,411** |

** The estimations were made using 1.5 incidence factor for MAM*

*** The estimations were made using 2.6 incidence factor for SAM (burden)*

**** The estimations were made using a ratio SAM/MAM = 0.314 (National ratio of 90,089 (SAM) / 287,226 (MAM)). The estimations of MAM children for Kilimanjaro, Pwani, Mbeya and Tabora have been removed for calculation.*

According to survey results, it is expected that there will be approximately 340,000 moderately acute malnourished children and more than 105,000 severely acute malnourished children in Tanzania.

[3] Based on the Average Annual Rate 2002-2012 by region from the Census General Report

### Prevalence of Underweight

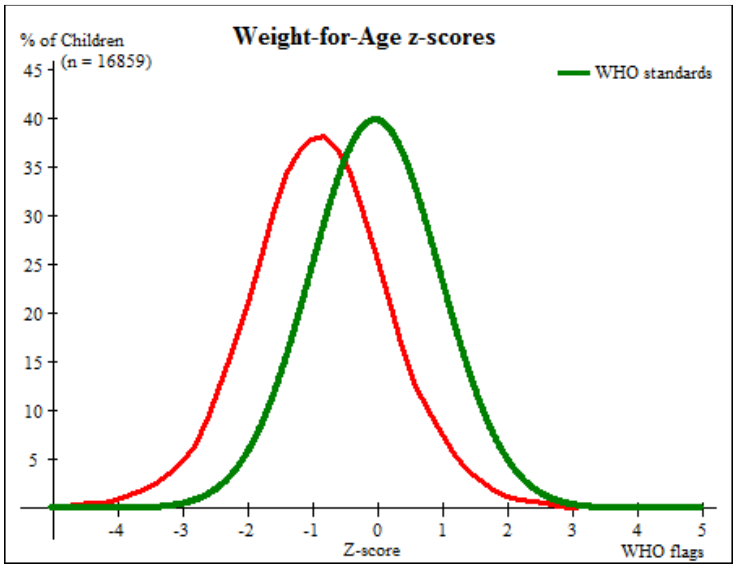


**Figure 6: Weight-for-Age z-score (WHO 2006)**

The above graph shows that the distribution of Weight-for-Age is shifted to the left but still following the WHO standard natural distribution of reference population when WHO flags are applied with mean z-score -0.89±1.11 SD.

**Table 17: Prevalence of Global, Moderate and Severe Underweight (Weigh-for-Age Z-score) in children 0 to 59 months of age by age group and sex in Tanzania (WHO 2006)**

| Background characteristic | N | Underweight (WAZ <-2) | | Moderate Underweight (WAZ <-2 and >=-3) | | Severe Underweight (WAZ <-3) | |
|---|---|---|---|---|---|---|---|
| | | n | % [CI 95%] | n | % [CI 95%] | n | % [CI 95%] |
| **Age** | | | | | | | |
| 0-5 months | 2,037 | 162 | 7.3% [5.9-8.8] | 108 | 5.0% [3.8-6.2] | 54 | 2.3% [1.6-3.1] |
| 6-11 months | 2,058 | 242 | 11.1% [9.5-12.7] | 174 | 7.8% [6.4-9.2] | 68 | 3.3% [2.5-4.2] |
| 12-23 months | 3,640 | 597 | 15.8% [14.4-17.3] | 462 | 12.2% [10.9-13.6] | 135 | 3.6% [2.9-4.2] |
| 24-35 months | 3,536 | 528 | 14.0% [12.7-15.3] | 415 | 11.1% [9.9-12.2] | 113 | 3.0% [2.3-3.6] |
| 36-47 months | 3,091 | 487 | 14.4% [13.0-15.9] | 406 | 12.0% [10.7-13.3] | 81 | 2.4% [1.8-3.0] |
| 48-59 months | 2,505 | 392 | 14.3% [12.8-15.9] | 329 | 12.3% [10.9-13.8] | 63 | 2.0% [1.4-2.6] |
| **Sex** | | | | | | | |
| Male | 8,460 | 1,300 | 14.6% [13.6-15.5] | 991 | 11.2% [10.3-12.0] | 309 | 3.4% [3.0-3.8] |
| Female | 8,407 | 1,108 | 14.3% [12.8-15.9] | 903 | 10.0% [9.3-10.8] | 205 | 2.2% [1.9-2.6] |

**Table 18: Prevalence of Global, Moderate and Severe Underweight (Weigh-for-Age Z-score) in children 0 to 59 months of age by region, Mainland, Zanzibar and National (WHO 2006)**

| # | Region | N | Underweight (WAZ <-2) | | | | | | Moderate Underweight (WAZ <-2 and >=-3) | | Severe Underweight (WAZ <-3) | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | All | | Boys | | Girls | | All | | All | |
| | | | n | % [CI 95%] | n | % [CI 95%] | n | % [CI 95%] | n | % [CI 95%] | n | % [CI 95%] |
| | **Mainland** | **14,207** | **1,985** | **13.4% [12.7-14.1]** | **1,079** | **14.6% [13.6-15.6]** | **906** | **12.2% [11.3-13.1]** | **1,565** | **10.6% [10.0-11.2]** | **420** | **2.8% [2.5-3.1]** |
| 1 | Dodoma | 675 | 147 | 21.8% [18.1-26.0] | 92 | 25.8% [18.1-26.0] | 55 | 17.3% [13.1-22.6] | 109 | 16.1% [13.6-19.0] | 38 | 5.6% [3.7-8.6] |
| 2 | Arusha | 504 | 77 | 15.3% [12.3-18.8] | 39 | 15.3% [11.2-20.5] | 38 | 15.3% [11.1-20.6] | 63 | 12.5% [9.8-15.9] | 14 | 2.8% [1.7-4.6] |
| 3 | Kilimanjaro | 399 | 30 | 7.5% [4.9-11.3] | 18 | 8.4% [5.3-13.2] | 12 | 6.5% [13.4-12.0] | 23 | 5.8% [3.7-8.9] | 7 | 1.8% [0.8-3.8] |
| 4 | Tanga | 590 | 60 | 10.2% [7.0-14.5] | 31 | 11.1% [7.0-17.2] | 29 | 9.3% [5.7-15.0] | 53 | 9.0% [6.3-12.6] | 7 | 1.2% [0.5-2.6] |
| 5 | Morogoro | 520 | 60 | 11.5% [9.1-14.5] | 34 | 12.5% [8.8-17.6] | 26 | 10.4% [7.0-15.2] | 49 | 9.4% [7.2-12.3] | 11 | 2.1% [1.2-3.7] |
| 6 | Pwani | 850 | 104 | 12.2% [10.1-14.8] | 58 | 13.3% [10.6-16.6] | 46 | 11.1% [8.0-15.2] | 89 | 10.5% [8.4-13.0] | 15 | 1.8% [1.1-2.8] |
| 7 | Dar-Es-Salaam | 543 | 36 | 6.6% [4.8-9.2] | 25 | 9.2% [6.1-13.7] | 11 | 4.1% [2.2-7.4] | 31 | 5.7% [4.0-8.1] | 5 | 0.9% [0.4-2.2] |
| 8 | Lindi | 715 | 79 | 11.0% [8.9-13.6] | 43 | 12.8% [9.6-17.0] | 36 | 9.5% [7.1-12.5] | 62 | 8.7% [6.7-11.1] | 17 | 2.4% [1.5-3.6] |
| 9 | Mtwara | 420 | 39 | 9.3% [6.6-13.0] | 17 | 7.9% [4.8-12.6] | 22 | 10.8% [6.8-16.7] | 34 | 8.1% [5.6-11.5] | 5 | 1.2% [0.5-2.8] |
| 10 | Ruvuma | 837 | 119 | 14.2% [11.4-17.6] | 60 | 14.3% [10.7-18.8] | 59 | 14.1% [10.7-18.5] | 98 | 11.7% [9.3-14.6] | 21 | 2.5% [1.6-4.0] |
| 11 | Iringa | 440 | 68 | 15.5% [11.7-20.1] | 40 | 19.9% [14.0-27.5] | 28 | 11.7% [8.1-16.6] | 54 | 12.3% [9.4-15.9] | 14 | 3.2% [1.8-5.6] |
| 12 | Mbeya | 498 | 62 | 12.4% [9.2-16.7] | 30 | 12.0% [7.7-18.3] | 32 | 12.0% [7.7-18.3] | 54 | 10.8% [7.9-14.6] | 8 | 1.6% [0.9-3.0] |
| 13 | Singida | 637 | 114 | 17.9% [14.6-21.8] | 63 | 19.6% [15.0-25.1] | 51 | 16.2% [12.5-20.8] | 98 | 15.4% [12.4-18.9] | 16 | 2.5% [1.7-3.7] |
| 14 | Tabora | 544 | 55 | 10.1% [7.6-13.3] | 35 | 12.2% [8.7-16.8] | 20 | 7.8% [4.8-12.4] | 49 | 9.0% [6.7-12.1] | 6 | 1.1% [0.5-2.7] |
| 15 | Rukwa | 569 | 99 | 17.4% [13.6-22.0] | 50 | 17.8% [13.3-23.4] | 49 | 17.0% [12.2-23.3] | 79 | 13.9% [10.7-17.9] | 20 | 3.5% [2.1-5.9] |
| 16 | Kigoma | 573 | 108 | 18.8% [15.6-22.6] | 58 | 19.8% [15.3-25.3] | 50 | 17.9% [13.8-22.7] | 83 | 14.5% [11.4-18.2] | 25 | 4.4% [3.1-6.1] |
| 17 | Shinyanga | 372 | 36 | 9.7% [6.9-13.5] | 19 | 11.4% [7.9-16.4] | 17 | 8.3% [4.8-13.9] | 33 | 8.9% [6.4-12.2] | 3 | 0.8% [0.3-2.5] |

| # | Region | N | Underweight (WAZ <-2) | | | | | | Moderate Underweight (WAZ <-2 and >=-3) | | Severe Underweight (WAZ <-3) | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | All | | Boys | | Girls | | All | | All | |
| | | | n | % [CI 95%] | n | % [CI 95%] | n | % [CI 95%] | n | % [CI 95%] | n | % [CI 95%] |
| 18 | Kagera | 653 | 145 | 22.2% [18.3-26.6] | 79 | 22.6% [18.4-27.5] | 66 | 21.7% [16.2-28.5] | 112 | 21.7% [16.2-28.5] | 33 | 5.1% [3.3-7.7] |
| 19 | Mwanza | 675 | 69 | 10.2% [8.0-13.0] | 37 | 10.7% [7.1-15.6] | 32 | 9.8% [7.1-13.3] | 55 | 8.1% [6.3-10.4] | 14 | 2.1% [1.3-3.3] |
| 20 | Mara | 387 | 51 | 13.2% [10.0-17.2] | 26 | 13.1% [8.7-19.3] | 25 | 13.3% [8.8-19.6] | 47 | 12.1% [9.0-16.1] | 4 | 1.0% [0.4-2.5] |
| 21 | Manyara | 588 | 81 | 13.8% [10.5-17.9] | 40 | 14.2% [10.2-19.6] | 41 | 13.4% [9.5-18.5] | 62 | 10.5% [7.5-14.6] | 19 | 3.2% [1.9-5.6] |
| 22 | Njombe | 277 | 47 | 17.0% [12.5-22.6] | 20 | 14.0% [8.8-21.5] | 27 | 20.1% [14.6-27.2] | 40 | 14.4% [10.1-20.2] | 7 | 2.5% [1.2-5.4] |
| 23 | Katavi | 484 | 61 | 12.6% [9.5-16.5] | 38 | 15.3% [11.5-20.1] | 23 | 9.7% [5.9-15.8] | 54 | 11.2% [8.4-14.7] | 7 | 1.4% [0.7-3.0] |
| 24 | Simiyu | 497 | 54 | 10.9% [8.3-14.1] | 29 | 12.9% [8.8-18.7] | 25 | 9.2% [6.2-13.4] | 49 | 9.9% [7.3-13.2] | 5 | 1.0% [0.4-2.8] |
| 25 | Geita | 716 | 89 | 12.4% [10.0-15.4] | 45 | 13.2% [10.1-17.0] | 44 | 11.8% [8.3-16.4] | 83 | 11.6% [9.2-14.5] | 6 | 0.8% [0.3-2.0] |
| | **Zanzibar** | **2,660** | **423** | **13.9% [12.5-15.4]** | **221** | **13.6% [11.6-15.5]** | **202** | **14.3% [12.2-16.3]** | **329** | **10.8% [9.6-12.1]** | **94** | **3.1% [2.3-3.8]** |
| 26 | Unguja North | 491 | 82 | 16.7% [12.6-21.8] | 46 | 18.3% [13.2-24.7] | 36 | 15.1% [10.9-20.5] | 68 | 13.8% [10.2-18.5] | 14 | 2.9% [1.6-5.1] |
| 27 | Unguja South | 451 | 68 | 15.1% [11.5-19.6] | 33 | 15.0% [11.2-19.8] | 35 | 15.2% [10.0-22.3] | 60 | 13.3% [10.1-17.4] | 8 | 1.8% [0.9-3.3] |
| 28 | Town West | 498 | 51 | 10.2% [8.2-12.7] | 21 | 8.0% [5.2-12.0] | 30 | 12.8% [9.7-16.7] | 44 | 8.8% [7.0-11.1] | 7 | 1.4% [0.6-3.2] |
| 29 | Pemba North | 546 | 91 | 16.7% [13.1-21.0] | 50 | 17.5% [12.8-23.6] | 41 | 15.7% [11.6-20.9] | 70 | 12.8% [10.0-16.4] | 21 | 3.8% [2.2-6.7] |
| 30 | Pemba South | 641 | 116 | 18.1% [14.9-21.8] | 61 | 19.6% [15.4-24.5] | 55 | 16.7% [12.5-22.0] | 94 | 14.7% [12.1-17.7] | 22 | 3.4% [2.3-5.2] |
| | **National** | **16,867** | **2,408** | **13.4% [12.7-14.1]** | **1,300** | **14.6% [13.6-15.5]** | **1,108** | **12.2% [11.3-13.1]** | **1,894** | **10.6% [10.0-11.1]** | **514** | **2.8% [2.5-3.1]** |

## Prevalence of Overweight

**Table 19: Prevalence of Global, Moderate and Severe Overweight (Weigh-for-Height Z-score – no edema) in children 0 to 59 months of age by region, Mainland, Zanzibar and National (WHO 2006)**

| | Region | N | Overweight (WHZ >2) | | Severe Overweight (WHZ >3) | |
|---|---|---|---|---|---|---|
| | | | N | % [CI 95%] | n | % [CI 95%] |
| | **Mainland** | **14,191** | **533** | **3.6% [3.2-4.0]** | **107** | **0.7% [0.6-0.9]** |
| 1 | Dodoma | 683 | 10 | 1.5% [0.6-2.4] | 2 | 0.3% [0.0-0.7] |
| 2 | Arusha | 512 | 11 | 2.1% [0.9-3.4] | 6 | 1.2% [0.2-2.1] |
| 3 | Kilimanjaro | 406 | 15 | 3.7% [1.9-5.5] | 7 | 1.7% [0.5-3.0] |
| 4 | Tanga | 596 | 19 | 3.2% [1.8-4.6] | 4 | 0.7% [0.0-1.3] |
| 5 | Morogoro | 532 | 15 | 2.8% [1.4-4.2] | 2 | 0.4% [0.0-0.9] |
| 6 | Pwani | 862 | 52 | 6.0% [4.4-7.6] | 16 | 1.9% [1.0-2.8] |
| 7 | Dar-Es-Salaam | 541 | 27 | 5.0% [3.2-6.8] | 5 | 0.9% [0.1-1.7] |
| 8 | Lindi | 729 | 25 | 3.4% [2.1-4.8] | 2 | 0.3% [0.0-0.7] |
| 9 | Mtwara | 424 | 14 | 3.3% [1.6-5.0] | 2 | 0.5% [0.0-1.1] |
| 10 | Ruvuma | 845 | 40 | 4.7% [3.3-6.2] | 8 | 0.9% [0.3-1.6] |
| 11 | Iringa | 443 | 18 | 4.1% [2.2-5.9] | 3 | 0.7% [0.0-1.4] |
| 12 | Mbeya | 508 | 25 | 4.9% [3.0-6.8] | 4 | 0.8% [0.0-1.6] |
| 13 | Singida | 641 | 22 | 3.4% [2.0-4.8] | 4 | 0.6% [0.0-1.2] |
| 14 | Tabora | 547 | 21 | 3.8% [2.2-5.5] | 6 | 1.1% [0.2-2.0] |
| 15 | Rukwa | 580 | 29 | 5.0% [3.2-6.8] | 4 | 0.7% [0.0-1.4] |
| 16 | Kigoma | 575 | 19 | 3.3% [1.8-4.8] | 5 | 0.9% [0.1-1.6] |
| 17 | Shinyanga | 379 | 12 | 3.2% [1.4-4.9] | 3 | 0.8% [0.0-1.7] |
| 18 | Kagera | 659 | 13 | 2.0% [0.9-3.0] | 1 | 0.2% [0.0-0.4] |
| 19 | Mwanza | 756 | 34 | 4.5% [3.0-6.0] | 5 | 0.7% [0.1-1.2] |
| 20 | Mara | 389 | 10 | 2.6% [1.0-4.1] | 0 | 0.0% [0.0-0.0] |
| 21 | Manyara | 593 | 17 | 2.9% [1.5-4.2] | 2 | 0.3% [0.0-0.8] |
| 22 | Njombe | 279 | 10 | 3.6% [1.4-5.8] | 2 | 0.7% [0.0-1.7] |
| 23 | Katavi | 490 | 45 | 9.2% [6.6-11.7] | 11 | 2.2% [0.9-3.6] |
| 24 | Simiyu | 502 | 5 | 1.0% [0.1-1.9] | 0 | 0.0% [0.0-0.0] |
| 25 | Geita | 720 | 25 | 3.5% [2.1-4.8] | 3 | 0.4% [0.0-0.9] |
| | **Zanzibar** | **2,654** | **36** | **1.8% [1.0-2.7]** | **3** | **0.1% [0.0-0.3]** |
| 26 | Unguja North | 499 | 8 | 1.6% [0.5-2.7] | 1 | 0.2% [0.0-0.6] |
| 27 | Unguja South | 453 | 6 | 1.3% [0.3-2.4] | 1 | 0.2% [0.0-0.7] |
| 28 | Town West | 502 | 14 | 2.8% [1.3-4.2] | 1 | 0.2% [0.0-0.6] |
| 29 | Pemba North | 553 | 6 | 1.1% [0.2-1.9] | 0 | 0.0% [0.0-0.0] |
| 30 | Pemba South | 647 | 2 | 0.3% [0.0-0.7] | 0 | 0.0% [0.0-0.0] |
| | **National** | **16,845** | **569** | **3.5% [3.2-3.9]** | **110** | **0.7% [0.5-0.8]** |

The critical age for the onset of malnutrition for children is between 6 and 23 months. In the above graph, stunting and underweight prevalence start at 16.0% and 8.4% respectively in the first month of life. Chronic malnutrition increases quickly until it reaches peak at 26 months of age (46.4%). By this age, the majority of the damage of malnutrition in childhood is done and cannot be reserved. Underweight reaches its peak in at 18 months with 18.7%.
Prevalence of global acute malnutrition starts above 5% up to the first 18 months of life and steadily coming down as age increases

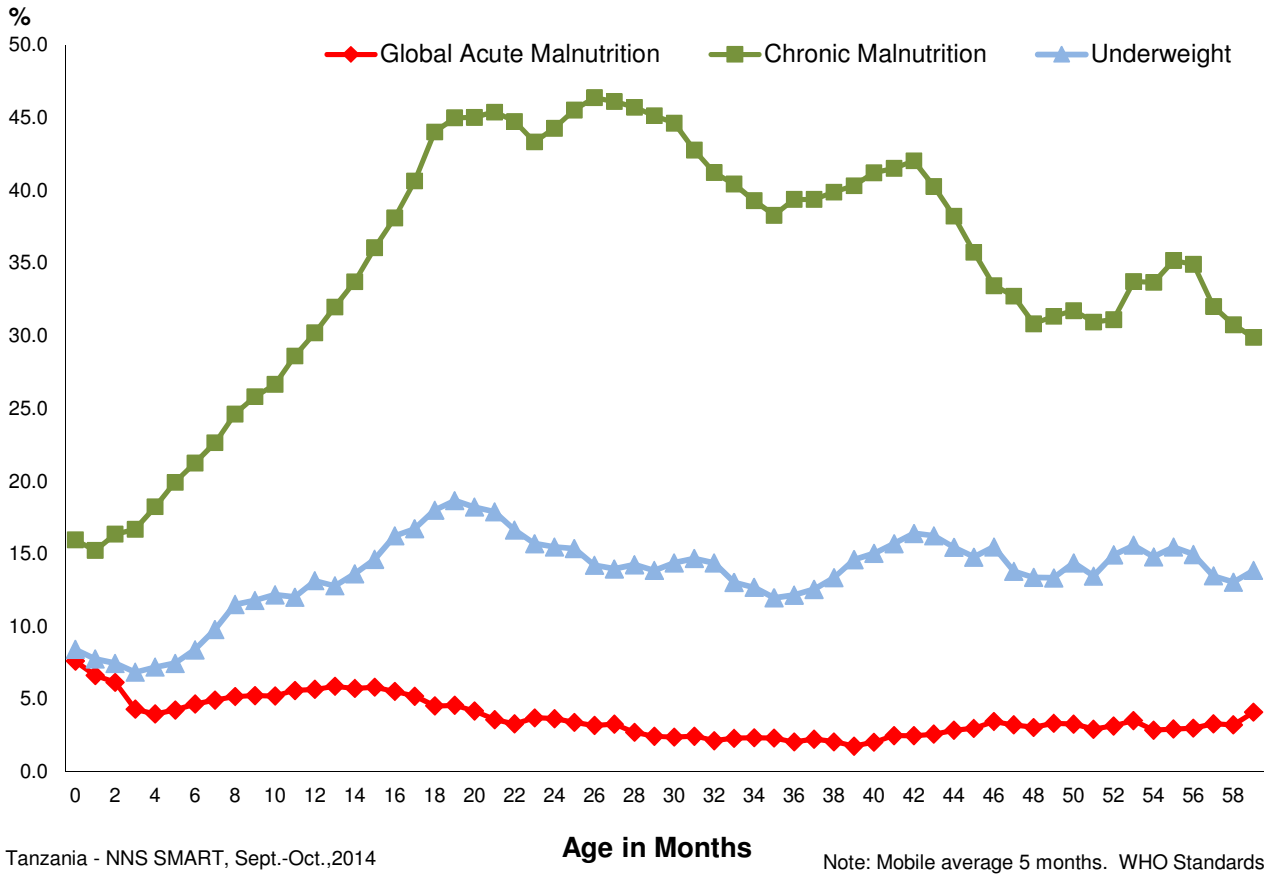


**Figure 7: Trends of malnutrition by age in months**

## 5.2 Vitamin A Supplementation (6-59 months)

Provision of vitamin A supplementation every 6 months can help protect a child from death and disease associated with vitamin A deficiency and is recognized as one of the most cost-effective approaches to improve child survival. The last campaign for vitamin A supplementation and deworming held from Saturday 18th of October to Friday 24th of October 2014. The proportion of all children aged 6-59 months who had received vitamin A in the last 6 months was 72.2% (Table 20). About 28.0% of the children did not receive vitamin A supplement, which is alarming. A high coverage of vitamin A supplementation was noted at Arusha, Kagera and Unguja North (>90%) and the lowest at Mwanza, Singida, Manyara and Town West with less than 50%.

**Table 20: Vitamin A supplementation coverage by region, Mainland, Zanzibar and National in children 6 to 59 months**

| | Region | N | VAS | | | No VAS (%) | Don't know (%) | Total (%) |
|---|---|---|---|---|---|---|---|---|
| | | | By card (%) | By recall (%) | Total VAS (%) [95% CI] | | | |
| | **Mainland** | **12,621** | **30.0%** | **42.6%** | **72.6% [71.0-74.1]** | **23.6%** | **3.8%** | **100.0%** |
| 1 | Dodoma | 624 | 0.3% | 86.9% | 87.2% [79.3-92.4] | 11.4% | 1.4% | 100.0% |
| 2 | Arusha | 468 | 25.2% | 66.7% | 91.9% [87.3-94.9] | 6.8% | 1.3% | 100.0% |
| 3 | Kilimanjaro | 363 | 26.2% | 59.2% | 85.4% [79.6-89.8] | 10.7% | 3.9% | 100.0% |
| 4 | Tanga | 519 | 43.5% | 18.3% | 61.8% [54.1-69.0] | 37.4% | 0.8% | 100.0% |
| 5 | Morogoro | 480 | 11.3% | 55.0% | 66.3% [57.0-74.4] | 29.4% | 4.3% | 100.0% |
| 6 | Pwani | 745 | 18.3% | 68.3% | 86.6% [82.0-90.1] | 12.5% | 0.9% | 100.0% |
| 7 | Dar-Es-Salaam | 482 | 46.1% | 27.8% | 73.9% [67.6-79.2] | 19.7% | 6.4% | 100.0% |
| 8 | Lindi | 646 | 25.1% | 52.9% | 78.0% [70.1-84.3] | 18.4% | 3.6% | 100.0% |
| 9 | Mtwara | 375 | 56.3% | 22.4% | 78.7% [69.0-85.9] | 18.1% | 3.2% | 100.0% |
| 10 | Ruvuma | 741 | 23.8% | 52.6% | 76.4% [69.0-82.5] | 21.6% | 2.0% | 100.0% |
| 11 | Iringa | 386 | 50.8% | 26.7% | 77.5% [69.0-84.2] | 19.2% | 3.3% | 100.0% |
| 12 | Mbeya | 456 | 44.3% | 32.9% | 77.2% [71.8-81.8] | 20.2% | 2.6% | 100.0% |
| 13 | Singida | 584 | 9.8% | 38.9% | 48.6% [33.7-63.9] | 38.7% | 12.7% | 100.0% |
| 14 | Tabora | 509 | 21.4% | 39.1% | 60.5% [52.5-68.0] | 35.4% | 4.1% | 100.0% |
| 15 | Rukwa | 498 | 37.6% | 18.7% | 56.2% [45.8-66.1] | 41.6% | 2.2% | 100.0% |
| 16 | Kigoma | 508 | 20.9% | 52.0% | 72.8% [64.2-80.0] | 23.6% | 3.6% | 100.0% |
| 17 | Shinyanga | 339 | 36.3% | 34.8% | 71.1% [62.2-78.6] | 18.0% | 10.9% | 100.0% |
| 18 | Kagera | 598 | 17.4% | 78.3% | 95.7% [92.9-97.4] | 4.0% | 0.3% | 100.0% |
| 19 | Mwanza | 616 | 45.0% | 3.9% | 48.9% [38.2-59.6] | 48.7% | 2.4% | 100.0% |
| 20 | Mara | 347 | 23.3% | 64.8% | 88.2% [80.1-93.3] | 11.2% | 0.6% | 100.0% |
| 21 | Manyara | 522 | 1.0% | 40.8% | 41.8% [33.2-50.9] | 44.1% | 14.1% | 100.0% |

| | Region | N | VAS | | | No VAS (%) | Don't know (%) | Total (%) |
|---|---|---|---|---|---|---|---|---|
| | | | By card (%) | By recall (%) | Total VAS (%) [95% CI] | | | |
| 22 | Njombe | 238 | 31.1% | 42.0% | 73.1% [61.7-82.1] | 19.3% | 7.6% | 100.0% |
| 23 | Katavi | 427 | 27.9% | 23.2% | 51.1% [41.7-60.3] | 45.9% | 3.0% | 100.0% |
| 24 | Simiyu | 444 | 7.4% | 69.4% | 76.8% [68.6-83.4] | 22.3% | 0.9% | 100.0% |
| 25 | Geita | 642 | 76.9% | 0.0% | 76.9% [69.9-82.7] | 22.7% | 0.4% | 100.0% |
| | **Zanzibar** | **2,307** | **18.4%** | **39.8%** | **58.2% [53.3-63.1]** | **39.5%** | **2.3%** | **100.0%** |
| 26 | Unguja North | 422 | 23.9% | 68.0% | 91.9% [85.6-95.6] | 8.1% | 0.0% | 100.0% |
| 27 | Unguja South | 389 | 31.6% | 52.4% | 84.1% [65.9-93.5] | 14.9% | 1.0% | 100.0% |
| 28 | Town West | 436 | 25.0% | 11.9% | 36.9% [29.1-45.5] | 59.2% | 3.9% | 100.0% |
| 29 | Pemba North | 479 | 3.8% | 47.0% | 50.7% [38.8-62.6] | 46.8% | 2.5% | 100.0% |
| 30 | Pemba South | 581 | 0.7% | 82.4% | 83.1% [78.3-87.1] | 16.4% | 0.5% | 100.0% |
| | **National** | **14,928** | **29.6%** | **42.6%** | **72.2% [70.6-73.7]** | **24.1%** | **3.7%** | **100.0%** |

## 5.3 Deworming (12-59 months)

Helminthes or intestinal worms represent a serious public health problem in areas where climate is tropical and inadequate sanitation and unhygienic conditions prevail. Helminthes cause significant malabsorption of vitamin A and aggravate malnutrition and anemia, which eventually contributes to retarded growth and poor performance in school. Children under five years old are extremely vulnerable to the deficiencies induced by worm infections, therefore deworming is critical for the reduction of child morbidity and mortality.
Deworming was conducted simultaneously with vitamin A supplementation in October 2014 (18-24). The proportion of all children aged 12-59 months who had received deworming in the last 6 months was 70.6%.at national level (Table 21). A high coverage of deworming was noted at Kagera and Unguja North (>90%) and the lowest at Mwanza, Singida and Manyara with less than 50%.

**Table 21: Deworming coverage by region, Mainland, Zanzibar and National in children 12 to 59 months**

| | Region | N | Deworming | | | No Deworming (%) | Don't know (%) | Total (%) |
|---|---|---|---|---|---|---|---|---|
| | | | By card (%) | By recall (%) | Total Deworming (%) [95% CI] | | | |
| | **Mainland** | **10,873** | **25.4%** | **45.2%** | **70.6% [25.0-4.4]** | **25.0%** | **4.4%** | **100.0%** |
| 1 | Dodoma | 534 | 0% | 87.1% | 87.1% [79.5-92.1] | 11.2% | 1.7% | 100.0% |
| 2 | Arusha | 466 | 20.4% | 68.7% | 89.2% [83.7-92.9] | 9.1% | 1.7% | 100.0% |
| 3 | Kilimanjaro | 324 | 23.1% | 62.3% | 85.5% [79.1-90.2] | 10.2% | 4.3% | 100.0% |
| 4 | Tanga | 435 | 43.4% | 16.6% | 60.0% [51.4-68.0] | 39.1% | 0.9% | 100.0% |
| 5 | Morogoro | 417 | 1.7% | 63.5% | 65.2% [55.9-73.6] | 29.3% | 5.5% | 100.0% |
| 6 | Pwani | 615 | 16.1% | 70.6% | 86.7% [80.2-91.2] | 12.4% | 0.9% | 100.0% |

| | Region | N | Deworming | | | No Deworming (%) | Don't know (%) | Total (%) |
|---|---|---|---|---|---|---|---|---|
| | | | By card (%) | By recall (%) | Total Deworming (%) [95% CI] | | | |
| 7 | Dar-Es-Salaam | 402 | 42.0% | 32.8% | 74.9% [68.1-80.6] | 18.9% | 6.2% | 100.0% |
| 8 | Lindi | 576 | 12.3% | 58.0% | 70.3% [61.3-78.0] | 25.2% | 4.5% | 100.0% |
| 9 | Mtwara | 318 | 47.8% | 29.9% | 77.7% [67.0-85.7] | 18.2% | 4.1% | 100.0% |
| 10 | Ruvuma | 629 | 21.1% | 49.1% | 70.3% [61.2-78.0] | 27.3% | 2.4% | 100.0% |
| 11 | Iringa | 334 | 53.9% | 26.6% | 80.5% [70.8-87.6] | 15.9% | 3.6% | 100.0% |
| 12 | Mbeya | 389 | 44.0% | 31.9% | 75.9% [69.1-81.5] | 21.1% | 3.0% | 100.0% |
| 13 | Singida | 499 | 6.8% | 41.7% | 48.5% [32.7-64.6] | 37.1 | 14.4% | 100.0% |
| 14 | Tabora | 452 | 20.8% | 39.2% | 60.0% [52.3-67.2] | 35.4% | 4.6% | 100.0% |
| 15 | Rukwa | 412 | 39.1% | 18.0% | 57.0% [45.1-68.2] | 40.3% | 2.7% | 100.0% |
| 16 | Kigoma | 449 | 14.9% | 55.0% | 69.9% [61.0-77.6] | 26.1% | 4.0% | 100.0% |
| 17 | Shinyanga | 297 | 31.0% | 37.4% | 68.4% [59.8-75.8] | 19.5% | 12.1% | 100.0% |
| 18 | Kagera | 536 | 4.1% | 90.3% | 94.4% [91.4-96.4] | 4.9% | 0.7% | 100.0% |
| 19 | Mwanza | 529 | 33.5% | 3.4% | 36.9% [26.7-48.4] | 59.0% | 4.1% | 100.0% |
| 20 | Mara | 295 | 21.7% | 67.8% | 89.5% [79.6-94.9] | 9.8% | 0.7% | 100.0% |
| 21 | Manyara | 456 | 0.0% | 40.8% | 40.8% [30.8-51.6] | 44.3% | 14.9% | 100.0% |
| 22 | Njombe | 206 | 26.2% | 43.2% | 69.4% [56.0-80.2] | 21.4% | 9.2% | 100.0% |
| 23 | Katavi | 368 | 28.5% | 22.0% | 50.5% [39.6-61.4] | 46.7% | 2.8% | 100.0% |
| 24 | Simiyu | 382 | 5.8% | 70.4% | 76.2% [68.5-82.5] | 22.8% | 1.0% | 100.0% |
| 25 | Geita | 556 | 70.0% | 0.0% | 70.0% [62.6-76.4] | 29.7% | 0.3% | 100.0% |
| | **Zanzibar** | **1,982** | **14.8%** | **53.6%** | **68.4% [63.8-73.0]** | **30.1%** | **1.5%** | **100.0%** |
| 26 | Unguja North | 364 | 23.9% | 70.6% | 94.5% [88.2-97.5] | 5.2% | 0.3% | 100.0% |
| 27 | Unguja South | 329 | 23.1% | 59.3% | 82.4% [65.7-91.9] | 16.4% | 1.2% | 100.0% |
| 28 | Town West | 373 | 20.1% | 35.4% | 55.5% [46.4-64.2] | 42.4% | 2.1% | 100.0% |
| 29 | Pemba North | 410 | 1.2% | 57.3% | 58.5% [47.1-69.2] | 40.0% | 1.5% | 100.0% |
| 30 | Pemba South | 506 | 0.0% | 84.6% | 84.6% [80.5-88.0] | 14.4% | 1.0% | 100.0% |
| | **National** | **12,855** | **25.1%** | **45.5%** | **70.6% [69.0-72.2]** | **25.2%** | **4.2%** | **100.0%** |

## 5.4 Infant and Young Child Feeding Practices (0-23 months)

### Children ever breastfed

98.4% of children 0-23 months reported to have been ever breastfed (Table 22). This is higher than the national rate of 96.9% (TDHS 2010).

**Table 22: Ever breastfed by region, Mainland, Zanzibar and National (Children 0-23 months)**

| | Region | N | Proportion of children born in the past 24 months who were ever breastfed | |
|---|---|---|---|---|
| | | | n | % [95% CI] |
| | **Mainland** | **5,849** | **5,753** | **98.4% [98.0-98.7]** |
| 1 | Dodoma | 296 | 291 | 98.3% [96.8-99.8] |
| 2 | Arusha | 187 | 184 | 98.4% [96.6-100.0] |
| 3 | Kilimanjaro | 123 | 117 | 95.1% [91.3-98.9] |
| 4 | Tanga | 267 | 266 | 99.6% [98.9-100.0] |
| 5 | Morogoro | 250 | 245 | 98.0% [96.3-99.7] |
| 6 | Pwani | 420 | 415 | 98.8% [97.8-99.8] |
| 7 | Dar-Es-Salaam | 251 | 244 | 97.2% [95.2-99.3] |
| 8 | Lindi | 293 | 287 | 98.0% [96.3-99.6] |
| 9 | Mtwara | 234 | 229 | 97.9% [96.0-99.7] |
| 10 | Ruvuma | 359 | 347 | 96.7% [94.8-98.5] |
| 11 | Iringa | 196 | 195 | 99.5% [98.5-100.0] |
| 12 | Mbeya | 206 | 204 | 99.0% [97.7-100.0] |
| 13 | Singida | 195 | 192 | 98.5% [97.7-100.0] |
| 14 | Tabora | 176 | 174 | 98.9% [97.3-100.0] |
| 15 | Rukwa | 240 | 237 | 98.8% [97.3-100.0] |
| 16 | Kigoma | 211 | 209 | 99.1% [97.7-100.0] |
| 17 | Shinyanga | 166 | 162 | 97.6% [95.3-99.9] |
| 18 | Kagera | 242 | 240 | 99.2% [98.0-100.0] |
| 19 | Mara | 329 | 324 | 98.5% [97.2-99.8] |
| 20 | Mwanza | 138 | 138 | 100% |
| 21 | Manyara | 217 | 211 | 97.2% [95.0-99.4] |
| 22 | Njombe* | 137 | 132 | 96.4% [93.2-99.5] |
| 23 | Katavi | 187 | 182 | 97.3% [95.0-99.6] |
| 24 | Simiyu | 202 | 201 | 99.5% [98.5-100.0] |
| 25 | Geita | 327 | 327 | 100% |
| | **Zanzibar** | **1,224** | **1,212** | **98.9% [98.2-99.6]** |
| 26 | Unguja North | 246 | 245 | 99.6% [98.8-100.0] |
| 27 | Unguja South | 211 | 209 | 99.1% [97.7-100.0] |
| 28 | Town West | 225 | 222 | 98.7% [97.2-100.0] |
| 29 | Pemba North | 260 | 259 | 99.6% [98.9-100.0] |
| 30 | Pemba South | 282 | 277 | 98.2% [96.7-99.8] |
| | **National** | **7,073** | **6,965** | **98.4% [98.0-98.7]** |

### Early Initiation of Breastfeeding

Early initiation of breastfeeding has the potential to prevent 22% of newborn deaths**.** The survey revealed that 50.8% of children 0-23 months initiated breastfeeding within 1 hour (Table 23). This result is very close to the national rate recorded in 2010: 48.7% (TDHS 2010). Early initiation of breastfeeding is higher in Zanzibar with 61.7%.

**Table 23: Early Initiation of Breatfeeding by region, Mainland, Zanzibar and National (Children 0-23 months)**

| | Region | N | Proportion of children born in the past 24 months who were put to the breast within one hour of birth | |
|---|---|---|---|---|
| | | | n | % [95% CI] |
| | **Mainland** | **5,849** | **2,809** | **50.5% [48.6-52.4]** |
| 1 | Dodoma | 296 | 176 | 59.5% [53.9-65.1] |
| 2 | Arusha | 187 | 119 | 63.6% [56.7-70.6] |
| 3 | Kilimanjaro | 123 | 95 | 77.2% [69.8-84.7] |
| 4 | Tanga | 267 | 204 | 76.4% [71.3-81.5] |
| 5 | Morogoro | 250 | 155 | 62.0% [56.0-68.0] |
| 6 | Pwani | 420 | 128 | 30.5% [26.1-34.9] |
| 7 | Dar-Es-Salaam | 251 | 154 | 61.4% [55.3-67.4] |
| 8 | Lindi | 293 | 153 | 52.2% [46.5-57.9] |
| 9 | Mtwara | 234 | 122 | 52.1% [45.7-58.6] |
| 10 | Ruvuma | 359 | 210 | 58.5% [53.4-63.6] |
| 11 | Iringa | 196 | 148 | 75.5% [69.5-81.5] |
| 12 | Mbeya | 206 | 135 | 65.5% [59.0-72.0] |
| 13 | Singida | 195 | 51 | 26.2% [20.0-32.3] |
| 14 | Tabora | 176 | 35 | 19.9% [14.0-25.8] |
| 15 | Rukwa | 240 | 54 | 22.5% [17.2-27.8] |
| 16 | Kigoma | 211 | 140 | 66.4% [60.0-72.7] |
| 17 | Shinyanga | 166 | 39 | 23.5% [17.0-30.0] |
| 18 | Kagera | 242 | 144 | 59.5% [53.3-65.7] |
| 19 | Mara | 329 | 135 | 41.0% [35.7-46.4] |
| 20 | Mwanza | 138 | 42 | 30.4% [22.7-38.1] |
| 21 | Manyara | 217 | 98 | 45.2% [38.5-51.8] |
| 22 | Njombe | 137 | 94 | 68.6% [60.8-76.4] |
| 23 | Katavi | 187 | 38 | 20.3% [14.5-26.1] |
| 24 | Simiyu | 202 | 63 | 31.2% [24.8-37.6] |
| 25 | Geita | 327 | 77 | 23.5% [18.9-28.2] |
| | **Zanzibar** | **1,224** | **756** | **61.7% [57.7-65.6]** |
| 26 | Unguja North | 246 | 172 | 69.9% [64.2-75.7] |
| 27 | Unguja South | 211 | 141 | 66.8% [60.5-73.2] |
| 28 | Town West | 225 | 140 | 62.2% [55.9-68.6] |
| 29 | Pemba North | 260 | 136 | 52.3% [46.2-58.4] |
| 30 | Pemba South | 282 | 167 | 59.2% [53.5-65.0] |
| | **National** | **7,073** | **3,565** | **50.8% [49.0-52.7]** |

### Exclusive breastfeeding under 6 months

WHO recommends mothers to exclusive breastfeed infants for first six months of life to achieve optimal growth, development and good health.
At national level, less than 42% of infants under six months of age were exclusively breastfed (Table 24). The 2010 TDHS shows the proportion of children exclusively breastfed was 49.8%. In Zanzibar, less than 20% of infants under six months of age were exclusively breastfed which is low.

**Table 24: Exclusive breastfeeding by region, Mainland, Zanzibar and National (Infants 0-5 months)**

| | Region | N | Proportion of infants 0-5 months of age who are fed exclusively with breast milk | |
|---|---|---|---|---|
| | | | n | % [95% CI] |
| | **Mainland** | **1,629** | **663** | **41.8% [39.1-44.6]** |
| 1 | Dodoma | 74 | 27 | 36.5% [25.4-47.5] |
| 2 | Arusha | 46 | 15 | 32.6% [18.9-46.3] |
| 3 | Kilimanjaro | 43 | 11 | 25.6% [12.4-38.8] |
| 4 | Tanga | 82 | 10 | 12.2% [5.1-19.3] |
| 5 | Morogoro | 62 | 35 | 56.5% [44.0-68.9] |
| 6 | Pwani | 122 | 40 | 32.8% [24.4-41.2] |
| 7 | Dar-Es-Salaam | 64 | 32 | 50.0% [37.6-62.4] |
| 8 | Lindi | 88 | 34 | 38.6% [28.4-48.9] |
| 9 | Mtwara | 80 | 21 | 26.3% [16.5-36.0] |
| 10 | Ruvuma | 103 | 20 | 19.4% [11.7-27.1] |
| 11 | Iringa | 59 | 37 | 62.7% [50.3-75.2] |
| 12 | Mbeya | 55 | 15 | 27.3% [15.4-39.2] |
| 13 | Singida | 51 | 28 | 54.9% [41.1-68.7] |
| 14 | Tabora | 38 | 17 | 44.7% [28.7-60.8] |
| 15 | Rukwa | 81 | 34 | 42.0% [31.2-52.8] |
| 16 | Kigoma | 63 | 37 | 58.7% [46.5-71.0] |
| 17 | Shinyanga | 38 | 18 | 47.4% [31.3-63.5] |
| 18 | Kagera | 61 | 43 | 70.5% [58.9-82.0] |
| 19 | Mara | 79 | 38 | 48.1% [37.0-59.2] |
| 20 | Mwanza | 39 | 13 | 33.3% [18.3-48.3] |
| 21 | Manyara | 69 | 23 | 33.3% [22.1-44.5] |
| 22 | Njombe | 45 | 20 | 44.4% [29.8-59.1] |
| 23 | Katavi | 60 | 32 | 53.3% [40.6-66.1] |
| 24 | Simiyu | 52 | 24 | 46.2% [32.5-59.8] |
| 25 | Geita | 75 | 39 | 52.0% [40.6-63.4] |
| | **Zanzibar** | **384** | **67** | **19.7% [14.0-25.4]** |
| 26 | Unguja North | 85 | 15 | 17.6% [9.5-25.8] |
| 27 | Unguja South | 66 | 18 | 27.3% [16.4-38.1] |
| 28 | Town West | 71 | 18 | 25.4% [15.2-35.5] |
| 29 | Pemba North | 84 | 9 | 10.7% [4.1-17.4] |
| 30 | Pemba South | 78 | 7 | 9.0% [2.6-15.4] |
| | **National** | **2,013** | **730** | **41.1% [38.4-43.7]** |

### Continued breastfeeding at 1 year

The survey revealed that 90.0% of children 12-15 months were fed breast milk during the day prior to survey (Table 25). This result is very close to the national rate recorded in 2010: 94.0% (TDHS 2010).

**Table 25: Continued breastfeeding at 1 year by region, Mainland, Zanzibar and National (Children 12-15 months)**

| | Region | N | Proportion of children 12-15 months of age who are fed breast milk during the previous day | |
|---|---|---|---|---|
| | | | n | % [95% CI] |
| | **Mainland** | **921** | **839** | **90.0% [87.7-92.4]** |
| 1 | Dodoma | 51 | 48 | 94.1% [87.6-100.0] |
| 2 | Arusha | 31 | 30 | 96.8% [90.4-100.0] |
| 3 | Kilimanjaro | 14 | 14 | 100.0% |
| 4 | Tanga | 39 | 36 | 92.3% [83.8-100.0] |
| 5 | Morogoro | 33 | 33 | 100.0% |
| 6 | Pwani | 55 | 49 | 89.1% [80.8-97.4] |
| 7 | Dar-Es-Salaam | 36 | 29 | 80.6% [67.4-93.7] |
| 8 | Lindi | 52 | 50 | 96.2% [90.9-100.0] |
| 9 | Mtwara | 37 | 34 | 91.9% [83.0-100.0] |
| 10 | Ruvuma | 49 | 46 | 93.9% [87.1-100.0] |
| 11 | Iringa | 29 | 28 | 96.6% [89.8-100.0] |
| 12 | Mbeya | 26 | 26 | 100.0% |
| 13 | Singida | 26 | 21 | 80.8% [65.3-96.2] |
| 14 | Tabora | 38 | 33 | 86.8% [75.9-97.7] |
| 15 | Rukwa | 32 | 30 | 93.8% [85.2-100.0] |
| 16 | Kigoma | 37 | 36 | 97.3% [92.0-100.0] |

| | Region | N | Proportion of children 12-15 months of age who are fed breast milk during the previous day | |
|---|---|---|---|---|
| | | | n | % [95% CI] |
| 17 | Shinyanga | 23 | 17 | 73.9% [55.5-92.3] |
| 18 | Kagera | 44 | 42 | 95.5% [89.2-100.0] |
| 19 | Mara | 55 | 44 | 80.0% [69.3-90.7] |
| 20 | Mwanza | 24 | 18 | 75.0% [57.3-92.7] |
| 21 | Manyara | 27 | 23 | 85.2% [71.5-98.9] |
| 22 | Njombe | 28 | 25 | 89.3% [77.6-100.0] |
| 23 | Katavi | 27 | 27 | 100.0% |
| 24 | Simiyu | 40 | 36 | 90.0% [80.6-99.4] |
| 25 | Geita | 68 | 64 | 94.1% [88.5-99.8] |
| | **Zanzibar** | **191** | **169** | **90.1% [85.2-95.0]** |
| 26 | Unguja North | 44 | 43 | 97.7% [93.3-100.0] |
| 27 | Unguja South | 30 | 27 | 90.0% [79.1-100.0] |
| 28 | Town West | 34 | 32 | 94.1% [86.1-100.0] |
| 29 | Pemba North | 37 | 27 | 73.0% [58.5-87.5] |
| 30 | Pemba South | 46 | 40 | 87.0% [77.1-96.8] |
| | **National** | **1,112** | **1,008** | **90.0% [87.8-92.3]** |

### Continued breastfeeding at 2 year

The survey revealed that less than 50% of children 20-23 months were still breastfed (Table 26). This result is very close to the national rate recorded in 2010: 51.0% (TDHS 2010).

**Table 26: Continued breastfeeding at 2 year by region, Mainland, Zanzibar and National (Children 20-23 months)**

| | Region | N | Proportion of children 20-23 months of age who are fed breast milk during the previous day | |
|---|---|---|---|---|
| | | | n | % [95% CI] |
| | **Mainland** | **757** | **370** | **48.0% [43.6-52.3]** |
| 1 | Dodoma | 38 | 19 | 50.0% [33.9-66.1] |
| 2 | Arusha | 25 | 22 | 88.0% [75.0-100.0] |
| 3 | Kilimanjaro | 10 | 7 | 70.0% [40.0-100.0] |
| 4 | Tanga | 26 | 15 | 57.7% [38.3-77.1] |
| 5 | Morogoro | 48 | 25 | 52.1% [37.8-66.4] |
| 6 | Pwani | 49 | 24 | 49.0% [34.8-63.1] |
| 7 | Dar-Es-Salaam | 32 | 12 | 37.5% [20.4-54.6] |
| 8 | Lindi | 45 | 26 | 57.8% [43.2-72.4] |
| 9 | Mtwara | 24 | 15 | 62.5% [42.7-82.3] |
| 10 | Ruvuma | 62 | 37 | 59.7% [47.4-72.0] |
| 11 | Iringa | 34 | 12 | 35.3% [19.0-51.6] |
| 12 | Mbeya | 21 | 10 | 47.6% [25.7-69.5] |
| 13 | Singida | 17 | 5 | 29.4% [7.1-51.8] |
| 14 | Tabora | 18 | 8 | 44.4% [20.8-68.1] |
| 15 | Rukwa | 18 | 8 | 44.4% [20.8-68.1] |
| 16 | Kigoma | 27 | 14 | 51.9% [32.6-71.1] |
| 17 | Shinyanga | 30 | 9 | 30.0% [13.3-46.7] |
| 18 | Kagera | 35 | 20 | 57.1% [40.5-73.8] |
| 19 | Mara | 53 | 12 | 22.6% [11.3-34.0] |
| 20 | Mwanza | 8 | 5 | 62.5% [26.6-98.4] |
| 21 | Manyara | 27 | 21 | 77.8% [61.8-93.8] |
| 22 | Njombe | 14 | 7 | 50.0% [22.8-77.2] |
| 23 | Katavi | 26 | 18 | 69.2% [51.1-87.3] |
| 24 | Simiyu | 18 | 9 | 50.0% [26.2-73.8] |
| 25 | Geita | 52 | 10 | 19.2% [8.4-30.1] |
| | **Zanzibar** | **136** | **72** | **58.8% [50.8-66.7]** |
| 26 | Unguja North | 26 | 14 | 53.8% [34.3-73.4] |
| 27 | Unguja South | 17 | 8 | 47.1% [22.6-71.5] |
| 28 | Town West | 21 | 15 | 71.4% [51.6-91.3] |
| 29 | Pemba North | 34 | 21 | 61.8% [45.2-78.4] |
| 30 | Pemba South | 38 | 14 | 36.8% [21.3-52.4] |
| | **National** | **893** | **442** | **48.2% [44.0-52.5]** |

## Introduction of complementary food

Complementary foods (solid or semi-solid foods fed to infants in addition to breast milk) are recommended to be started at age 6 months. At national level, the survey shows that 89.5% of children from 6 to 8 months had a timely introduction of complementary food. TDHS 2010 reported that 94.7% of breastfeeding children aged 6-8 months of age had a timely introduction of complementary food.

**Table 27: Introduction of complementary food by region, Mainland, Zanzibar and National (Infants 6-8 months)**

| | Region | N | Proportion of infants 6-8 months of age who received solid, semi-solid or soft foods | |
|---|---|---|---|---|
| | | | n | % [95% CI] |
| | **Mainland** | **859** | **761** | **89.7% [87.6-91.7]** |
| 1 | Dodoma | 44 | 34 | 77.3% [64.7-89.8] |
| 2 | Arusha | 21 | 21 | 100.0% |
| 3 | Kilimanjaro | 18 | 18 | 100.0% |
| 4 | Tanga | 46 | 45 | 97.8% [93.6-100.0] |
| 5 | Morogoro | 31 | 24 | 77.4% [62.4-92.4] |
| 6 | Pwani | 70 | 64 | 91.4% [84.8-98.0] |
| 7 | Dar-Es-Salaam | 51 | 49 | 96.1% [90.7-100.0] |
| 8 | Lindi | 38 | 36 | 94.7% [87.5-100.0] |
| 9 | Mtwara | 40 | 37 | 92.5% [84.2-100.0] |
| 10 | Ruvuma | 47 | 47 | 100.0% |
| 11 | Iringa | 22 | 18 | 81.8% [65.3-98.3] |
| 12 | Mbeya | 24 | 21 | 87.5% [74.0-100.0] |
| 13 | Singida | 35 | 32 | 91.4% [82.0-100.0] |
| 14 | Tabora | 22 | 22 | 100.0% |
| 15 | Rukwa | 34 | 24 | 70.6% [55.0-86.2] |
| 16 | Kigoma | 24 | 22 | 91.7% [80.4-100.0] |
| 17 | Shinyanga | 18 | 16 | 88.9% [73.9-100.0] |
| 18 | Kagera | 25 | 20 | 80.0% [64.0-96.0] |
| 19 | Mara | 54 | 52 | 96.3% [91.2-100.0] |
| 20 | Mwanza | 30 | 26 | 86.7% [74.3-99.1] |
| 21 | Manyara | 32 | 23 | 71.9% [56.0-87.7] |
| 22 | Njombe | 26 | 24 | 92.3% [81.9-100.0] |
| 23 | Katavi | 26 | 20 | 76.9% [60.4-93.5] |
| 24 | Simiyu | 36 | 31 | 86.1% [74.6-97.6] |
| 25 | Geita | 45 | 35 | 77.8% [65.5-90.1] |
| | **Zanzibar** | **196** | **172** | **85.9% [78.7-93.2]** |
| 26 | Unguja North | 40 | 37 | 92.5% [84.2-100.0] |
| 27 | Unguja South | 39 | 37 | 94.9% [87.9-100.0] |
| 28 | Town West | 37 | 31 | 83.8% [71.7-95.8] |
| 29 | Pemba North | 41 | 30 | 73.2% [59.4-86.9] |
| 30 | Pemba South | 39 | 37 | 94.9% [87.9-100.0] |
| | **National** | **1,055** | **933** | **89.5% [87.5-91.5]** |

## Average number of food groups consumed

The amounts of feeds are increased gradually from 6 to 23 months, which is the period of transition to eating the family diet.

**Table 28: Average number of food groups consumed by age group and by sex (Children 6-23 months)**

| Background characteristic | N | Average number of food group consumed | |
|---|---|---|---|
| | | Mean | [95% CI] |
| **Age group** | | | |
| 6-8 months | 1,055 | 2.1 | [2.0-2.2] |
| 9-11 months | 976 | 2.6 | [2.5-2.7] |
| 12-17 months | 1,632 | 2.9 | [2.8-3.0] |
| 18-23 months | 1,397 | 3.0 | [2.9-3.1] |
| **Sex** | | | |
| Male | 2,528 | 2.7 | [2.6-2.8] |
| Female | 2,495 | 2.7 | [2.6-2.8] |

**Table 29: Average number of food groups consumed by region, Mainland, Zanzibar and National (Children 6-23 months)**

| | Region | N | Average number of food group consumed | |
|---|---|---|---|---|
| | | | Mean | [95% CI] |
| | **Mainland** | **4,220** | **2.7** | **[2.6-2.8]** |
| 1 | Dodoma | 222 | 2.3 | [2.1-2.4] |
| 2 | Arusha | 141 | 3.2 | [2.9-3.4] |
| 3 | Kilimanjaro | 80 | 4.1 | [3.8-4.5] |
| 4 | Tanga | 185 | 4.5 | [4.3-4.7] |
| 5 | Morogoro | 188 | 2.4 | [2.2-2.6] |
| 6 | Pwani | 298 | 3.3 | [3.1-3.5] |
| 7 | Dar-Es-Salaam | 187 | 3.5 | [3.3-3.7] |
| 8 | Lindi | 205 | 2.5 | [2.4-2.7] |
| 9 | Mtwara | 154 | 2.7 | [2.6-2.9] |
| 10 | Ruvuma | 256 | 3.0 | [2.9-3.2] |
| 11 | Iringa | 137 | 2.3 | [2.1-2.5] |
| 12 | Mbeya | 151 | 2.1 | [2.0-2.3] |
| 13 | Singida | 144 | 2.2 | [2.0-2.4] |
| 14 | Tabora | 138 | 2.4 | [2.3-2.5] |
| 15 | Rukwa | 159 | 2.1 | [1.9-2.3] |
| 16 | Kigoma | 148 | 2.8 | [2.6-3.0] |
| 17 | Shinyanga | 128 | 2.6 | [2.4-2.8] |
| 18 | Kagera | 181 | 2.5 | [2.3-2.6] |
| 19 | Mara | 250 | 2.4 | [2.3-2.6] |
| 20 | Mwanza | 99 | 2.2 | [1.9-2.4] |
| 21 | Manyara | 148 | 2.2 | [2.0-2.3] |
| 22 | Njombe | 92 | 2.8 | [2.6-3.1] |
| 23 | Katavi | 127 | 2.0 | [1.8-2.1] |
| 24 | Simiyu | 150 | 2.1 | [1.9-2.3] |
| 25 | Geita | 252 | 2.3 | [2.2-2.4] |
| | **Zanzibar** | **840** | **2.3** | **[2.1-2.4]** |
| 26 | Unguja North | 161 | 2.0 | [1.9-2.2] |
| 27 | Unguja South | 145 | 2.3 | [2.1-2.4] |
| 28 | Town West | 154 | 2.3 | [2.1-2.4] |
| 29 | Pemba North | 176 | 2.3 | [2.1-2.5] |
| 30 | Pemba South | 204 | 2.3 | [2.2-2.5] |
| | **National** | **5,060** | **2.7** | **[2.6-2.8]** |

## Minimum Dietary Diversity

**Table 30: Minimum Dietary Diversity by age group and by sex (Children 6-23 months)**

| Background characteristic | N | Proportion of children 6-23 months of age who received foods from ≥ 4 food groups during the previous day | |
|---|---|---|---|
| | | n | % [95% CI] |
| **Age group** | | | |
| 6-8 months | 1,055 | 137 | 15.8% [12.8-18.9] |
| 9-11 months | 976 | 199 | 22.5% [19.0-25.9] |
| 12-17 months | 1,632 | 390 | 26.5% [23.8-29.3] |
| 18-23 months | 1,397 | 368 | 30.0% [26.7-33.3] |
| **Sex** | | | |
| Male | 2,528 | 542 | 24.3% [21.9-26.7] |
| Female | 2,495 | 549 | 24.9% [22.5-27.2] |

The proportion of children aged 6-23 months who received foods from 4 or more food groups was 24.5% at national level (Table 31). The higher proportion were noted at Kilimanjaro and Tanga with respectively 66.3% and 79.5% and the lowest at Iringa, Mbeya, Singida, Tabora, Manyara and Katavi with less than 10%. The proportion in Zanzibar represents less than half of the proportion at national level with 12.1%.
In 2010, the minimum dietary diversity was better with 56% at national level and 40% in Zanzibar.

**Table 31: Minimum Dietary Diversity by region, Mainland, Zanzibar and National (Children 6-23 months)**

| | Region | N | Proportion of children 6-23 months of age who foods from ≥ 4 food groups during the previous day | |
|---|---|---|---|---|
| | | | n | % [95% CI] |
| | **Mainland** | **4,220** | **994** | **24.8% [23.0-26.7]** |
| 1 | Dodoma | 222 | 32 | 14.4% [9.8-19.0] |
| 2 | Arusha | 141 | 61 | 43.3% [35.1-51.5] |
| 3 | Kilimanjaro | 80 | 53 | 66.3% [55.8-76.7] |
| 4 | Tanga | 185 | 147 | 79.5% [73.6-85.3] |
| 5 | Morogoro | 188 | 31 | 16.5% [11.2-21.8] |
| 6 | Pwani | 298 | 137 | 46.0% [40.3-51.6] |
| 7 | Dar-Es-Salaam | 187 | 97 | 51.9% [44.7-59.1] |
| 8 | Lindi | 205 | 34 | 16.6% [11.5-21.7] |
| 9 | Mtwara | 154 | 30 | 19.5% [13.2-25.8] |
| 10 | Ruvuma | 256 | 86 | 33.6% [27.8-39.4] |
| 11 | Iringa | 137 | 12 | 8.8% [4.0-13.5] |
| 12 | Mbeya | 151 | 9 | 6.0% [2.2-9.7] |
| 13 | Singida | 144 | 10 | 6.9% [2.8-11.1] |
| 14 | Tabora | 138 | 8 | 5.8% [1.9-9.7] |
| 15 | Rukwa | 159 | 22 | 13.8% [8.5-19.2] |
| 16 | Kigoma | 148 | 37 | 25.0% [18.0-32.0] |
| 17 | Shinyanga | 128 | 30 | 23.4% [16.1-30.8] |
| 18 | Kagera | 181 | 37 | 20.4% [14.5-26.3] |
| 19 | Mara | 250 | 34 | 13.6% [9.3-17.9] |
| 20 | Mwanza | 99 | 14 | 14.1% [7.2-21.0] |
| 21 | Manyara | 148 | 13 | 8.8% [4.2-13.4] |
| 22 | Njombe | 92 | 25 | 27.2% [18.0-36.3] |
| 23 | Katavi | 127 | 1 | 0.8% [0.0-2.3] |
| 24 | Simiyu | 150 | 13 | 8.7% [4.1-13.2] |
| 25 | Geita | 252 | 21 | 8.3% [4.9-11.8] |
| | **Zanzibar** | **840** | **100** | **12.1% [8.7-15.5]** |
| 26 | Unguja North | 161 | 9 | 5.6% [2.0-9.2] |
| 27 | Unguja South | 145 | 14 | 9.7% [4.8-14.5] |
| 28 | Town West | 154 | 19 | 12.3% [7.1-17.5] |
| 29 | Pemba North | 176 | 28 | 15.9% [10.5-21.3] |
| 30 | Pemba South | 204 | 30 | 14.7% [9.8-19.6] |
| | **National** | **5,060** | **1,094** | **24.5% [22.7-26.3]** |

## Minimum Meal Frequency

**Table 32: Minimum meal frequency by age group and by sex (Children 6-23 months)**

| Background characteristic | N | Children 6-23 months | |
|---|---|---|---|
| | | n | % [95% CI] |
| **Age group** | | | |
| 6-8 months | 1,055 | 857 | 82.7% [80.0-85.3] |
| 9-11 months | 976 | 599 | 63.0% [59.2-66.8] |
| 12-17 months | 1,632 | 1,059 | 65.9% [62.9-69.0] |
| 18-23 months | 1,397 | 730 | 54.6% [51.2-58.0] |
| **Sex** | | | |
| Male | 2,528 | 1,615 | 65.8% [63.2-68.3] |
| Female | 2,495 | 1,608 | 65.7% [63.2-68.1] |

The proportion of children aged 6-23 months who received solid, semi-solid or soft foods the minimum number of times or more was 65.7% at national level (Table 33). In 2010, the minimum meal frequency was lower with only 34.1% at national level.

**Table 33: Minimum meal frequency by age group and for breastfed/non-breastfed children, by region, Mainland, Zanzibar and National**

| # | Region | N | Breastfed Children 6-23 months | | Non-breastfed children 6-23 months | | Children 6-23 months | |
|---|---|---|---|---|---|---|---|---|
| | | | n | % [CI 95%] | n | % [CI 95%] | n | % [CI 95%] |
| | **Mainland** | **3,450** | **2,526** | **73.4% [71.3-75.5]** | **239** | **35.1% [31.0-39.2]** | **2,765** | **66.0% [64.0-68.0]** |
| 1 | Dodoma | 190 | 109 | 57.4% [50.3-64.4] | 6 | 19.4% [5.2-33.5] | 115 | 51.8% [45.2-58.4] |
| 2 | Arusha | 128 | 115 | 89.8% [84.6-95.1] | 10 | 83.3% [61.3-100.0] | 125 | 88.7% [83.4-93.9] |
| 3 | Kilimanjaro | 75 | 73 | 97.3% [93.7-100.0] | 4 | 80.0% [40.7-100.0] | 77 | 96.3% [92.1-100.0] |
| 4 | Tanga | 164 | 149 | 90.9% [86.4-95.3] | 11 | 52.4% [30.5-74.3] | 160 | 86.5% [81.5-91.4] |
| 5 | Morogoro | 156 | 78 | 50% [42.1-57.9] | 13 | 40.6% [23.3-57.9] | 91 | 48.4% [41.2-55.6] |
| 6 | Pwani | 235 | 219 | 93.2% [90.0-96.4] | 28 | 45.9% [33.3-58.5] | 247 | 82.9% [78.6-87.2] |
| 7 | Dar-Es-Salaam | 143 | 137 | 95.8% [92.5-99.1] | 27 | 73.0% [58.4-87.5] | 164 | 87.7% [83.0-92.4] |
| 8 | Lindi | 180 | 151 | 83.9% [78.5-89.3] | 3 | 13.0% [0.0-27.1] | 154 | 75.1% [69.2-81.1] |
| 9 | Mtwara | 130 | 115 | 88.5% [82.9-94.0] | 5 | 20.8% [4.2-37.5] | 120 | 77.9% [71.3-84.5] |
| 10 | Ruvuma | 216 | 184 | 85.2% [80.4-89.9] | 8 | 20.5% [7.7-33.4] | 192 | 75.0% [69.7-80.3] |
| 11 | Iringa | 103 | 78 | 75.7% [67.4-84.1] | 5 | 15.6% [2.8-28.4] | 83 | 60.6% [52.4-68.8] |
| 12 | Mbeya | 125 | 86 | 68.8% [60.6-77.0] | 6 | 24.0% [6.9-41.1] | 92 | 60.9% [53.1-68.7] |
| 13 | Singida | 118 | 78 | 66.1% [57.5-74.7] | 5 | 20.0% [4.0-36.0] | 83 | 57.6% [49.5-65.7] |
| 14 | Tabora | 106 | 77 | 72.6% [64.1-81.2] | 3 | 9.4% [0.0-19.6] | 80 | 58.0% [49.7-66.2] |
| 15 | Rukwa | 137 | 70 | 51.1% [42.7-59.5] | 2 | 10.0% [0.0-23.5] | 72 | 45.3% [37.5-53.0] |
| 16 | Kigoma | 124 | 48 | 38.7% [30.1-47.3] | 4 | 17.4% [1.5-33.3] | 52 | 35.1% [27.4-42.9] |
| 17 | Shinyanga | 88 | 56 | 63.6% [53.5-73.7] | 7 | 20.0% [6.5-33.5] | 63 | 49.2% [40.5-57.9] |
| 18 | Kagera | 158 | 60 | 38.0% [30.4-45.6] | 1 | 4.8% [0.0-14.1] | 61 | 33.7% [26.8-40.6] |
| 19 | Mara | 176 | 155 | 88.1% [83.8-92.9] | 38 | 51.4% [39.9-62.8] | 193 | 77.2% [72.0-82.4] |
| 20 | Mwanza | 84 | 75 | 89.3% [82.6-95.9] | 4 | 26.7% [3.5-49.9] | 79 | 79.8% [71.8-87.7] |
| 21 | Manyara | 121 | 84 | 69.4% [61.2-77.7] | 12 | 52.2% [31.3-73.1] | 96 | 64.9% [57.1-72.6] |
| 22 | Njombe | 73 | 62 | 84.9% [76.7-93.2] | 6 | 31.6% [10.1-53.1] | 68 | 73.9% [64.9-82.9] |
| 23 | Katavi | 114 | 44 | 38.6% [29.6-47.6] | 0 | 0.0% | 44 | 34.6% [26.3-43.0] |
| 24 | Simiyu | 125 | 103 | 82.4% [75.7-89.1] | 8 | 32% [13.3-50.7] | 111 | 74.0% [67.0-81.0] |
| 25 | Geita | 181 | 120 | 66.3% [59.4-73.2] | 23 | 32.4% [21.4-43.4] | 143 | 56.7% [50.6-62.9] |
| | **Zanzibar** | **697** | **446** | **59.4% [53.6-65.3]** | **34** | **26.4% [15.6-37.3]** | **480** | **54.4% [49.1-59.8]** |
| 26 | Unguja North | 140 | 99 | 70.7% [63.1-78.3] | 1 | 5.3% [0.0-15.6] | 100 | 62.1% [54.6-69.6] |
| 27 | Unguja South | 124 | 81 | 65.3% [56.9-73.7] | 5 | 25.0% [5.5-44.5] | 86 | 59.3% [51.3-67.3] |
| 28 | Town West | 140 | 71 | 50.7% [42.4-59.0] | 4 | 30.8% [4.6-56.9] | 75 | 48.7% [40.8-56.6] |

| # | Region | N | Breastfed Children 6-23 months | | Non-breastfed children 6-23 months | | Children 6-23 months | |
|---|---|---|---|---|---|---|---|---|
| | | | n | % [CI 95%] | n | % [CI 95%] | n | % [CI 95%] |
| 29 | Pemba North | 143 | 99 | 69.2% [61.6-76.8] | 11 | 34.4% [17.6-51.1] | 110 | 62.5% [55.3-69.7] |
| 30 | Pemba South | 150 | 96 | 64.0% [56.3-71.7] | 13 | 25.5% [13.4-37.6] | 109 | 53.4% [46.6-60.3] |
| | **National** | **4,147** | **2,972** | **73.0% [71.0-75.0]** | **273** | **34.9% [30.9-38.9]** | **3,245** | **65.7% [63.7-67.6]** |

## Minimum Acceptable Diet

**Table 34: Minimum Acceptable Diet by age group and by sex (Children 6-23 months)**

| Background characteristic | N | Children 6-23 months | |
|---|---|---|---|
| | | n | % [95% CI] |
| **Age group** | | | |
| 6-8 months | 1,055 | 135 | 15.4% [12.4-18.4] |
| 9-11 months | 976 | 174 | 20.3% [16.9-23.7] |
| 12-17 months | 1,632 | 329 | 22.3% [19.6-25.0] |
| 18-23 months | 1,397 | 244 | 20.7% [17.7-23.6] |
| **Sex** | | | |
| Male | 2,528 | 443 | 20.4% [18.0-22.7] |
| Female | 2,495 | 436 | 19.9% [17.7-22.0] |

The survey revealed that 20.0% of children 6-23 months received a minimum acceptable diet (Table 35). This result is very close to the national rate recorded in 2010: 21.0% (TDHS 2010).

**Table 35: Minimum Acceptable Diet (MAD) by age group and for breastfed/non-breastfed children, by region, Mainland, Zanzibar and National**

| # | Region | N | Breastfed Children 6-23 months | | Non-breastfed children 6-23 months | | Children 6-23 months | |
|---|---|---|---|---|---|---|---|---|
| | | | n | % [CI 95%] | n | % [CI 95%] | n | % [CI 95%] |
| | **Mainland** | **4,220** | **724** | **21.8% [19.8-23.8]** | **92** | **12.9% [9.8-16.0]** | **816** | **20.4% [18.6-22.1]** |
| 1 | Dodoma | 222 | 17 | 8.9% [4.9-13.0] | 3 | 9.4% [0.0-19.6] | 20 | 9.0% [5.2-12.8] |
| 2 | Arusha | 141 | 52 | 40.3% [31.8-48.8] | 9 | 69.2% [43.1-95.4] | 61 | 43.3% [35.1-51.5] |
| 3 | Kilimanjaro | 80 | 48 | 64.0% [53.1-74.9] | 3 | 60.0% [11.9-100.0] | 51 | 63.8% [53.1-74.4] |
| 4 | Tanga | 185 | 121 | 73.8% [67.0-80.5] | 10 | 47.6% [25.7-69.5] | 131 | 70.8% [64.2-77.4] |
| 5 | Morogoro | 188 | 19 | 12.2% [7.0-17.3] | 3 | 9.4% [0.0-19.6] | 22 | 11.7% [7.1-16.3] |
| 6 | Pwani | 298 | 102 | 43.0% [36.7-49.4] | 20 | 31.7% [20.1-43.3] | 122 | 40.9% [35.3-46.5] |
| 7 | Dar-Es-Salaam | 187 | 68 | 45.3% [37.3-53.3] | 16 | 36.4% [22.0-50.8] | 84 | 44.9% [37.8-52.1] |
| 8 | Lindi | 205 | 25 | 13.7% [8.7-18.8] | 0 | 0.0% | 25 | 12.2% [7.7-16.7] |
| 9 | Mtwara | 154 | 24 | 18.5% [11.8-25.2] | 3 | 12.5% [0.0-26.0] | 27 | 17.5% [11.5-23.6] |
| 10 | Ruvuma | 256 | 66 | 30.4% [24.3-36.6] | 6 | 15.0% [3.8-26.2] | 72 | 28.1% [22.6-33.6] |

| # | Region | N | Breastfed Children 6-23 months | | Non-breastfed children 6-23 months | | Children 6-23 months | |
|---|---|---|---|---|---|---|---|---|
| | | | n | % [CI 95%] | n | % [CI 95%] | n | % [CI 95%] |
| 11 | Iringa | 137 | 10 | 9.5% [3.9-15.2] | 0 | 0.0% | 10 | 7.3% [2.9-11.7] |
| 12 | Mbeya | 151 | 8 | 6.3% [2.1-10.6] | 0 | 0.0% | 8 | 5.3% [1.7-8.9] |
| 13 | Singida | 144 | 4 | 3.4% [0.1-6.6] | 2 | 7.7% [0.0-18.2] | 6 | 4.2% [0.9-7.4] |
| 14 | Tabora | 138 | 5 | 4.7% [0.7-8.8] | 0 | 0.0% | 5 | 3.6% [0.5-6.8] |
| 15 | Rukwa | 159 | 15 | 10.8% [5.6-16.0] | 1 | 4.5% [0.0-13.5] | 16 | 10.1% [5.4-14.8] |
| 16 | Kigoma | 148 | 22 | 17.6% [10.9-24.3] | 2 | 8.3% [0.0-19.6] | 24 | 16.2% [10.3-22.2] |
| 17 | Shinyanga | 128 | 13 | 14.0% [6.9-21.1] | 1 | 2.5% [0.0-7.4] | 14 | 10.9% [5.5-16.4] |
| 18 | Kagera | 181 | 19 | 11.9% [6.8-16.9] | 0 | 0.0% | 19 | 10.5% [6.0-15.0] |
| 19 | Mara | 250 | 27 | 15.3% [10.0-20.7] | 3 | 4.1% [0.0-8.6] | 30 | 12.0% [8.0-16.0] |
| 20 | Mwanza | 99 | 9 | 10.7% [4.1-17.4] | 2 | 13.3% [0.0-31.2] | 11 | 11.1% [4.9-17.3] |
| 21 | Manyara | 148 | 8 | 6.4% [2.1-10.7] | 0 | 0.0% | 8 | 5.4% [1.7-9.1] |
| 22 | Njombe | 92 | 20 | 27.4% [17.1-37.7] | 2 | 10.5% [0.0-24.7] | 22 | 23.9% [15.1-32.7] |
| 23 | Katavi | 127 | 1 | 0.9% [0.0-2.6] | 0 | 0.0% | 1 | 0.8% [0.0-2.3] |
| 24 | Simiyu | 150 | 8 | 6.4% [2.1-10.7] | 2 | 8.0% [0.0-18.9] | 10 | 6.7% [2.7-10.7] |
| 25 | Geita | 252 | 13 | 7.2% 3.4-11.0] | 4 | 5.6% [0.2-11.0] | 17 | 6.7% [3.6-9.8] |
| | **Zanzibar** | **840** | **57** | **8.8% [5.8-11.9]** | **9** | **5.2% [1.1-9.3]** | **66** | **8.4% [5.6-11.2]** |
| 26 | Unguja North | 161 | 6 | 4.2% [0.9-7.5] | 0 | 0.0% | 6 | 3.7% [0.8-6.7] |
| 27 | Unguja South | 145 | 8 | 6.4% [2.1-10.7] | 0 | 0.0% | 8 | 5.5% [1.8-9.2] |
| 28 | Town West | 154 | 14 | 9.9% [5.0-14.9] | 0 | 0.0% | 14 | 9.1% [4.5-13.6] |
| 29 | Pemba North | 176 | 19 | 13.2% [7.6-18.7] | 4 | 12.1% [0.8-23.4] | 23 | 13.1% [8.1-18.1] |
| 30 | Pemba South | 204 | 10 | 6.5% [2.6-10.5] | 5 | 9.3% [1.4-17.1] | 15 | 7.4% [3.8-10.9] |
| | **National** | **5,060** | **781** | **21.4% [19.5-23.4]** | **101** | **12.8% [9.7-15.8]** | **882** | **20.0% [18.3-21.7]** |

## 5.5 Women Nutritional Status (15-49 years)

### Description of sample and Review of data quality

**Table 36: Description of the data (age, weight and height) collected from women aged 15 to 49 years by region, Mainland, Zanzibar and National**

| | Region | N | Age | | | Weight | | Height | |
|---|---|---|---|---|---|---|---|---|---|
| | | | Missing Data | | Median Age | Missing Data | | Missing Data | |
| | | | N | % | Years | n | % | n | % |
| | **Mainland** | **15,136** | **277** | **1.8%** | **28.7** | **75** | **0.5%** | **101** | **0.7%** |
| 1 | Dodoma | 628 | 17 | 2.7% | 28.9 | 2 | 0.3% | 2 | 0.3% |
| 2 | Arusha | 621 | 14 | 2.3% | 29.1 | 1 | 0.2% | 2 | 0.3% |
| 3 | Kilimanjaro | 488 | 9 | 1.8% | 30.3 | 1 | 0.2% | 1 | 0.2% |
| 4 | Tanga | 616 | 3 | 0.5% | 29.2 | 0 | 0.0% | 1 | 0.2% |
| 5 | Morogoro | 571 | 19 | 3.3% | 28.0 | 10 | 1.8% | 10 | 1.8% |
| 6 | Pwani | 908 | 18 | 2.0% | 28.8 | 2 | 0.2% | 6 | 0.7% |
| 7 | Dar-Es-Salaam | 1,007 | 14 | 1.4% | 27.9 | 25 | 2.5% | 25 | 2.5% |
| 8 | Lindi | 823 | 16 | 1.9% | 30.4 | 0 | 0.0% | 4 | 0.5% |
| 9 | Mtwara | 522 | 14 | 2.7% | 29.2 | 1 | 0.2% | 1 | 0.2% |
| 10 | Ruvuma | 955 | 4 | 0.4% | 29.2 | 0 | 0.0% | 4 | 0.4% |
| 11 | Iringa | 431 | 9 | 2.1% | 28.5 | 1 | 0.2% | 1 | 0.2% |
| 12 | Mbeya | 500 | 23 | 4.6% | 29.3 | 4 | 0.8% | 10 | 2.0% |
| 13 | Singida | 552 | 9 | 1.6% | 29.3 | 10 | 1.8% | 4 | 0.7% |
| 14 | Tabora | 553 | 1 | 0.2% | 28.0 | 0 | 0.0% | 0 | 0.0% |
| 15 | Rukwa | 569 | 23 | 4.0% | 28.0 | 0 | 0.0% | 1 | 0.2% |
| 16 | Kigoma | 495 | 26 | 5.3% | 28.3 | 14 | 2.8% | 14 | 2.8% |
| 17 | Shinyanga | 448 | 10 | 2.2% | 27.9 | 1 | 0.2% | 2 | 0.4% |
| 18 | Kagera | 523 | 3 | 0.6% | 29.0 | 1 | 0.2% | 1 | 0.2% |
| 19 | Mwanza | 774 | 4 | 0.5% | 27.7 | 0 | 0.0% | 0 | 0.0% |
| 20 | Mara | 447 | 5 | 1.1% | 28.6 | 0 | 0.0% | 0 | 0.0% |
| 21 | Manyara | 600 | 11 | 1.8% | 29.0 | 0 | 0.0% | 4 | 0.7% |
| 22 | Njombe | 387 | 2 | 0.5% | 29.3 | 1 | 0.3% | 1 | 0.3% |
| 23 | Katavi | 556 | 5 | 0.9% | 28.3 | 0 | 0.0% | 2 | 0.4% |
| 24 | Simiyu | 479 | 13 | 2.7% | 27.4 | 1 | 0.2% | 2 | 0.4% |
| 25 | Geita | 683 | 5 | 0.7% | 27.1 | 0 | 0.0% | 3 | 0.4% |
| | **Zanzibar** | **3,263** | **70** | **2.1%** | **28.6** | **37** | **1.1%** | **43** | **1.3%** |
| 26 | Unguja North | 660 | 8 | 1.2% | 28.5 | 6 | 0.9% | 7 | 1.1% |
| 27 | Unguja South | 610 | 4 | 0.7% | 28.8 | 9 | 1.5% | 12 | 2.0% |
| 28 | Town West | 785 | 7 | 0.9% | 28.6 | 7 | 0.9% | 8 | 1.0% |
| 29 | Pemba North | 578 | 23 | 4.0% | 28.7 | 6 | 1.0% | 7 | 1.2% |
| 30 | Pemba South | 630 | 28 | 4.4% | 28.7 | 9 | 1.4% | 9 | 1.4% |
| | **National** | **18,399** | **347** | **1.9%** | **28.7** | **112** | **0.6%** | **144** | **0.8%** |

The figure below shows the distribution of age in years of the sample of women 15 to 49 years. It appears on this figure that all age groups were represented in the sample. The average age of the surveyed women was 28.7 years. This age distribution shows peaks at certain age heaping level namely: 20, 30, 35 and 40 years who are numbers easily evoked by women to estimate their age.

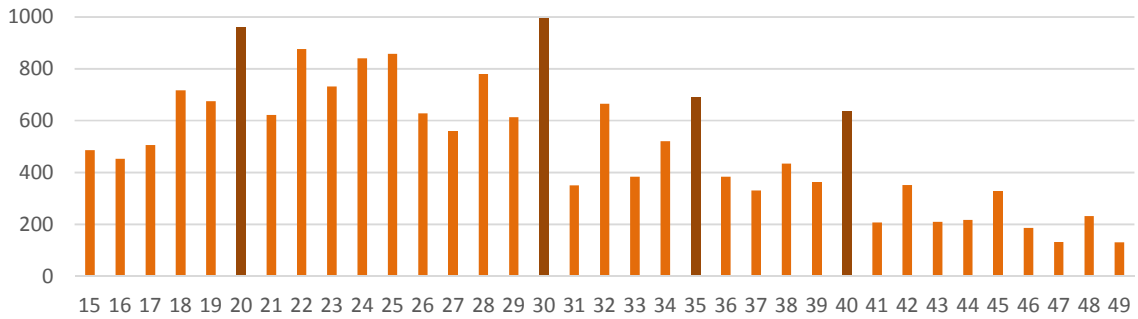


**Figure 8: Distribution of age in years**

The table below shows the distribution of the sample of women aged 15 to 49 years according to the status of pregnancy and the status on breastfeeding. Among all women surveyed, 1,460 were pregnant or 7.9% of the sample. The analysis of these results revealed that the proportion of pregnant women by region varied from 4.5% in Kilimanjaro to 14.3% in Tabora. Lactating women were 6,050 i.e. 32.9% of the sample. Pregnant and lactating women were 73 or 0.4% of the sample.

**Table 37: Distribution of the sample of women aged 15 to 49 years by region, Mainland, Zanzibar and National**

| | Region | N | Non pregnant and non-lactating women | | Pregnant women | | Lactating women | | Pregnant and Lactating women | | Missing data / Don't know | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | n | % | n | % | n | % | n | % | n | % |
| | **Mainland** | **15,136** | **8,675** | **57.3** | **1,185** | **7.8** | **5,025** | **33.2** | **59** | **0.4** | **192** | **1.3** |
| 1 | Dodoma | 628 | 275 | 43.8 | 59 | 9.4 | 285 | 45.4 | 0 | 0.0 | 9 | 1.4 |
| 2 | Arusha | 621 | 403 | 64.9 | 32 | 5.2 | 171 | 27.5 | 6 | 1.0 | 9 | 1.4 |
| 3 | Kilimanjaro | 488 | 343 | 70.3 | 22 | 4.5 | 121 | 24.8 | 1 | 0.2 | 1 | 0.2 |
| 4 | Tanga | 616 | 340 | 55.2 | 48 | 7.8 | 219 | 35.6 | 7 | 1.1 | 2 | 0.3 |
| 5 | Morogoro | 571 | 320 | 56.0 | 43 | 7.5 | 203 | 35.6 | 1 | 0.2 | 4 | 0.7 |
| 6 | Pwani | 908 | 512 | 56.4 | 48 | 5.3 | 341 | 37.6 | 2 | 0.2 | 5 | 0.6 |
| 7 | Dar-es-Salaam | 1,007 | 722 | 71.7 | 48 | 4.8 | 199 | 19.8 | 5 | 0.5 | 33 | 3.3 |
| 8 | Lindi | 823 | 526 | 63.9 | 41 | 5.0 | 253 | 30.7 | 0 | 0.0 | 3 | 0.4 |
| 9 | Mtwara | 522 | 338 | 64.8 | 28 | 5.4 | 152 | 29.1 | 3 | 0.6 | 1 | 0.2 |
| 10 | Ruvuma | 955 | 559 | 58.5 | 60 | 6.3 | 321 | 33.6 | 7 | 0.7 | 8 | 0.8 |
| 11 | Iringa | 431 | 241 | 55.9 | 32 | 7.4 | 154 | 35.7 | 0 | 0.0 | 4 | 0.9 |
| 12 | Mbeya | 500 | 284 | 56.8 | 34 | 6.8 | 172 | 34.4 | 1 | 0.2 | 9 | 1.8 |
| 13 | Singida | 552 | 273 | 49.5 | 62 | 11.2 | 200 | 36.2 | 1 | 0.2 | 16 | 2.9 |
| 14 | Tabora | 553 | 328 | 59.3 | 79 | 14.3 | 145 | 26.2 | 1 | 0.2 | 0 | 0.0 |
| 15 | Rukwa | 569 | 273 | 48.0 | 55 | 9.7 | 229 | 40.2 | 3 | 0.5 | 9 | 1.6 |
| 16 | Kigoma | 495 | 229 | 46.3 | 61 | 12.3 | 186 | 37.6 | 7 | 1.4 | 12 | 2.4 |
| 17 | Shinyanga | 448 | 267 | 59.6 | 49 | 10.9 | 125 | 27.9 | 2 | 0.4 | 5 | 1.1 |
| 18 | Kagera | 523 | 256 | 48.9 | 28 | 5.4 | 232 | 44.4 | 2 | 0.4 | 5 | 1.0 |
| 19 | Mwanza | 774 | 447 | 57.8 | 62 | 8.0 | 243 | 31.4 | 3 | 0.4 | 19 | 2.5 |
| 20 | Mara | 447 | 271 | 60.6 | 38 | 8.5 | 137 | 30.6 | 0 | 0.0 | 1 | 0.2 |
| 21 | Manyara | 600 | 337 | 56.2 | 54 | 9.0 | 196 | 32.7 | 3 | 0.5 | 10 | 1.7 |
| 22 | Njombe | 387 | 238 | 61.5 | 28 | 7.2 | 113 | 29.2 | 2 | 0.5 | 6 | 1.6 |
| 23 | Katavi | 556 | 309 | 55.6 | 45 | 8.1 | 199 | 35.8 | 0 | 0.0 | 3 | 0.5 |
| 24 | Simiyu | 479 | 243 | 50.7 | 55 | 11.5 | 170 | 35.5 | 0 | 0.0 | 11 | 2.3 |
| 25 | Geita | 683 | 341 | 49.9 | 74 | 10.8 | 259 | 37.9 | 2 | 0.3 | 7 | 1.0 |
| | **Zanzibar** | **3,263** | **1,915** | **58.7** | **275** | **8.4** | **1,025** | **31.4** | **14** | **0.4** | **34** | **1.0** |
| 26 | Unguja North | 660 | 376 | 57.0 | 48 | 7.3 | 230 | 34.8 | 0 | 0.0 | 6 | 0.9 |
| 27 | Unguja South | 610 | 366 | 60.0 | 47 | 7.7 | 185 | 30.3 | 1 | 0.2 | 11 | 1.8 |
| 28 | Town West | 785 | 526 | 67.0 | 50 | 6.4 | 198 | 25.2 | 6 | 0.8 | 5 | 0.6 |
| 29 | Pemba North | 578 | 308 | 53.3 | 61 | 10.6 | 196 | 33.9 | 4 | 0.7 | 9 | 1.6 |
| 30 | Pemba South | 630 | 339 | 53.8 | 69 | 11.0 | 216 | 34.3 | 3 | 0.5 | 3 | 0.5 |
| | **National** | **18,399** | **10,590** | **57.6** | **1,460** | **7.9** | **6,050** | **32.9** | **73** | **0.4** | **226** | **1.2** |

The figure below shows the distribution of pregnant women according to age groups. It appears on this curve as the highest proportion of pregnant women (11.1%) was in the 20-24 years age group while the lowest proportion of pregnant women (1.5%) was in the 45-49 years age group.

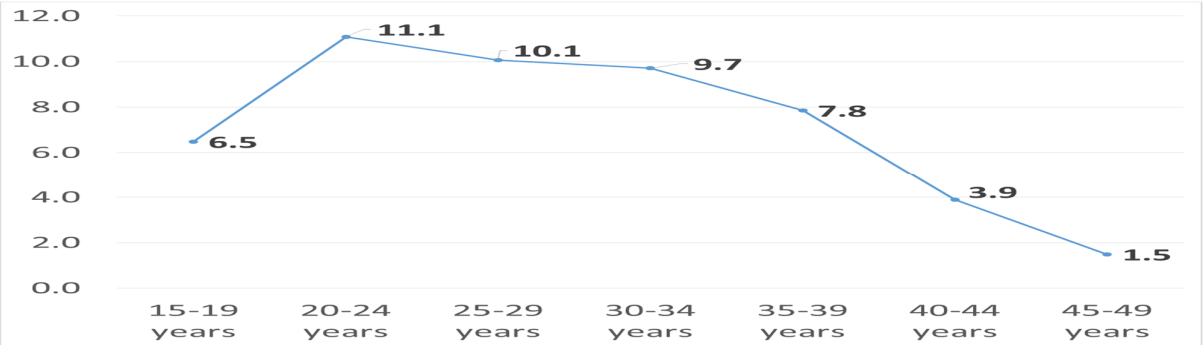


**Figure 9: Percent of pregnant women by age groups**

## Nutritional status of non-pregnant women 15 to 49 years (Body Mass Index - BMI)

Eligible women with missing weigh and/or height, age and/or pregnancy status were excluded from the analysis. Women who were pregnant also were excluded from the analysis.

**Table 38: Nutritional status of non-pregnant women 15 to 49 years according to BMI classification by region, Mainland, Zanzibar and National**

| Region | N | Severe thinness BMI <16.0 | | Thinness BMI <18.5 | | Normal range 18.5<BMI<25.0 | | Overweight ≥ 25.0 | | Obese ≥ 30.0 | | Mean BMI |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | n | % | n | % | n | % | n | % | n | % | |
| **Mainland** | **13,706** | **49** | **0.4%** | **734** | **5.4%** | **8,940** | **64.8%** | **2,729** | **19.9%** | **1,257** | **9.5%** | **23.7** |
| Dodoma | 561 | 2 | 0.4% | 46 | 8.2% | 369 | 65.8% | 97 | 17.3% | 46 | 8.4% | 23.2 |
| Arusha | 575 | 1 | 0.2% | 44 | 7.7% | 304 | 52.9% | 142 | 24.7% | 83 | 14.6% | 24.5 |
| Kilimanjaro | 464 | 1 | 0.2% | 13 | 2.8% | 246 | 53.0% | 101 | 21.8% | 101 | 22.2% | 25.6 |
| Tanga | 559 | 3 | 0.5% | 25 | 4.5% | 365 | 65.3% | 115 | 20.6% | 50 | 9.1% | 23.8 |
| Morogoro | 523 | 3 | 0.6% | 28 | 5.4% | 308 | 58.9% | 121 | 23.1% | 53 | 12.0% | 24.2 |
| Pwani | 853 | 2 | 0.2% | 56 | 6.6% | 482 | 56.5% | 184 | 21.6% | 124 | 15.1% | 24.5 |
| Dar-Es-Salaam | 922 | 7 | 0.8% | 33 | 3.6% | 434 | 47.1% | 255 | 27.7% | 178 | 20.9% | 25.7 |
| Lindi | 779 | 1 | 0.1% | 32 | 4.1% | 515 | 66.1% | 170 | 21.8% | 57 | 7.8% | 23.7 |
| Mtwara | 490 | 2 | 0.4% | 22 | 4.5% | 337 | 68.8% | 94 | 19.2% | 34 | 7.1% | 23.3 |
| Ruvuma | 880 | 2 | 0.2% | 42 | 4.8% | 642 | 73.0% | 149 | 16.9% | 41 | 5.1% | 23.1 |
| Iringa | 395 | 2 | 0.5% | 13 | 3.3% | 240 | 60.8% | 105 | 26.6% | 33 | 8.9% | 24.1 |
| Mbeya | 456 | 0 | 0.0% | 11 | 2.4% | 286 | 62.7% | 110 | 24.1% | 42 | 10.7% | 24.5 |
| Singida | 474 | 2 | 0.4% | 40 | 8.4% | 306 | 64.6% | 99 | 20.9% | 24 | 5.7% | 23.0 |
| Tabora | 473 | 1 | 0.2% | 35 | 7.4% | 328 | 69.3% | 81 | 17.1% | 28 | 5.9% | 23.0 |
| Rukwa | 504 | 1 | 0.2% | 16 | 3.2% | 377 | 74.8% | 84 | 16.7% | 25 | 5.2% | 23.2 |
| Kigoma | 415 | 1 | 0.2% | 31 | 7.5% | 298 | 71.8% | 59 | 14.2% | 17 | 6.3% | 22.5 |
| Shinyanga | 391 | 2 | 0.5% | 21 | 5.3% | 270 | 68.7% | 77 | 19.6% | 21 | 5.9% | 23.1 |
| Kagera | 489 | 2 | 0.4% | 41 | 8.4% | 389 | 79.6% | 48 | 9.8% | 7 | 1.8% | 21.8 |
| Mara | 690 | 2 | 0.3% | 27 | 3.9% | 463 | 67.1% | 148 | 21.4% | 50 | 7.2% | 23.6 |
| Mwanza | 407 | 3 | 0.7% | 31 | 7.6% | 310 | 76.0% | 48 | 11.8% | 16 | 3.9% | 22.2 |
| Manyara | 533 | 1 | 0.2% | 47 | 8.8% | 321 | 60.2% | 108 | 20.3% | 52 | 10.5% | 23.6 |
| Njombe | 351 | 1 | 0.3% | 11 | 3.1% | 251 | 71.5% | 70 | 19.9% | 18 | 5.1% | 23.5 |
| Katavi | 509 | 2 | 0.4% | 21 | 4.1% | 354 | 69.5% | 98 | 19.3% | 32 | 6.7% | 23.4 |
| Simiyu | 413 | 2 | 0.5% | 19 | 4.6% | 305 | 73.8% | 66 | 16.0% | 21 | 5.1% | 22.9 |
| Geita | 600 | 3 | 0.5% | 29 | 4.8% | 440 | 73.3% | 100 | 16.7% | 25 | 4.7% | 22.8 |
| **Zanzibar** | **2,943** | **25** | **0.8%** | **257** | **9.2%** | **1,529** | **50.3%** | **678** | **23.1%** | **454** | **16.6%** | **24.6** |
| Unguja North | 606 | 5 | 0.8% | 36 | 5.9% | 317 | 52.3% | 169 | 27.9% | 79 | 13.0% | 24.3 |
| Unguja South | 553 | 5 | 0.9% | 41 | 7.4% | 279 | 50.5% | 126 | 22.8% | 102 | 18.4% | 24.8 |
| Town West | 725 | 5 | 0.7% | 73 | 10.1% | 326 | 45.0% | 171 | 23.6% | 150 | 20.7% | 25.2 |
| Pemba North | 504 | 3 | 0.6% | 53 | 10.5% | 299 | 59.3% | 95 | 18.8% | 54 | 10.7% | 23.5 |
| Pemba South | 555 | 7 | 1.3% | 54 | 9.7% | 308 | 55.5% | 117 | 21.1% | 69 | 12.4% | 23.6 |
| **National** | **16,652** | **74** | **0.4%** | **991** | **5.5%** | **10,469** | **64.4%** | **3,407** | **20.0%** | **1,711** | **9.7%** | **23.7** |

**Table 39: Nutritional status of non-pregnant women 15 to 49 years according to BMI classification by age group**

| Region | N | Severe thinness BMI <16.0 | | Thinness BMI <18.5 | | Normal range 18.5<BMI<25.0 | | Overweight ≥ 25.0 | | Obese ≥ 30.0 | | Mean BMI |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | n | % | n | % | n | % | n | % | n | % | |
| **Age group** | | | | | | | | | | | | |
| 15-19 years | 2,632 | 26 | 0.9% | 291 | 10.2% | 1,980 | 76.5% | 273 | 10.8% | 62 | 1.5% | 21.7 |
| 20-24 years | 3,531 | 12 | 0.3% | 210 | 5.0% | 2,515 | 73.1% | 603 | 16.2% | 191 | 5.4% | 22.9 |
| 25-29 years | 3,060 | 12 | 0.3% | 156 | 4.7% | 1,903 | 62.4% | 700 | 23.3% | 289 | 9.3% | 23.9 |
| 30-34 years | 2,599 | 6 | 0.2% | 107 | 4.3% | 1,522 | 60.1% | 613 | 21.8% | 351 | 13.5% | 24.3 |
| 35-39 years | 2,007 | 7 | 0.3% | 85 | 3.6% | 1,036 | 54.1% | 530 | 26.2% | 349 | 15.7% | 25.0 |
| 40-44 years | 1,541 | 5 | 0.3% | 70 | 4.4% | 849 | 57.8% | 365 | 22.5% | 252 | 15.0% | 24.7 |
| 45-49 years | 986 | 5 | 0.6% | 57 | 7.0% | 491 | 50.2% | 248 | 24.6% | 185 | 17.6% | 25.0 |

## Iron-Folic Acid Supplementation

**Table 40: Percentage of women 15-49 years of age with children under five years of age who took an IFA supplementation during pregnancy for past birth, disagregated by number of days, by region, Mainland, Zanzibar and National**

| Region | No IFA Supplementation | | Missing Data/Don't know | | Valid N | Number of days iron tablets or syrup taken during pregnancy for past birth | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | <60 days | | 60 – 89 days | | 90+ days | | Missing data / Don't know | |
| | n | % | n | % | | n | % | n | % | n | % | n | % |
| **Mainland** | **4,357** | **30.6** | **3,061** | **21.8** | **7,189** | **3,013** | **41.2** | **970** | **13.6** | **1,217** | **17.4** | **1,989** | **27.8** |
| Dodoma | 76 | 13.1 | 94 | 16.2 | 411 | 233 | 56.7 | 63 | 15.3 | 64 | 15.6 | 51 | 12.4 |
| Arusha | 191 | 32.9 | 150 | 25.8 | 240 | 122 | 50.8 | 21 | 8.8 | 47 | 19.6 | 50 | 20.8 |
| Kilimanjaro | 231 | 49.3 | 20 | 4.3 | 218 | 99 | 45.4 | 32 | 14.7 | 67 | 30.7 | 20 | 9.2 |
| Tanga | 248 | 42.5 | 7 | 1.2 | 329 | 87 | 26.4 | 63 | 19.1 | 90 | 27.4 | 89 | 27.1 |
| Morogoro | 126 | 22.6 | 144 | 25.8 | 288 | 168 | 58.3 | 21 | 7.3 | 31 | 10.8 | 68 | 23.6 |
| Pwani | 275 | 31.3 | 85 | 9.7 | 518 | 228 | 44.0 | 66 | 12.7 | 73 | 14.1 | 151 | 29.2 |
| Dar-Es-Salaam | 152 | 15.4 | 507 | 51.4 | 328 | 134 | 40.9 | 46 | 14.0 | 67 | 20.4 | 81 | 24.7 |
| Lindi | 93 | 11.5 | 165 | 20.4 | 550 | 195 | 35.5 | 63 | 11.5 | 62 | 11.3 | 230 | 41.8 |
| Mtwara | 98 | 19.0 | 70 | 13.5 | 349 | 127 | 36.4 | 43 | 12.3 | 27 | 7.7 | 152 | 43.6 |
| Ruvuma | 209 | 22.4 | 140 | 15.0 | 582 | 293 | 50.3 | 60 | 10.3 | 162 | 27.8 | 67 | 11.5 |
| Iringa | 83 | 19.3 | 69 | 16.1 | 277 | 106 | 38.3 | 72 | 26.0 | 58 | 20.9 | 41 | 14.8 |
| Mbeya | 167 | 33.8 | 95 | 19.2 | 232 | 30 | 12.9 | 27 | 11.6 | 27 | 11.6 | 148 | 63.8 |
| Singida | 96 | 17.7 | 195 | 36.0 | 250 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 250 | 100.0 |
| Tabora | 326 | 61.2 | 7 | 1.3 | 200 | 126 | 63.0 | 18 | 9.0 | 10 | 5.0 | 46 | 23.0 |
| Rukwa | 153 | 27.4 | 167 | 29.9 | 239 | 99 | 41.4 | 45 | 18.8 | 34 | 14.2 | 61 | 25.5 |
| Kigoma | 99 | 20.5 | 139 | 28.8 | 245 | 74 | 30.2 | 39 | 15.9 | 83 | 33.9 | 49 | 20.0 |
| Shinyanga | 126 | 29.6 | 137 | 32.2 | 162 | 88 | 54.3 | 16 | 9.9 | 18 | 11.1 | 40 | 24.7 |
| Kagera | 112 | 22.0 | 124 | 24.4 | 273 | 80 | 29.3 | 44 | 16.1 | 105 | 38.5 | 44 | 16.1 |
| Mara | 193 | 46.7 | 74 | 17.9 | 146 | 203 | 60.4 | 79 | 23.5 | 33 | 9.8 | 21 | 6.3 |
| Mwanza | 256 | 35.2 | 136 | 18.7 | 336 | 3 | 2.1 | 4 | 2.7 | 2 | 1.4 | 137 | 93.8 |
| Manyara | 240 | 41.7 | 118 | 20.5 | 218 | 79 | 36.2 | 33 | 15.1 | 42 | 19.3 | 64 | 29.4 |
| Njombe | 136 | 37.2 | 39 | 10.7 | 191 | 74 | 38.7 | 26 | 13.6 | 63 | 33.0 | 28 | 14.7 |
| Katavi | 175 | 33.0 | 196 | 36.9 | 160 | 66 | 41.3 | 27 | 16.9 | 13 | 8.1 | 54 | 33.8 |
| Simiyu | 209 | 44.2 | 98 | 20.7 | 166 | 109 | 65.7 | 18 | 10.8 | 18 | 10.8 | 21 | 12.7 |
| Geita | 287 | 44.0 | 85 | 13.0 | 281 | 190 | 67.6 | 44 | 15.7 | 21 | 7.5 | 26 | 9.3 |
| **Zanzibar** | **885** | **37.3** | **851** | **23.3** | **1,252** | **461** | **40.3** | **309** | **23.1** | **289** | **20.6** | **193** | **16.0** |
| Unguja North | 146 | 23.5 | 194 | 31.2 | 282 | 85 | 30.1 | 48 | 17.0 | 87 | 30.9 | 62 | 22.0 |
| Unguja South | 124 | 21.9 | 196 | 34.6 | 247 | 87 | 35.2 | 32 | 13.0 | 77 | 31.2 | 51 | 20.6 |
| Town West | 409 | 56.1 | 98 | 13.4 | 222 | 116 | 52.3 | 22 | 9.9 | 34 | 15.3 | 50 | 22.5 |
| Pemba North | 113 | 21.6 | 191 | 36.5 | 219 | 77 | 35.2 | 99 | 45.2 | 34 | 15.5 | 9 | 4.1 |
| Pemba South | 93 | 17.0 | 172 | 31.4 | 282 | 96 | 34.0 | 108 | 38.3 | 57 | 20.2 | 21 | 7.4 |
| **National** | **5,242** | **30.9** | **3,912** | **21.9** | **8,441** | **3,474** | **41.2** | **1,279** | **13.8** | **1,506** | **17.5** | **2,182** | **27.5** |

## 5.6 Use of Iodized Salt

Salt was analyzed to determine if it was iodized. The test took place in 19 092 households, using Rapid Test Kit to detect the presence of potassium iodate. Between 0.6% and 12.6% of the households surveyed had no salt the day of the survey.

**Table 41: Consumption of iodized salt in households by region, Mainland, Zanzibar and National**

| | Region | N | Iodized salt PPM ≠ 0 | | Non iodized salt PPM = 0 | | No salt in the household | |
|---|---|---|---|---|---|---|---|---|
| | | | n | % | n | % | n | % |
| | **Mainland** | **15,809** | **9,014** | **62.1% [60.3-63.8]** | **6,265** | **34.6% [32.8-36.3]** | **530** | **3.3% [3.0-3.7]** |
| 1 | Dodoma | 644 | 445 | 69.1% | 159 | 24.7% | 40 | 6.2% |
| 2 | Arusha | 738 | 697 | 94.4% | 10 | 1.4% | 31 | 4.2% |
| 3 | Kilimanjaro | 668 | 619 | 92.7% | 33 | 4.9% | 16 | 2.4% |
| 4 | Tanga | 620 | 521 | 84.0% | 95 | 15.3% | 4 | 0.6% |
| 5 | Morogoro | 615 | 440 | 71.5% | 149 | 24.2% | 26 | 4.2% |
| 6 | Pwani | 864 | 769 | 89.0% | 80 | 9.3% | 15 | 1.7% |
| 7 | Dar-Es-Salaam | 957 | 882 | 92.2% | 29 | 3.0% | 46 | 4.8% |
| 8 | Lindi | 919 | 54 | 5.9% | 845 | 91.9% | 20 | 2.2% |
| 9 | Mtwara | 644 | 81 | 12.6% | 529 | 82.1% | 34 | 5.3% |
| 10 | Ruvuma | 997 | 249 | 25.0% | 740 | 74.2% | 8 | 0.8% |
| 11 | Iringa | 459 | 398 | 86.7% | 46 | 10.0% | 15 | 3.3% |
| 12 | Mbeya | 522 | 482 | 92.3% | 29 | 5.6% | 11 | 2.1% |
| 13 | Singida | 635 | 203 | 32.0% | 409 | 64.4% | 23 | 3.6% |
| 14 | Tabora | 635 | 124 | 19.5% | 502 | 79.1% | 9 | 1.4% |
| 15 | Rukwa | 608 | 129 | 21.2% | 445 | 73.2% | 34 | 5.6% |
| 16 | Kigoma | 528 | 467 | 88.4% | 44 | 8.3% | 17 | 3.2% |
| 17 | Shinyanga | 436 | 130 | 29.8% | 301 | 69.0% | 5 | 1.1% |
| 18 | Kagera | 554 | 275 | 49.6% | 265 | 47.8% | 14 | 2.5% |
| 19 | Mara | 570 | 286 | 50.2% | 264 | 46.3% | 20 | 3.5% |
| 20 | Mwanza | 441 | 417 | 94.6% | 1 | 0.2% | 23 | 5.2% |
| 21 | Manyara | 682 | 395 | 57.9% | 239 | 35.0% | 48 | 7.0% |
| 22 | Njombe | 451 | 302 | 67.0% | 141 | 31.3% | 8 | 1.8% |
| 23 | Katavi | 600 | 367 | 61.2% | 191 | 31.8% | 42 | 7.0% |
| 24 | Simiyu | 431 | 148 | 34.3% | 271 | 62.9% | 12 | 2.8% |
| 25 | Geita | 591 | 134 | 22.7% | 448 | 75.8% | 9 | 1.5% |
| | **Zanzibar** | **3,283** | **2,335** | **71.5% [67.3-75.6]** | **681** | **21.5% [17.6-25.4]** | **267** | **7.0% [5.9-8.2]** |
| 26 | Unguja North | 683 | 500 | 73.2% | 123 | 18.0% | 60 | 8.8% |
| 27 | Unguja South | 631 | 495 | 78.4% | 99 | 15.7% | 37 | 5.9% |
| 28 | Town West | 634 | 484 | 76.3% | 136 | 21.5% | 14 | 2.2% |
| 29 | Pemba North | 642 | 378 | 58.9% | 183 | 28.5% | 81 | 12.6% |
| 30 | Pemba South | 693 | 478 | 69.0% | 140 | 20.2% | 75 | 10.8% |
| | **National** | **19,092** | **11,349** | **62.2% [60.4-64.0]** | **6,946** | **34.4% [32.6-36.1]** | **797** | **3.4% [3.1-3.8]** |

## 5.7 Handwashing Practices

**Table 42: Percentage of household that have soap and who report having used soap for handwashing at least at two critical times during past 24 hours (including "after defecating"), by region, Mainland, Zanzibar and National**

| | Region | N | Percentage of household that have soap | | Percentage of household who report having used soap for handwashing at least at two critical times during past 24 hours | |
|---|---|---|---|---|---|---|
| | | | n | % | n | % |
| | **Mainland** | **15,771** | **14,297** | **91.1% [90.4-91.8]** | **1,675** | **11.5% [10.2-12.7]** |
| 1 | Dodoma | 643 | 502 | 78.1% | 100 | 22.4% |
| 2 | Arusha | 738 | 691 | 93.6% | 43 | 6.3% |
| 3 | Kilimanjaro | 662 | 646 | 97.6% | 71 | 11.2% |
| 4 | Tanga | 620 | 619 | 99.8% | 330 | 53.9% |
| 5 | Morogoro | 615 | 540 | 87.8% | 107 | 20.0% |
| 6 | Pwani | 863 | 817 | 94.7% | 466 | 58.9% |
| 7 | Dar-Es-Salaam | 952 | 920 | 96.6% | 222 | 24.5% |
| 8 | Lindi | 917 | 741 | 80.8% | 45 | 6.7% |
| 9 | Mtwara | 643 | 532 | 82.7% | 16 | 3.1% |
| 10 | Ruvuma | 996 | 964 | 96.8% | 44 | 4.6% |
| 11 | Iringa | 459 | 431 | 93.9% | 1 | 0.2% |
| 12 | Mbeya | 517 | 483 | 93.4% | 2 | 0.4% |
| 13 | Singida | 629 | 541 | 86.0% | 3 | 0.6% |
| 14 | Tabora | 635 | 569 | 89.6% | 0 | 0.0% |
| 15 | Rukwa | 608 | 482 | 79.3% | 24 | 5.3% |
| 16 | Kigoma | 525 | 447 | 85.1% | 17 | 4.3% |
| 17 | Shinyanga | 436 | 405 | 92.9% | 0 | 0.0% |
| 18 | Kagera | 554 | 506 | 91.3% | 35 | 7.2% |
| 19 | Mara | 570 | 558 | 97.9% | 15 | 2.7% |
| 20 | Mwanza | 440 | 398 | 90.5% | 31 | 8.1% |
| 21 | Manyara | 681 | 557 | 81.8% | 2 | 0.4% |
| 22 | Njombe | 451 | 439 | 97.3% | 71 | 16.4% |
| 23 | Katavi | 599 | 542 | 90.5% | 18 | 3.5% |
| 24 | Simiyu | 427 | 378 | 88.5% | 8 | 2.2% |
| 25 | Geita | 591 | 589 | 99.7% | 4 | 0.7% |
| | **Zanzibar** | **3,269** | **2,928** | **91.0% [89.2-92.8]** | **288** | **13.2% [10.4-16.0]** |
| 26 | Unguja North | 674 | 589 | 87.4% | 1 | 0.2% |
| 27 | Unguja South | 627 | 535 | 85.3% | 2 | 0.4% |
| 28 | Town West | 634 | 597 | 94.2% | 114 | 19.9% |
| 29 | Pemba North | 642 | 594 | 92.5% | 40 | 7.0% |
| 30 | Pemba South | 692 | 613 | 88.6% | 131 | 21.6% |
| | **National** | **19,040** | **17,225** | **91.4% [90.7-92.1]** | **1,963** | **11.7% [10.5-13.0]** |

# 5. Discussion

## Children Nutritional Status

### Chronic malnutrition

For Mainland, based on the WHO classification, the survey results show a level of chronic malnutrition considered "very high", exceeding the 40% threshold in 9 regions (Iringa, Njombe, Kagera, Dodoma, Ruvuma, Rukwa, Kigoma, Katavi and Geita) among which 3 regions are above 50%: Iringa (51.3%), Njombe (51.5%) and Kagera (51.9%) (Figure 10 and 11).

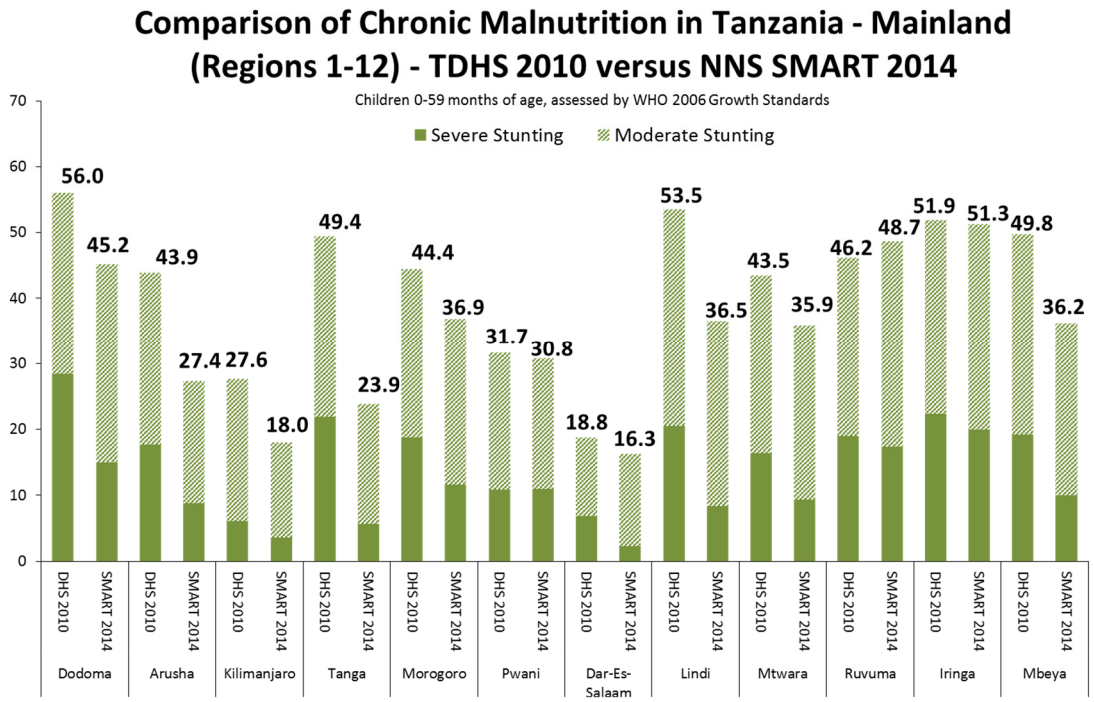


**Figure 10: Prevalence of Chronic Malnutrition according to WHO Growth Standards 2006 among children 0 to 59 months of age – NNS SMART 2014 versus TDHS 2010 by region (Mainland – Regions 1-12)**

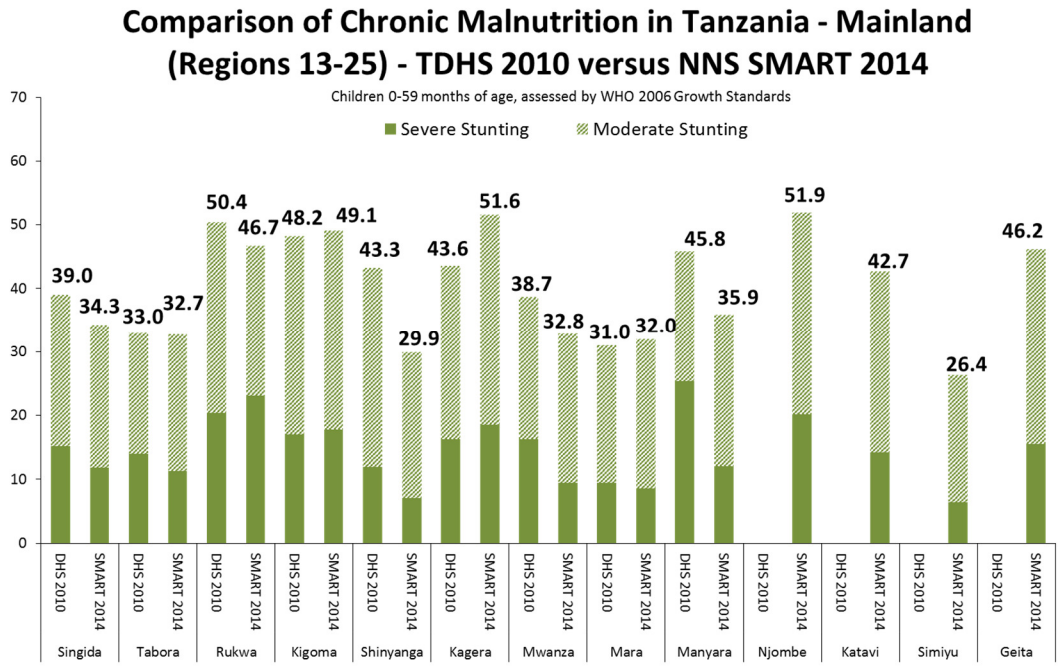


**Figure 11: Prevalence of Chronic Malnutrition according to WHO Growth Standards 2006 among children 0 to 59 months of age – NNS SMART 2014 versus TDHS 2010 by region (Mainland – Regions 13-25)**

In all regions, stunting rates are lower than in 2010 except for Ruvuma (46.2% to 48.7%), Kigoma (48.2% to 49.1%), Kagera (43.6% to 51.6%) and Mara (31.0% to 32.0%) (Figure 10 and 11).

For Zanzibar, stunting rates are ranging from 20.6% in Town West to 30.4% in Unguja North (Figure 12). In all 5 regions, prevalence of chronic malnutrition are lower than in TDHS.

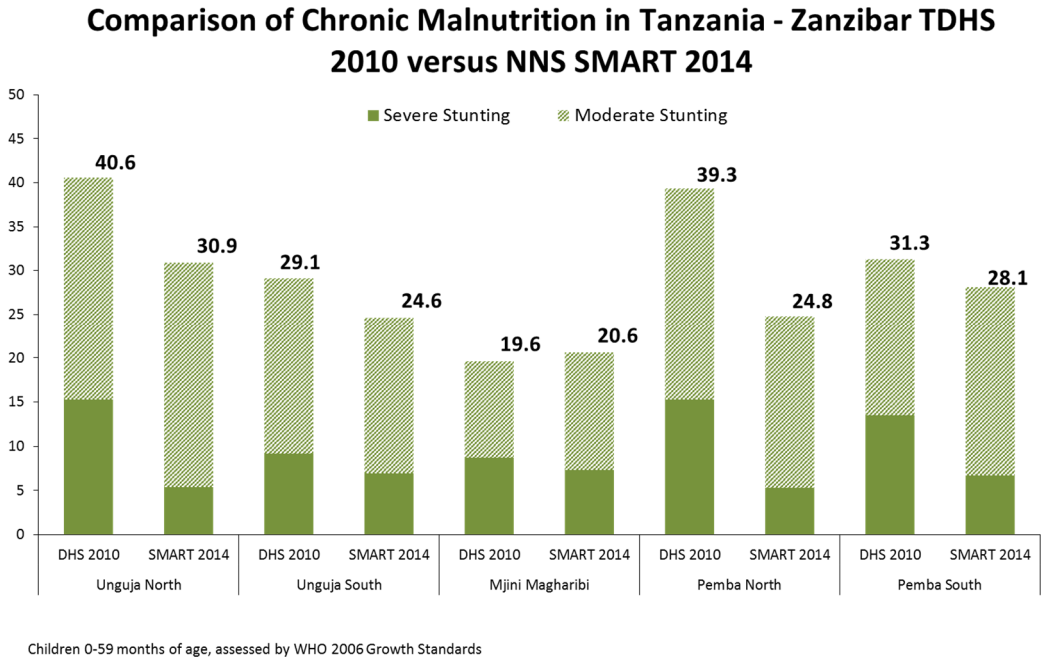


**Figure 12: Prevalence of Chronic Malnutrition according to WHO Growth Standards 2006 among children 0 to 59 months of age – NNS SMART 2014 versus TDHS 2010 by region (Zanzibar)**

At national level, stunting was identified in 34.7% (33.7-35.7) of children 0-59 months of age which is a “high” rate according to WHO classification. Severe stunting was found in 11.5% of children countrywide. In 2010, TDHS found a prevalence of stunting of 42.0% (“very high” level).

According to those results, more than 2,700,000 children under five years of age are stunted in Tanzania. Nutrition interventions should be prioritized in the regions with the higher number of stunted children and the higher prevalence of chronic malnutrition. These regions are Kagera, Kigoma, Dodoma, Mbeya and Mwanza.

These prevalence reflects the existence of long term undernutrition and highlights the need to prioritize stunting prevention interventions. Programming for stunting prevention interventions will require a comprehensive and long-term approach. It has been estimated that the prevalence of chronic malnutrition can be reduced by about a third if effective interventions are implemented on a large scale (2008 Lancet series on Maternal and Child Undernutrition). The most effective interventions in preventing stunting occur during the window of opportunity, from the time of pregnancy until the end of the first two years of life of the child.

According to this survey, stunting prevalence starts at 16.0% in the first month of life. Chronic malnutrition increases quickly until it reaches a peak at 26 months of age (46.4%). By this age, the majority of the damage of malnutrition in childhood is done and cannot be reserved. Prevalence of stunting in age group 12-23 months and 24-35 months were found to be the higher with respectively 39.3% and 43.6%.

**Acute Malnutrition**

For Mainland, based on the WHO classification, the survey results show a level of Global Acute Malnutrition (GAM) considered "acceptable", not exceeding the 5% threshold in all regions except for Dodoma with 5.2%. The lowest rate of Global Acute Malnutrition (GAM) 0.7% was found in Iringa. The highest rates of GAM were found in Dodoma, Tanga (4.8%), Mara (4.9%) and Singida (4.7%). 9 cases of bilateral edema were identified in the total survey sample. (Figure 13 and 14)

In all regions, wasting rates are equal or lower than in 2010 except for Mbeya (1.2% to 2.0%) and Kigoma (3.2% to 3.9%) (Figure 13 and 14).

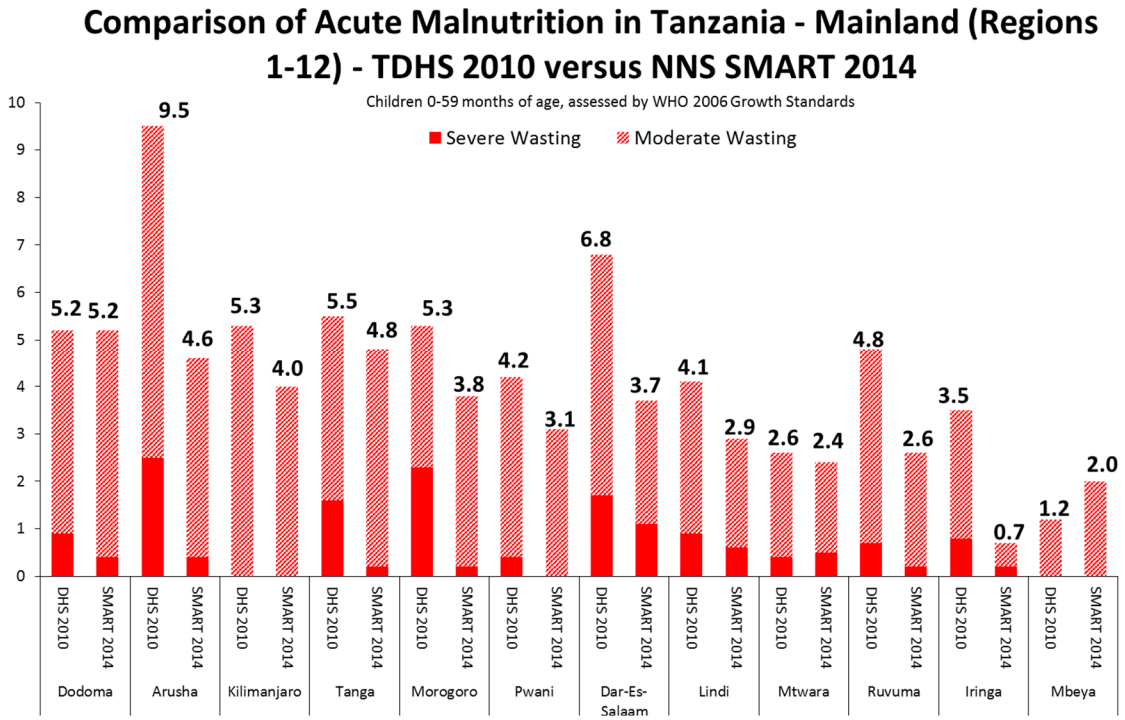


**Figure 13: Prevalence of Acute Malnutrition (Global, Moderate and Severe) according to WHO Growth Standards 2006 among children 0 to 59 months of age – NNS SMART 2014 versus TDHS 2010 by region (Mainland – Regions 1-12)**

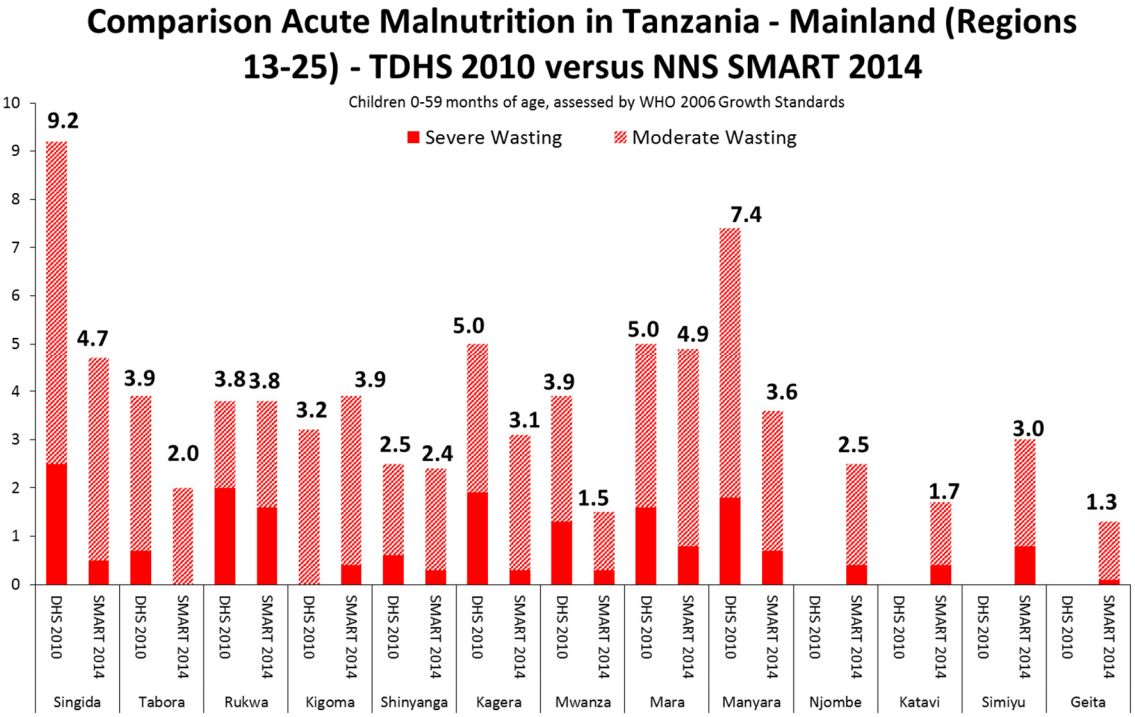


**Figure 14: Prevalence of Acute Malnutrition according to WHO Growth Standards 2006 among children 0 to 59 months of age – NNS SMART 2014 versus TDHS 2010 by region (Mainland – Regions 13-25)**

For Zanzibar, wasting rates are ranging from 6.3% in Town West to 7.5% in Unguja South (Figure 15). In all 5 regions, prevalence of chronic malnutrition are lower than in TDHS. The GAM rate for Zanzibar decreased from 12.0% in 2010 to 7.2%.

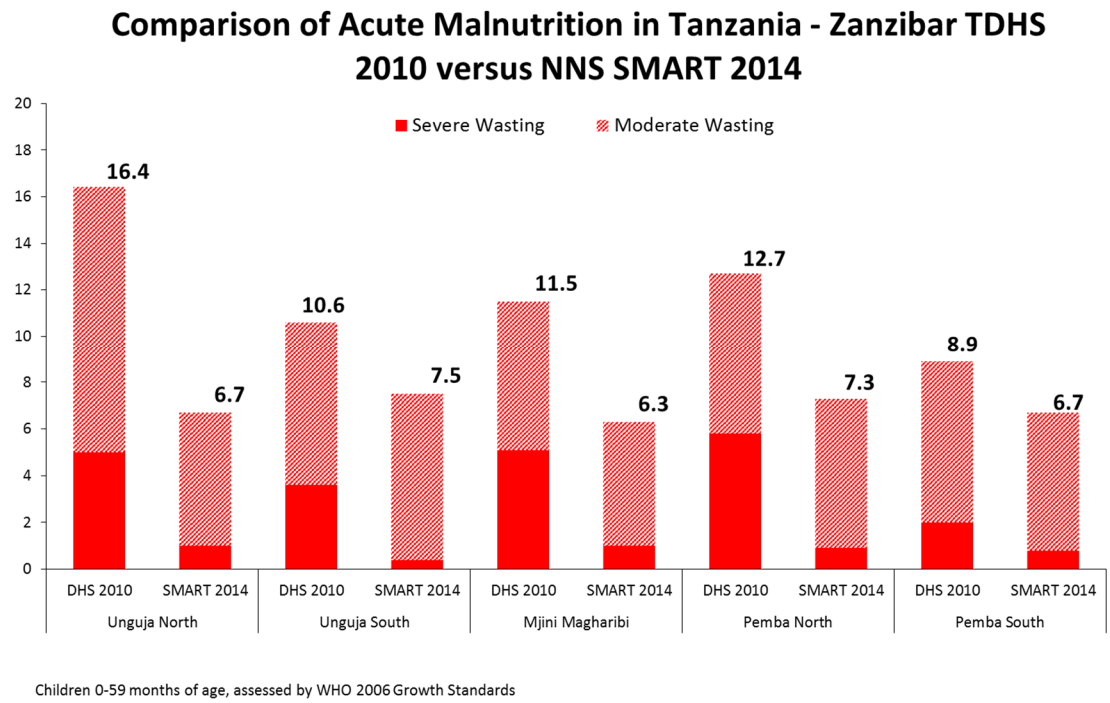


**Figure 15: Prevalence of Acute Malnutrition (Global, Moderate and Severe) according to WHO Growth Standards 2006 among children 0 to 59 months of age – NNS SMART 2014 versus TDHS 2010 by region (Zanzibar)**

According to the WHO classification, the results of the survey showed a level of Global Acute Malnutrition considered "acceptable" (not exceeding the 5% threshold) with 3.8%. The prevalence of GAM is lower than the 2010 levels (4.8%).

According to previous results, it is expected that there will be approximately 340,000 moderately acute malnourished children and more than 105,000 severely acute malnourished children in Tanzania.

**Underweight**

Regarding the prevalence of underweight, the level can be considered “Medium” by WHO cut-offs for level of public health significance (10-20%). At national level, the prevalence of underweight is used for monitoring the MDG1 “Eradicate extreme poverty and hunger”. Tanzania is very close to reach the target for 2015 (12.5%) with a national prevalence of 13.4% (12.7-14.1) (Figure 16).

Weight-for-Age is a composite index of Height-for-Age and Weight-for-Height. It takes into account both acute and chronic malnutrition. While underweight is used for monitoring the MDGs (MDG1), it is no longer in use for monitoring individual children as it cannot detect children who are stunted with a normal weight and does not detect acute malnutrition that threatens children’s lives. Investments should be made to allow measurement of children length/height for timely nutrition intervention.

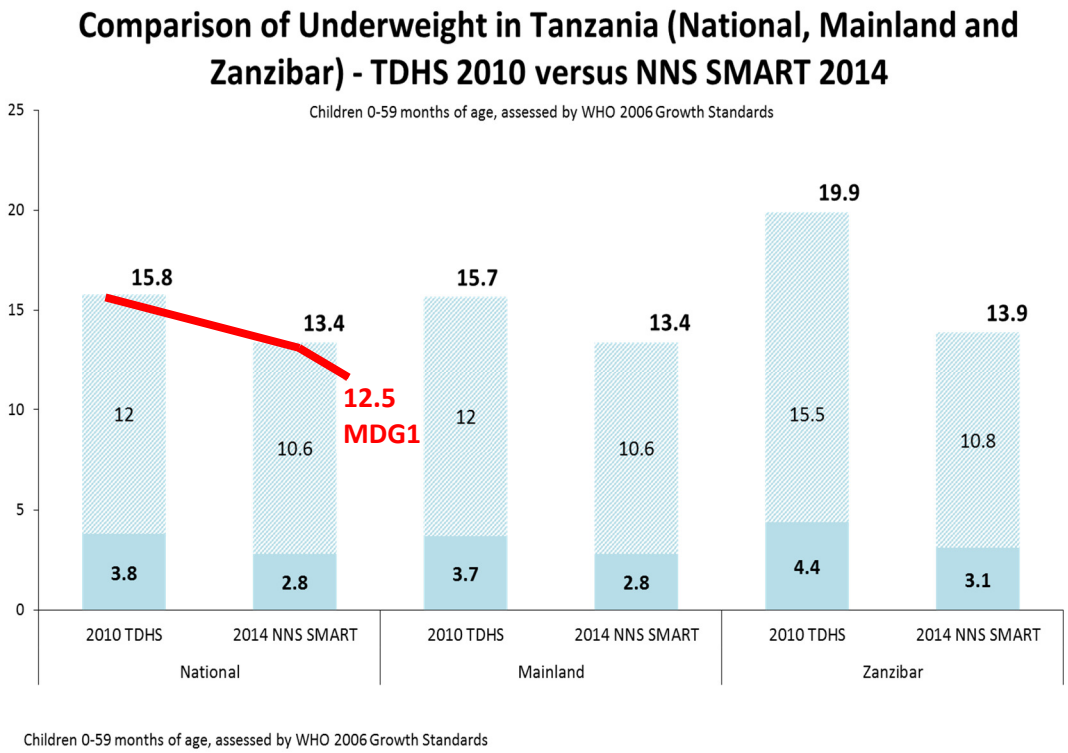


**Figure 16: Prevalence of Underweight (Global, Moderate and Severe) according to WHO Growth Standards 2006 among children 0 to 59 months of age – NNS SMART 2014 versus TDHS 2010 (National, Mainland and Zanzibar)**

Trends in nutritional status of children for the period 1991-92 to 2014 are shown in Figure 17. For the purpose of comparison to assess trends, all results are coming from the WHO Global Database on Child Growth and Malnutrition where WHO Growth Standards have been used to recalculate prevalence.
Figure 17 shows a downward trend in stunting. Stunting declined of 7 percentage points between 1991-1992 and 2010 but sharply declined (8 percentage points) between 2010 and 2014 surveys. A similar pattern is observed for underweight which dropped by 25.1% (1991-1992) in 13.4% (2014). The prevalence of wasting has remained basically the same in Tanzania during these last ten years with a rate between 4 and 5%.

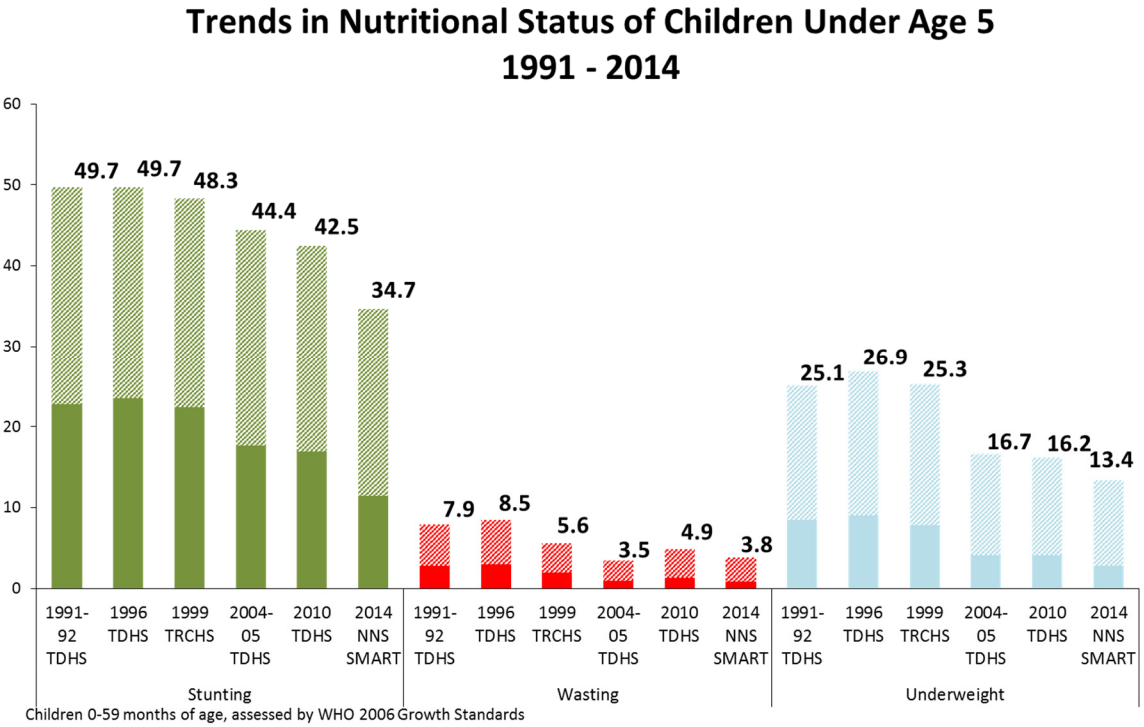


**Figure 17: Trends in nutritional status of children under age 5 according to WHO Growth Standards 2006**

**Vitamin A Supplementation and Deworming**

Children with lack of micronutrient intake and mal-absorption can suffer serious lifelong repercussions. The causes of vitamin and mineral deficiencies are multiple and interconnected. The basic causes of micronutrients deficiencies are related to diet, where poor people are highly affected as they do not consume sufficient amount of nutrient rich foods. Varied diets would resolve most vitamin and mineral deficiencies, which is complex and achieved in long-term as it goes with development and practice changes. However, many lives can be saved and improved through a range of cost-effective interventions, among which supplementation is one. Vitamin A is a fat soluble vitamin which can be stored in liver for 4-6 months. Therefore, periodic supplementation of Vitamin A supplements is one method to tackle this problem. Improving the Vitamin A status of deficient children through supplementation enhances their resistance to disease and can significantly reduce mortality, therefore it can be considered as a central element of the child survival program.

In addition to EPI program at health facility level, vitamin A supplementation is among the services provided on bi-annual basis during national campaign. The last campaign occurred from 18$^{th}$ of October to 24$^{th}$ of October 2014. Both the blue and red capsules were used to show the caretakers to help the mother to recall and the potential recall bias is expected to be low.

The proportion of all children aged 6-59 months who had received vitamin A in the last 6 months was 72.2% (70.6-73.7) which is better than in 2010 (61.0%). About 28.0% of the children did not receive vitamin A supplement, which is alarming. Coverage of vitamin A supplementation decreased in Zanzibar from 79.0% in 2010 to 61.0%.

A high coverage of vitamin A supplementation was noted at Arusha, Kagera and Unguja North (>90%) and the lowest at Mwanza, Singida, Manyara and Town West with less than 50%.

Worm infection in children causes significant Vitamin A mal-absorption which can aggravate malnutrition and anemia rates and contribute to retarded growth. Where Vitamin A-rich foods are already marginal in the diet, worm infestation can tip the balance towards vitamin A deficiency. Chronic worm infection also leads to malabsorption of Vitamin A, a different mechanism which has the same end result of the Vitamin A status of the child. Therefore, deworming has a paramount importance in contributing for reduction of child morbidity and mortality. For these reasons, deworming is recommended for children from 12 to 59 months of age as children in this age group are considered as a potential risk of acquiring the disease. As deworming also helps to enhance the iron status of children which eventually helps children to exercise their intellectual ability to the fullest.

Deworming was conducted simultaneously with vitamin A supplementation in October 2014. The proportion of all children aged 12-59 months who had received deworming in the last 6 months was 70.6% (69.0-72.2) at national level. The coverage is directly correlated with Vitamin A coverage which probably happened due to effectiveness of the integrated campaign organized in October 2014 at national level. Coverage of deworming increased from 50.0% in 2010 to 70.6%. There is a slight diminution of the coverage for Zanzibar from 72.0% in 2010 to 68.4%.

A high coverage of deworming was noted at Kagera and Unguja North (>90%) and the lowest at Mwanza, Singida and Manyara with less than 50%.

**IYCF Practices**

More than 30 studies from around the world, in the developing and developed countries alike, have shown that optimal and appropriate breastfeeding and complementary feeding practices dramatically reduces the risk of dying in infants and young children.

98.4% of children 0-23 months reported to have been ever breastfed. This is higher than the national rate of 96.9% (TDHS 2010).

Early initiation of breastfeeding has the potential to prevent 22% of newborn deaths**.** The survey revealed that 50.8% of children 0-23 months initiated breastfeeding within 1 hour. This result is very close to the national rate recorded in 2010: 48.7% (TDHS 2010). Early initiation of breastfeeding rate increased from 49.9% in 2010 to 61.7% in 2014 for Zanzibar.

WHO recommends mothers to exclusive breastfeed infants for first six months of life to achieve optimal growth, development and good health. At national level, less than 42% of infants under six months of age were exclusively breastfed. The 2010 TDHS shows the proportion of children exclusively breastfed was 49.8%. In Zanzibar, less than 20% of infants under six months of age were exclusively breastfed which is low.

The survey revealed that 90.0% of children 12-15 months were fed breast milk during the day prior to survey. This result is very close to the national rate recorded in 2010: 94.0% (TDHS 2010). Less than 50% of children 20-23 months were still breastfed (51.0% -TDHS 2010).

Breastfeeding is one of the most effective ways to ensure child health and survival. If every child was breastfed within an hour of birth, given only breast milk for their first six months of life, and continued breastfeeding up to the age of two years, about 800 000 child lives would be saved every year.
Adequate breastfeeding counselling and support are essential for mothers and families to initiate and maintain optimal breastfeeding practices.

Complementary foods (solid or semi-solid foods fed to infants in addition to breast milk) are recommended to be started at age 6 months. At national level, the survey shows that 89.5% of children from 6 to 8 months had a timely introduction of complementary food. TDHS 2010 reported that 94.7% of breastfeeding children aged 6-8 months of age had a timely introduction of complementary food.

The proportion of children aged 6-23 months who received foods from 4 or more food groups was 24.5% at national level. The higher proportion were noted at Kilimanjaro and Tanga with respectively 66.3% and 79.5% and the lowest at Iringa, Mbeya, Singida, Tabora, Manyara and Katavi with less than 10%. The proportion in Zanzibar represents less than half of the proportion at national level with 12.1%.
In 2010, the minimum dietary diversity was better with 56% at national level and 40% in Zanzibar.

The proportion of children aged 6-23 months who received solid, semi-solid or soft foods the minimum number of times or more was 65.7% at national level. In 2010, the minimum meal frequency was lower with only 34.1% at national level.

The survey revealed that 20.0% of children 6-23 months received a minimum acceptable diet. This result is very close to the national rate recorded in 2010: 21.0% (TDHS 2010).

**Women Nutritional Status**
Body Mass Index (BMI) is used to classify underweight, overweight and obesity in adult. It is defined as the weight in kilograms divided by the square of the height in meters (kg/m2). BMI are not age dependent and same cut-offs is used for both sex. In developing countries it indicates that malnourished individuals, that is, women with a Body Mass Index (BMI) below 18.5 kg/m2, show a progressive increase in mortality rates. (Gupta 1999). Maternal under nutrition is one of the main contributory factors for low birth weight babies. Babies who are undernourished in the womb face risk of dying during their early months and years. Those who survive have are likely to remain undernourished throughout their lives, and to suffer a higher incidence of chronic disease. Children born underweight also tend to have cognitive disabilities and a lower IQ, affecting their performance in school and their job opportunities at adults which eventually affects the country.

At national level, 5.5% of women 15-49 years of age were considered being in thinness (with 0.4% of severe thinness). A high prevalence of thinness was found at Pemba North (10.5%), Town West (10.1%), Pemba South (9.7%) and Manyara (8.8%). Prevalence of thinness were higher in age groups 15-19 years and 45-49 years with respectively 10.2% and 7.0%.
From 2010 to 2014, prevalence of thinness decreased from 11.4% (TDHS) to 5.5% at national level.

In contrast to the prevalence of thinness, 20% of women were found overweight and 9.7% of women were above the cut off point for obesity. In 2010, TDHS found respectively 15.2% and 6.2% for the prevalence of overweight and obesity. A high prevalence of obesity, around 20.0% was found at Kilimanjaro (21.8%), Dar-Es-Salaam

(19.2%), Town West (20.7%) and Unguja South (18.4%). Prevalence of overweight and obesity were higher in age groups 35-39 years and 45-49 years.

At national level, 30.9% of women 15-49 years of age with children under five years of age had not taken an iron-folic acid supplementation during pregnancy for past birth (40.7% in TDHS 2010). Majority of women took this supplementation less than 60 days.

**Use of Iodized Salt**

At national level, use of iodized salt the day prior to survey to cook the meal was 62.2%. Ten regions presented a percentage of use of iodized salt below 50% ranging from 5.9% in Lindi to 49.6% in Kagera. These regions are Lindi, Mtwara, Tabora, Rukwa, Geita, Ruvuma, Shinyanga, Singida, Simiyu and Kagera. Only 5 regions are above 90%: Dar-Es-Salaam, Mbeya, Kilimanjaro, Arusha and Mwanza.
For Zanzibar, use of iodized salt was ranging from 58.9% and 69.0% in Pemba North and South respectively to 78.4% in Unguja South.
At national level, more than one third of the households had a non-iodized salt the day of the survey (34.6% in Mainland and 21.5% in Zanzibar). Between 0.6% and 12.6% of the surveyed households had no salt the day of the survey (3.3% for Mainland and 7% for Zanzibar).

**Handwashing Practices**

An essential component of proper handwashing is the use of soap, without which it is difficult to reduce incidents of diarrhea. Soap eliminates diarrhea-inducing pathogens from the skin. Research in refugee settings has shown that in households where soap was present, fewer children had diarrheal diseases regardless of whether they actually used soap.
At national level, use of soap was 91.4%. Availability of soap was ranging from 78.1% in Lindi to 99.8% in Mwanza. For Zanzibar, use of soap was ranging from 85.3% and 87.4% in Pemba North and South respectively to 94.2% in Unguja South.

Household members knowing the critical times for handwashing does not imply that they actually practice such behavior. The 24-hour recall is another way to solicit a more accurate answer about handwashing practices without actually observing the behavior. At minimum the respondent should mention two critical times for handwashing, and this should include “after defecating.”
At national level, only 11.7% of the interviewed households members report having used soap for handwashing at least at two critical times during past 24 hours (including “after defecating”) (11.5% in Mainland and 13.2% in Zanzibar). Several regions in Mainland are below 1%. These regions are: Iringa, Mbeya, Singida, Tabora, Shinyanga and Geita. The highest rates were found in Tanga and Pwani with respectively 53.9% and 58.9%.
For Zanzibar, it was ranging from 0.2% and 0.4% in Unguja North and Unguja South to 21.6% and 19.9% in Pemba South and Town West respectively.

# 6. Conclusion and Recommendations

Stunting was found at 34.7% at national level. It reflects the existence of chronic nutrition related problem in the country. The repercussion of chronic malnutrition is serious which ends up in reducing adulthood productivity, which eventually affects the development of the nation as a whole. It is concluded that malnutrition is pressing major development challenge in the country. It is difficult to address the problem within short period as it requires ranges of interventions which should be supported by positive behavioral and practice change of the community at large.

Chronic malnutrition is the cumulative effect through time and the country cannot afford to see children getting malnourished further which interfere with their growth and contribute to stunting. Therefore, it is recommended to continue and scale up the existing nutrition program to address children in risk of mortality.

All forms of malnutrition were found high in the first two years of age. This period particularly, 6-23 is a critical age of onset of malnutrition where majority of childhood damages occurred. It is irreversible after this period. Therefore, it is highly recommended to consider children in this age group through improving infant and young child feeding practices and maternal education towards behavioral and practice changes and to achieve them it is recommended to:

- ✓ Invest in the establishment of community, health and nutrition system workplaces and public places for promoting, supporting and protecting exclusive breastfeeding for the first six months of life and continued breastfeeding up to two years of age and beyond;
- ✓ Support community-based programs to provide information and counseling on optimal and appropriate complementary feeding practices;
- ✓ Educate pregnant women about the importance of prenatal care and protect maternal nutrition and health to prevent low birth weight babies;
- ✓ Promote regular growth monitoring and include measurement of length/height (not just weight) in nutrition programs;
- ✓ Invest in a mass communication campaign for development based on preventive activities: nutrition of pregnant women, promotion of exclusive breastfeeding, complementary feeding and continued breastfeeding, good hygienic practices, the production and consumption of available complementary foods;

Vitamin A supplementation and deworming coverage was found not optimal in this survey and to have effective preventions it is encouraged to continue the integrated programs that used to provide the service to get high coverage. Regions with low performance should be encouraged to be improved for subsequent distribution rounds. Efforts should be made to improve coverage of vitamin A supplementation and deworming (80% target) like for examples:

- ✓ Raising awareness of mothers on micronutrient supplementation and deworming campaigns;
- ✓ Strengthening distribution channels of vitamin A and deworming supplies and monitoring and evaluation of campaigns;
- ✓ Planning the achievement of mass activities around supplementation and deworming at least twice a year

It is also recommended to:

- ✓ Develop a plan to fight against overweight and obesity.
- ✓ Strengthen action towards universal iodization of salt in all regions, especially in the 10 regions below 50%. Improve nutritional education to prevent overweight and obesity

Finally, in order to monitor the effect of present and future interventions on trends of malnutrition, it is recommended that a follow-up SMART survey be implemented in September-November 2016 following the same methodology as the present investigation.

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# Annexes

## Annex 1 – Anthropometric Questionnaire

### National Nutrition Survey with SMART Methods Tanzania
### Sept. – Nov. 2014

**Verbal Consent**

"Hello, my name is _____, we are working with the Ministry of Health and Social Welfare (MoHSW), the Ministry of Health Zanzibar and the Tanzania Food and Nutrition Centre (TFNC) to conduct a nutrition survey. The objectives of this survey are to assess nutritional status of children aged 0-59 months and women aged 15-49 years, IYCF practices, micronutrient interventions (coverage of vitamin A and iron/folic acid supplementation, deworming and iodized salt) and handwashing practices. I would like, if you permit to ask you questions about these topics and measure children (weight, height, MUAC and edema) and women (weight and height). All information that we collect will be kept completely confidential. Do you have any questions? May I begin?"

| Region | District | Ward/Shehia | Village/Street |
|---|---|---|---|
| _____ | _____ | _____ | _____ |

| Survey Date (DD/MM/YYYY) | Team Number | Cluster Number | HH Number |
|---|---|---|---|
| \|___\|___\|/\|___\|___\|/\|___\|___\|\|___\|___\| | \|___\|___\| | \|___\|___\|\|___\|___\| | \|___\|___\| |

**Availability of Iodized Salt – For all selected households**

| Code for Salt | Salt Result |
|---|---|
| 1= Iodized Salt PPM ≠ 0<br>2= Non-Iodized Salt PPM = 0<br>8= No salt in the household<br>**SALT** | \|___\| |

**Handwashing Practices – For all selected households**

| No | Question | Answer Codes | |
|---|---|---|---|
| **WH1** | Do you have soap?<br>*ONLY ASK FOR THE AVAILABILITY OF SOAP, NOT OTHER CLEANING AGENTS LIKE DETERGENTS, ASH, SAND*<br>**SOAP** | Found in handwashing place..... 1<br>Brought by caretaker within 1 min..... 2<br>No ..... 3 | \|___\|<br>**IF ANSWER IS 3 STOP NOW** |
| **WH2** | Have you used soap today or yesterday?<br><br>**YESTSP** | Yes ..... 1<br>No ..... 2 | \|___\|<br>**IF ANSWER IS 2 STOP NOW** |
| | | | Y N |
| **WH3** | When you used soap today or yesterday, what did you use it for?<br><br>*IF FOR WASHING MY OR MY CHILDREN'S HANDS IS MENTIONED, PROBE WHAT WAS THE OCCASION, BUT DO NOT READ THE ANSWERS. ASK TO BE SPECIFIC, ENCOURAGE "WHAT ELSE" UNTIL NOTHING FURTHER IS MENTIONED AND CHECK ALL THAT APPLY*<br><br>**CRITIMES** | Washing clothes .....3A<br>Washing cooking pots or dishes .....3B<br>Washing my body.....3C<br>Washing my children .....3D<br>Washing child's bottoms.....3E<br>Washing my children's hands.....3F<br>Washing hands after defecating..... 3G<br>Washing hands after cleaning child .....3H<br>Washing hands before feeding child ..... 3I<br>Washing hands before preparing food ... 3J<br>Washing hands before eating.....3K<br>Other..... 3L | 1 2<br>1 2<br>1 2<br>1 2<br>1 2<br>1 2<br>1 2<br>1 2<br>1 2<br>1 2<br>1 2<br>1 2 |

**Anthropometry - For all children under five years of age (0-59 months)**

| ID# | First name of the child | **Sex**<br><br>M=male<br>F=female | **Birthdate**<br><br>DD/MM/YYYY | **Age in months**<br><br>*Fill only if no birthdate* | **Weight** (kg) (00.0) | **Height** (cm)<br><br>(000.0) | **Bilateral Edema**<br><br>Y=Yes<br>N=No | **MUAC** (mm) (000)<br><br>*Left arm*<br><br>*ONLY 6-59 months* | **Measure**<br><br>L=Length (recumbent length)<br><br>H= Height (standing height) | **Clothes**<br><br>Y=Yes<br>N=No | **Vit. A** in past 6 months<br><br>*Show capsule*<br><br>1= Yes w/card<br>2= Yes w/o card<br>3= No<br>8= Don't know | **Deworming** in past 6 months<br><br>*Show tablet*<br><br>1= Yes w/card<br>2= Yes w/o card<br>3= No<br>8= Don't know |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | |
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| | | | | | | | | | | | | |
| | | | | | | | | | | | | |

| Survey Date (DD/MM/YYYY) | Team Number | Cluster Number | HH Number |
|---|---|---|---|
| \|___\|___\|/\|___\|___\|/\|___\|___\|\|___\|___\| | \|___\|___\| | \|___\|___\|\|___\|___\| | \|___\|___\| |

**Anthropometry - For all women from 15-49 years of age**

*** Women with children under age 5***

| ID# | First name of the woman | Age in years | Weight (kg) (00.0) | Height (cm) (000.0) | Pregnancy Status<br>1= Yes<br>2= No<br>8= Don't know | Lactating Status<br>1= Yes<br>2= No | *During your last pregnancy, were you given or you buy any iron syrup/iron or iron/folate tablets?*<br>1= Yes<br>2= No<br>8= Don't know | *During the whole pregnancy, for how many days did you take iron syrup/iron or iron/folate tablets?*<br>998= Don't know |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | | \|___\|___\|___\| |
| | | | | | | | | \|___\|___\|___\| |
| | | | | | | | | \|___\|___\|___\| |
| | | | | | | | | \|___\|___\|___\| |
| | | | | | | | | \|___\|___\|___\| |
| | | | | | | | | \|___\|___\|___\| |
| | | | | | | | | \|___\|___\|___\| |

**Annex 2 – IYCF Questionnaire**

# National Nutrition Survey with SMART Methods Tanzania
# Sept. – Nov. 2014

## Infant and Young Child Feeding (IYCF) practices – For all children under two years of age (0-23 months)

This questionnaire is to be administered to the mother or the main caregiver who is responsible for feeding the child. The child should be between 0 and 23 months of age

| Survey Date (DD/MM/YYYY) | Cluster Number | Team Number | HH Number | Child ID Number |
|---|---|---|---|---|
| \|___\|___\|/\|___\|___\|/\|___\|___\|\|___\|___\| | \|___\|___\|\|___\|___\| | \|___\|___\| | \|___\|___\| | \|___\| |

| No | QUESTION | ANSWER CODES | |
|---|---|---|---|
| IF1 | Sex<br><br>*TAKE FROM THE PREVIOUS QUESTIONNAIRE- DO NOT ASK MOTHER AGAIN*<br><br>**SEX** | Male ..... 1<br>Female ..... 2 | \|___\| |
| IF2 | Birthdate<br><br>*TAKE FROM THE PREVIOUS QUESTIONNAIRE- DO NOT ASK MOTHER AGAIN*<br>**BIRTHDAT** | DD/MM/YYYY…….\|___\|___\| /\|___\|___\| / \|___\|___\|\|___\|___\| | |
| IF3 | Child's age in months<br><br>*TAKE FROM THE PREVIOUS QUESTIONNAIRE- DO NOT ASK MOTHER AGAIN*<br>**MONTHS** | | \|___\|___\| |
| IF4 | Did you ever breastfeed **[NAME]**?<br><br>**EVERBF** | Yes ..... 1<br>No ..... 2<br>Don't know ..... 8 | \|___\|<br>**IF ANSWER IS 2 or 8 GO TO IF7** |
| IF5 | How long after birth did you first put **[NAME]** to the breast?<br><br>**INITBF** | Immediately (<60 min) ..... 1<br>Between 1 and 23 hours ..... 2<br>More than 24 hours ..... 3<br>Don't know ..... 8 | \|___\| |
| IF6 | Was **[NAME]** breastfed yesterday during the day or at night?<br><br>**YESTBF** | Yes ..... 1<br>No ..... 2<br>Don't know ..... 8 | \|___\| |

| | | | | | |
|---|---|---|---|---|---|
| **IF7** | Now I would like to ask you about liquids that **[NAME]** may have had yesterday during the day and at night. I am interested in whether your child had the item even if it was combined with other foods. Yesterday, during the day or at night, did **[NAME]** receive any of the following?<br><br>*ASK ABOUT ALL LIQUIDS. IF ITEM WAS GIVEN, CIRCLE '1'. IF ITEM WAS NOT GIVEN, CIRCLE '2'. IF CAREGIVER DOES NOT KNOW, CIRCLE '8'. EVERY LINE MUST HAVE A CODE.* | | Yes | No | DK |
| | 7A. Plain water<br><br>**WATER** | 7A…… | 1 | 2 | 8 |
| | 7B. Infant formula, like **Infacare, Nan, Lactogen, S26**<br><br>**INFORM** | 7B…… | 1 | 2 | 8 |
| | 7C. Milk such as tinned, powdered, or fresh animal milk, like **Nido, Cowbell, Tangafresh**<br><br>**MILK** | 7C…… | 1 | 2 | 8 |
| | 7D. Juice or juice drinks, like **Ceres**<br><br>**JUICE** | 7D…… | 1 | 2 | 8 |
| | 7E. Clear broth<br><br>**BROTH** | 7E…… | 1 | 2 | 8 |
| | 7F. Sour milk or yogurt, like home-made yogurt, **Asas, Tangafresh**<br><br>**YOGURT** | 7F…… | 1 | 2 | 8 |
| | 7G. Thin porridge<br><br>**THINPOR** | 7G…… | 1 | 2 | 8 |
| | 7H. Tea or coffee with milk<br><br>**WHTEACOF** | 7H…… | 1 | 2 | 8 |
| | 7I. Any sodas or other sweet drinks, like **Azam, Pepsi, Twist**, local herbs, gripe water, clear tea with no milk, black coffee, togwa<br><br>**WATLQD** | 7I…… | 1 | 2 | 8 |
| **IF8** | Please describe everything that **[NAME]** ate yesterday during the day or night, either at home or outside the home.<br>a) Think about when **[NAME]** first woke up yesterday. Did **[NAME]** eat anything at that time? *IF YES*: Please tell me everything **[NAME]** ate at that time. *PROBE*: Anything else? *UNTIL RESPONDENT SAYS NOTHING ELSE. IF NO, CONTINUE TO QUESTION b).*<br><br>b) What did **[NAME]** do after that? Did **[NAME]** eat anything at that time? *IF YES*: Please tell me everything **[NAME]** ate at that time. *PROBE*: Anything else? *UNTIL RESPONDENT SAYS NOTHING ELSE. REPEAT QUESTION b) ABOVE UNTIL RESPONDENT SAYS THE CHILD WENT TO SLEEP UNTIL THE NEXT DAY.*<br><br>*IF RESPONDENT MENTIONS MIXED DISHES LIKE A PORRIDGE, SAUCE OR STEW, PROBE:*<br>c) What ingredients were in that **[MIXED DISH]**? *PROBE:* Anything else? *UNTIL RESPONDENT SAYS NOTHING ELSE.* | | | | |

| | | | | | |
|---|---|---|---|---|---|
| | *AS THE RESPONDENT RECALLS FOODS, UNDERLINE THE CORRESPONDING FOOD AND CIRCLE '1' IN THE COLUMN NEXT TO THE FOOD GROUP.*<br>*ONCE THE RESPONDENT FINISHES RECALLING FOODS EATEN, READ EACH FOOD GROUP WHERE '1' WAS NOT CIRCLED, ASK THE FOLLOWING QUESTION AND CIRCLE '1' IF RESPONDENT SAYS YES, '2' IF NO AND '8' IF DON'T KNOW:*<br><br>Yesterday during the day or the night, did **[NAME]** drink/eat any **[FOOD GROUP ITEMS]**? | | Yes | No | DK |
| | 8A. Porridge, staff porridge, bread, rice, noodles, sweet potatoes and Irish potatoes, white yams, cassava, millet, sorghum, pastries, cakes, biscuits, plantains<br><br>**CEREAL** | 8A……1 | | 2 | 8 |
| | 8B. Beans, peas, lentils, peanuts, cashew nuts, pumpkin seeds, soy, sesame, green grams, Bambara nuts, groundnuts, pigeon peas<br><br>**LEGNUT** | 8B……1 | | 2 | 8 |
| | 8C. Dairy Products: Yogurt, cheese<br><br>**DAIRYFD** | 8C……1 | | 2 | 8 |
| | 8D**.** Any meat such as beef, pork, lamb, goat, chicken, duck pigeon, liver, kidney, heart or other organ meats, fresh or dried fish, sardines, seafood, prawns crabs, insects<br><br>**FLESHFD** | 8D……1 | | 2 | 8 |
| | 8E. Eggs<br><br>**EGGS** | 8E……1 | | 2 | 8 |
| | 8F. Pumpkin, carrots, squash or sweet potatoes that are yellow or orange inside, any dark green leafy vegetables (spinach, pumpkin leaves, cassava leaves, etc.), ripe mangoes, ripe papayas, foods made with red palm oil, red palm nut or red palm sauce<br><br>**VITAFRUIT** | 8F……1 | | 2 | 8 |
| | 8G. Any other fruits and vegetables<br><br>**OTHFRUIT** | 8G……1 | | 2 | 8 |
| | | | | | |
| **IF9** | How many times did [NAME] eat solid, semi-solid, or soft foods other than liquids yesterday during the day or at night?<br><br>**FDTIMES** | Number of times ……..\|___\|___\|<br><br>Don't know…..... 98 | | | |

**Annex 3 – Persons Involved in the Tanzania 2014 National Nutrition Survey**

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Chacha Magige Nyabisaga – RNO Simiyu (Simiyu/Mara)
Mariam Athuman Mwita – RNO Shinyanga (Shinyanga/Tabora)
Waibe J.M Mwita – RNO Iringa (Iringa/Mbeya)
Teda Sinde – RNO Singida (Singida/Manyara)
Lewis E Mahembe – RNO Mbeya (Njombe/Ruvuma)
Jehovaness John Mollel – RNO Pwani (Tanga/Pwani)
Sauli Epimack – RNO Singida (Kilimanjaro/Arusha)
Happy M. Moses – RNO Morogoro (Morogoro/Dodoma)
Aneth Vedastus – TFNC (Mtwara/Lindi)
Asha Hassan – MoH Zanzibar (Unguja)
Fahima Mohammed – OCGS (Unguja)
Shemsa Nassos Msellem – MoH Zanzibar (Pemba)

**Team 1 – Kagera/Kigoma**

| | | | |
|---|---|---|---|
| ***Team Leader*** | Felician F. Maduhu | ***Replacement*** | Josephat Juma |
| ***Measurer*** | Elieth Deogratias | | |
| ***Assistant Measurer*** | Mariam Ally | | |

**Team 2 – Kagera/Kigoma**

| | |
|---|---|
| ***Team Leader*** | Mary A. Baraka |
| ***Measurer*** | Denis Mbinga |
| ***Assistant Measurer*** | Masele Michael Maganga |

**Team 3 – Katavi/Rukwa**

| | |
|---|---|
| ***Team Leader*** | Tunsume P. Mwafumbila |
| ***Measurer*** | Doris Lunyungu |
| ***Assistant Measurer*** | Baraka J. Mollel |

**Team 4 – Katavi/Rukwa**

| | |
|---|---|
| ***Team Leader*** | Amani Mwakipesile |
| ***Measurer*** | Mariam Nakwa |
| ***Assistant Measurer*** | Emmanuel A. Mdindile |

**Team 5 – Mwanza/Geita**

| | |
|---|---|
| ***Team Leader*** | Faith Temu |
| ***Measurer*** | Sebastian T. Kabora |
| ***Assistant Measurer*** | Oscar Paul |

**Team 6 – Mwanza/Geita**

| | |
|---|---|
| ***Team Leader*** | Dennis Madeleke |
| ***Measurer*** | Ladislaus William Magaso |
| ***Assistant Measurer*** | Amos R. |

**Team 7 – Simiyu/Mara**

| | |
|---|---|
| ***Team Leader*** | January E. Dalushi |
| ***Measurer*** | Oswin C. Mulwa |
| ***Assistant Measurer*** | Aneth Folgence |

**Team 8 – Simiyu/Mara**

| | |
|---|---|
| ***Team Leader*** | Raphael G. Mtaho |
| ***Measurer*** | Joseph Nchambi |
| ***Assistant Measurer*** | Abel E. Gyunda |

**Team 9 – Shinyanga/Tabora**

| | |
|---|---|
| ***Team Leader*** | Zidikheri Mziray |
| ***Measurer*** | Neema Juma |
| ***Assistant Measurer*** | James Japhet |

**Team 10 – Shinyanga/Tabora**

| | | | |
|---|---|---|---|
| ***Team Leader*** | Mario S. Venance | ***Replacement*** | Solana Agustino |
| ***Measurer*** | Avelina France | | |
| ***Assistant Measurer*** | John Ngimba | | |

**Team 11 – Mbeya/Iringa**

| | |
|---|---|
| ***Team Leader*** | Benson D. Sanga |
| ***Measurer*** | Win Eliah White |
| ***Assistant Measurer*** | Zakaria Msumary |

**Team 12 – Mbeya/Iringa**

| | |
|---|---|
| ***Team Leader*** | Regina Shigongo |
| ***Measurer*** | Alexander Sagaya |
| ***Assistant Measurer*** | Zaina Muhamadi |

**Team 13 – Singida/Manyara**

| | | | |
|---|---|---|---|
| ***Team Leader*** | Cosmas M. Ngafa | ***Replacement*** | Elafaraja |
| ***Measurer*** | Julius Nkuu | | |
| ***Assistant Measurer*** | Winfrida Chacha | | |

**Team 14 – Singida/Manyara**

| | | | |
|---|---|---|---|
| ***Team Leader*** | Florence P. Mkome | ***Replacement*** | Siriri Makonga |
| ***Measurer*** | Stanley S. Masaki | | |
| ***Assistant Measurer*** | Khamis Ramadhani | | |

**Team 15 – Njombe/Ruvuma**

| | |
|---|---|
| ***Team Leader*** | Hadija Nsari |
| ***Measurer*** | Josephine Kazungu |
| ***Assistant Measurer*** | Daina Mgeni |

**Team 16 – Njombe/Ruvuma**

| | |
|---|---|
| ***Team Leader*** | Redempta Kagaruki |
| ***Measurer*** | Andrew M. Masele |
| ***Assistant Measurer*** | Irene Mayeji Kitolu |

**Team 17 – Tanga/Pwani**

| | | | |
|---|---|---|---|
| ***Team Leader*** | Bertha Mwakabale | ***Replacement*** | Bruno Emmanuel Ndazi |
| ***Measurer*** | Mwamini Mziray | | |
| ***Assistant Measurer*** | Asha Yusuph | | |

**Team 18 – Tanga/Pwani**

| | | | |
|---|---|---|---|
| ***Team Leader*** | Bonza K. Mshana | ***Replacement*** | Davide Shayo |
| ***Measurer*** | Josephine J. Swai | | |
| ***Assistant Measurer*** | Emiliana D. Sumaye | | |

**Team 19 – Kilimanjaro/Arusha**

| | | | |
|---|---|---|---|
| ***Team Leader*** | Jubilate Temu | ***Replacement*** | Franck Sengi |
| ***Measurer*** | Abu Ngoye | | Edna Ndau |
| ***Assistant Measurer*** | Jackeline Nususrupia | | Prisca Emmanuel |

**Team 20 – Kilimanjaro/Arusha**

| | |
|---|---|
| ***Team Leader*** | Rose Mauya |
| ***Measurer*** | Regina Shine Leon |
| ***Assistant Measurer*** | Sabuni Joseph A. |

**Team 21 – Morogoro/Dodoma**

| | | | |
|---|---|---|---|
| ***Team Leader*** | Prisca Shirati | ***Replacement*** | Aswile John |
| ***Measurer*** | Agnes Mtulo | | |
| ***Assistant Measurer*** | Range Mwita | | |

**Team 22 – Morogoro/Dodoma**

| | |
|---|---|
| ***Team Leader*** | Doris R. Munis |
| ***Measurer*** | Amina Moh'd Ali |
| ***Assistant Measurer*** | Maryam Salehe Moh'd |

**Team 23 – Mtwara/Lindi**

| | |
|---|---|
| ***Team Leader*** | Kingolo Sayi |
| ***Measurer*** | Victoria S. Ngatunga |
| ***Assistant Measurer*** | Herieth Joseph |

**Team 24 – Mtwara/Lindi**

| | | | |
|---|---|---|---|
| ***Team Leader*** | Eveline Festo Kabtina | ***Replacement*** | Fabian |
| ***Measurer*** | Maduhu Mlyahodi | | Salehe Seleman |
| ***Assistant Measurer*** | Veronica Baluwa | | |

**Team 25 – Mtwara/Lindi**

| | |
|---|---|
| ***Team Leader*** | Ally F. Mvungi |
| ***Measurer*** | Salvatore I. Chinguile |
| ***Assistant Measurer*** | Yussuf Said Yussuf |

**Team 26 – Unguja**

| | |
|---|---|
| ***Team Leader*** | Fatma Said Khamis |
| ***Measurer*** | Asha Khamis Salehe |
| ***Assistant Measurer*** | Abdalla Haji Mgeni |

**Team 27 – Unguja**

| | |
|---|---|
| ***Team Leader*** | Fatma Ally Said |
| ***Measurer*** | Mohamed N. Salim |
| ***Assistant Measurer*** | Ahmada Khamis Ahmada |

**Team 28 – Unguja**

| | |
|---|---|
| ***Team Leader*** | Khadija Ramadhan |
| ***Measurer*** | Abdallah Nassoro Msellem |
| ***Assistant Measurer*** | Latifa Kh. Ameir |

**Team 29 – Pemba**

| | |
|---|---|
| ***Team Leader*** | Harusi Massoud |
| ***Measurer*** | Mwajine Khamis Mjaka |
| ***Assistant Measurer*** | Sabiha Khalfan Said |

**Team 30 – Pemba**

| | |
|---|---|
| ***Team Leader*** | Fatma Khatibu Haji |
| ***Measurer*** | Tetuni Haroub Shehe |
| ***Assistant Measurer*** | Shaib Iitbar Mzee |

# Plausibility check for: TZN_1014_NATIONAL_VF.as

**Standard/Reference used for z-score calculation: WHO standards 2006**
(If it is not mentioned, flagged data is included in the evaluation. Some parts of this plausibility report are more for advanced users and can be skipped for a standard evaluation)

## Overall data quality

| Criteria | Flags* | Unit | Excel. | Good | Accept | Problematic | **Score** |
|---|---|---|---|---|---|---|---|
| Flagged data (% of in-range subjects) | Incl | % | 0-2.5<br>0 | >2.5-5.0<br>5 | >5.0-7.5<br>10 | >7.5<br>20 | **0** (1,8 %) |
| Overall Sex ratio (Significant chi square) | Incl | p | >0.1<br>0 | >0.05<br>2 | >0.001<br>4 | <=0.001<br>10 | **0** (p=0,679) |
| Overall Age distrib (Significant chi square) | Incl | p | >0.1<br>0 | >0.05<br>2 | >0.001<br>4 | <=0.001<br>10 | **10** (p=0,000) |
| Dig pref score - weight | Incl | # | 0-7<br>0 | 8-12<br>2 | 13-20<br>4 | > 20<br>10 | **0** (1) |
| Dig pref score - height | Incl | # | 0-7<br>0 | 8-12<br>2 | 13-20<br>4 | > 20<br>10 | **0** (4) |
| Dig pref score - MUAC | Incl | # | 0-7<br>0 | 8-12<br>2 | 13-20<br>4 | > 20<br>10 | **0** (3) |
| Standard Dev WHZ | Excl | SD | <1.1 and | <1.15 and | <1.20 and | >=1.20 or | |
| . | | | | | | | |
| . | Excl | SD | >0.9<br>0 | >0.85<br>2 | >0.80<br>6 | <=0.80<br>20 | **0** (1,05) |
| Skewness WHZ | Excl | # | <±0.2<br>0 | <±0.4<br>1 | <±0.6<br>3 | >=±0.6<br>5 | **0** (-0,02) |
| Kurtosis WHZ | Excl | # | <±0.2<br>0 | <±0.4<br>1 | <±0.6<br>3 | >=±0.6<br>5 | **0** (-0,06) |
| Poisson dist WHZ-2 | Excl | p | >0.05<br>0 | >0.01<br>1 | >0.001<br>3 | <=0.001<br>5 | **5** (p=0,000) |
| OVERALL SCORE WHZ = | | | 0-9 | 10-14 | 15-24 | >25 | **15** % |

The overall score of this survey is 15 %, this is acceptable.

**There were no duplicate entries detected.**

**Percentage of children with no exact birthday: 4 %**

**Anthropometric Indices likely to be in error (-3 to 3 for WHZ, -3 to 3 for HAZ, -3 to 3 for WAZ, from observed mean - chosen in Options panel - these values will be flagged and should be excluded from analysis for a nutrition survey in emergencies. For other surveys this might not be the best procedure e.g. when the percentage of overweight children has to be calculated):**
Percentage of values flagged with SMART flags:WHZ: 1,8 %, HAZ: 3,9 %, WAZ: 1,4 %

**Age distribution:**

Month 1 : ##########################################
Month 2 : ##################################################
Month 3 : ##################################################
Month 4 : ##########################################################
Month 5 : ##################################################
Month 6 : ##################################################
Month 7 : ##########################################################
Month 8 : ##################################################
Month 9 : ##############################################
Month 10 : ##############################################
Month 11 : ##########################################
Month 12 : ##############################################
Month 13 : ##############################################
Month 14 : ##############################################
Month 15 : ##########################################
Month 16 : ##########################################
Month 17 : ##########################################
Month 18 : ##########################################
Month 19 : ##########################################
Month 20 : ##########################################
Month 21 : ######################################
Month 22 : ##########################################
Month 23 : ##########################################
Month 24 : ##########################################
Month 25 : ##################################################
Month 26 : ######################################
Month 27 : ##########################################
Month 28 : ##########################################
Month 29 : ##########################################
Month 30 : ##################################################
Month 31 : ##########################################
Month 32 : ######################################
Month 33 : ######################################
Month 34 : ##################################
Month 35 : ##########################################
Month 36 : ##########################################
Month 37 : ######################################
Month 38 : ######################################
Month 39 : ######################################
Month 40 : ######################################
Month 41 : ######################################
Month 42 : ##################################
Month 43 : ##############################
Month 44 : ##################################
Month 45 : ##################################
Month 46 : ######################################
Month 47 : ##############################
Month 48 : ##########################################
Month 49 : ##########################################
Month 50 : ##############################
Month 51 : ##############################
Month 52 : ##############################

Month 53 : ############################
Month 54 : ##############################
Month 55 : ##############################
Month 56 : ########################
Month 57 : ########################
Month 58 : ######################
Month 59 : ########################
Month 60 : ##############

Age ratio of 6-29 months to 30-59 months: 1,03 (The value should be around 0.85).

**Statistical evaluation of sex and age ratios (using Chi squared statistic):**

| Age cat. | mo. | boys | girls | total | ratio boys/girls |
|---|---|---|---|---|---|
| 0 to 11 | 12 | 2067/1785,0 (1,2) | 2056/1774,0 (1,2) | 4123/3559,0 (1,2) | 1,01 |
| 12 to 23 | 12 | 1826/1740,0 (1,0) | 1819/1729,0 (1,1) | 3645/3470,0 (1,1) | 1,00 |
| 24 to 35 | 12 | 1777/1687,0 (1,1) | 1784/1676,0 (1,1) | 3561/3363,0 (1,1) | 1,00 |
| 36 to 47 | 12 | 1585/1660,0 (1,0) | 1536/1650,0 (0,9) | 3121/3310,0 (0,9) | 1,03 |
| 48 to 59 | 12 | 1260/1642,0 (0,8) | 1266/1632,0 (0,8) | 2526/3274,0 (0,8) | 1,00 |
| 0 to 59 | 60 | 8515/8488,0 (1,0) | 8461/8488,0 (1,0) | | 1,01 |

The data are expressed as observed number/expected number (ratio of obs/expect)

Overall sex ratio: p-value = 0,679 (boys and girls equally represented)
Overall age distribution: p-value = 0,000 (significant difference)
Overall age distribution for boys: p-value = 0,000 (significant difference)
Overall age distribution for girls: p-value = 0,000 (significant difference)
Overall sex/age distribution: p-value = 0,000 (significant difference)

**Digit preference Weight:**

Digit .0 : ##########################################################
Digit .1 : ##########################################################
Digit .2 : ##########################################################
Digit .3 : ##########################################################
Digit .4 : ##########################################################
Digit .5 : ##########################################################
Digit .6 : ##########################################################
Digit .7 : ##########################################################
Digit .8 : ##########################################################
Digit .9 : ##########################################################

Digit preference score: **1** (0-7 excellent, 8-12 good, 13-20 acceptable and > 20 problematic)
p-value for chi2: 0,000 (significant difference)

**Digit preference Height:**

Digit .0 : ##########################################################
Digit .1 : ##########################################################
Digit .2 : ##########################################################
Digit .3 : ##########################################################
Digit .4 : ##########################################################
Digit .5 : ##########################################################
Digit .6 : ##########################################################

Digit .7 : ##########################################
Digit .8 : ##########################################
Digit .9 : ########################################

Digit preference score: **4** (0-7 excellent, 8-12 good, 13-20 acceptable and > 20 problematic)
p-value for chi2: 0,000 (significant difference)

**Digit preference MUAC:**

Digit .0 : ##########################################################
Digit .1 : ######################################################
Digit .2 : ##########################################################
Digit .3 : ######################################################
Digit .4 : ##########################################################################
Digit .5 : ######################################################
Digit .6 : ##########################################################
Digit .7 : ##############################################
Digit .8 : ########################################################
Digit .9 : ########################################################

Digit preference score: **3** (0-7 excellent, 8-12 good, 13-20 acceptable and > 20 problematic)
p-value for chi2: 0,000 (significant difference)

**Evaluation of Standard deviation, Normal distribution, Skewness and Kurtosis using the 3 exclusion (Flag) procedures**

| . | no exclusion | exclusion from reference mean (WHO flags) | exclusion from observed mean (SMART flags) |
|---|---|---|---|
| **WHZ** | | | |
| Standard Deviation SD: | 1,16 | 1,15 | 1,05 |
| (The SD should be between 0.8 and 1.2) | | | |
| Prevalence (< -2) | | | |
| observed: | 4,3% | 4,3% | 3,4% |
| calculated with current SD: | 4,7% | 4,5% | 3,1% |
| calculated with a SD of 1: | 2,6% | 2,6% | 2,5% |
| **HAZ** | | | |
| Standard Deviation SD: | 1,45 | 1,40 | 1,18 |
| (The SD should be between 0.8 and 1.2) | | | |
| Prevalence (< -2) | | | |
| observed: | 35,7% | 35,6% | 35,5% |
| calculated with current SD: | 36,2% | 35,6% | 34,6% |
| calculated with a SD of 1: | 30,5% | 30,3% | 32,0% |
| **WAZ** | | | |
| Standard Deviation SD: | 1,13 | 1,11 | 1,03 |
| (The SD should be between 0.8 and 1.2) | | | |
| Prevalence (< -2) | | | |
| observed: | 14,4% | 14,3% | 13,8% |
| calculated with current SD: | 16,3% | 15,8% | 14,1% |
| calculated with a SD of 1: | 13,3% | 13,3% | 13,2% |
| **Results for Shapiro-Wilk test for normally (Gaussian) distributed data:** | | | |
| WHZ | p= 0,000 | p= 0,000 | p= 0,000 |
| HAZ | p= 0,000 | p= 0,000 | p= 0,000 |
| WAZ | p= 0,000 | p= 0,000 | p= 0,000 |
| (If p < 0.05 then the data are not normally distributed. If p > 0.05 you can consider the data normally distributed) | | | |
| **Skewness** | | | |
| WHZ | -0,26 | -0,12 | -0,02 |
| HAZ | 0,63 | 0,45 | 0,07 |
| WAZ | 0,02 | -0,04 | 0,00 |

If the value is:
-below minus 0.4 there is a relative excess of wasted/stunted/underweight subjects in the sample
-between minus 0.4 and minus 0.2, there may be a relative excess of wasted/stunted/underweight subjects in

the sample.
-between minus 0.2 and plus 0.2, the distribution can be considered as symmetrical.
-between 0.2 and 0.4, there may be an excess of obese/tall/overweight subjects in the sample.
-above 0.4, there is an excess of obese/tall/overweight subjects in the sample

**Kurtosis**

| | | | |
|---|---|---|---|
| WHZ | 2,28 | 0,99 | -0,06 |
| HAZ | 5,32 | 1,55 | -0,35 |
| WAZ | 2,59 | 0,87 | -0,05 |

Kurtosis characterizes the relative size of the body versus the tails of the distribution. Positive kurtosis indicates relatively large tails and small body. Negative kurtosis indicates relatively large body and small tails.
If the absolute value is:
-above 0.4 it indicates a problem. There might have been a problem with data collection or sampling.
-between 0.2 and 0.4, the data may be affected with a problem.
-less than an absolute value of 0.2 the distribution can be considered as normal.

## Test if cases are randomly distributed or aggregated over the clusters by calculation of the Index of Dispersion (ID) and comparison with the Poisson distribution for:

WHZ < -2: ID=7,09 (p=0,000)
WHZ < -3: ID=1,11 (p=0,263)
Oedema: ID=1,32 (p=0,052)
GAM: ID=7,18 (p=0,000)
SAM: ID=1,48 (p=0,010)
HAZ < -2: ID=66,90 (p=0,000)
HAZ < -3: ID=22,90 (p=0,000)
WAZ < -2: ID=27,80 (p=0,000)
WAZ < -3: ID=5,17 (p=0,000)

Subjects with SMART flags are excluded from this analysis.

The Index of Dispersion (ID) indicates the degree to which the cases are aggregated into certain clusters (the degree to which there are "pockets"). If the ID is less than 1 and p > 0.95 it indicates that the cases are UNIFORMLY distributed among the clusters. If the p value is between 0.05 and 0.95 the cases appear to be randomly distributed among the clusters, if ID is higher than 1 and p is less than 0.05 the cases are aggregated into certain cluster (there appear to be pockets of cases). If this is the case for Oedema but not for WHZ then aggregation of GAM and SAM cases is likely due to inclusion of oedematous cases in GAM and SAM estimates.

## Are the data of the same quality at the beginning and the end of the clusters?

Evaluation of the SD for WHZ depending upon the order the cases are measured within each cluster (if one cluster per day is measured then this will be related to the time of the day the measurement is made).

```
Time                                          SD for WHZ
point                 0.8 0.9 1.0 1.1 1.2 1.3 1.4 1.5 1.6 1.7 1.8 1.9 2.0 2.1 2.2 2.3
01: 1,42 (n=60, f=3)  ##########################
02: 1,15 (n=60, f=1)  ###############
03: 0,95 (n=59, f=1)  ######
04: 1,33 (n=60, f=2)  ######################
05: 1,12 (n=59, f=1)  ############
06: 1,09 (n=57, f=1)  ############
07: 0,90 (n=55, f=0)  ####
08: 1,25 (n=54, f=2)  ##################
09: 1,26 (n=54, f=1)  ##################
10: 0,93 (n=52, f=1)  #####
11: 0,93 (n=50, f=0)  ######
12: 1,14 (n=48, f=1)  ##############
13: 1,11 (n=48, f=1)  ############
14: 1,16 (n=48, f=0)  ###############
15: 1,07 (n=48, f=0)  ##########
16: 1,44 (n=47, f=2)  ##########################
17: 1,01 (n=46, f=0)  #########
18: 1,35 (n=46, f=2)  ######################
19: 0,97 (n=46, f=0)  #######
20: 0,99 (n=47, f=1)  ########
21: 0,96 (n=45, f=0)  #######
```

```
22: 1,08 (n=44, f=1)  ############
23: 1,40 (n=46, f=1)  ########################
24: 1,14 (n=46, f=1)  ##############
25: 1,45 (n=44, f=2)  ############################
26: 1,14 (n=45, f=1)  ##############
27: 1,09 (n=44, f=0)  ############
28: 1,12 (n=45, f=0)  ##############
29: 1,08 (n=45, f=1)  ############
30: 1,21 (n=44, f=0)  ##################
31: 1,05 (n=45, f=1)  ##########
32: 1,04 (n=45, f=1)  ##########
33: 1,23 (n=45, f=1)  ##################
34: 1,29 (n=45, f=1)  ####################
35: 1,13 (n=44, f=1)  ##############
36: 1,30 (n=45, f=2)  ####################
37: 1,26 (n=45, f=0)  ##################
38: 1,37 (n=45, f=3)  ########################
39: 0,94 (n=45, f=0)  ######
40: 1,02 (n=45, f=0)  #########
41: 1,11 (n=42, f=1)  ##############
42: 1,08 (n=43, f=0)  ############
43: 1,30 (n=41, f=1)  ####################
44: 1,12 (n=43, f=1)  ##############
45: 1,11 (n=43, f=0)  ##############
46: 1,06 (n=43, f=0)  ############
47: 1,69 (n=43, f=4)  ####################################
48: 0,95 (n=42, f=0)  ######
49: 1,26 (n=42, f=2)  ##################
50: 1,13 (n=43, f=0)  ##############
51: 1,20 (n=43, f=1)  ##################
52: 1,05 (n=43, f=1)  ##########
53: 1,16 (n=43, f=0)  ###############
54: 0,96 (n=43, f=0)  #######
55: 1,12 (n=40, f=1)  ##############
56: 1,23 (n=43, f=1)  ##################
57: 1,26 (n=43, f=1)  ##################
58: 1,09 (n=43, f=1)  ############
59: 1,25 (n=43, f=3)  ##################
60: 1,16 (n=42, f=2)  ###############
61: 1,21 (n=42, f=1)  ##################
62: 1,28 (n=42, f=1)  ####################
63: 1,20 (n=41, f=2)  ##################
64: 1,22 (n=42, f=1)  ##################
65: 1,32 (n=41, f=1)  ######################
66: 1,30 (n=41, f=1)  ####################
67: 0,97 (n=42, f=0)  #######
68: 1,51 (n=41, f=2)  ##############################
69: 0,97 (n=42, f=0)  #######
70: 1,30 (n=42, f=1)  ####################
71: 1,09 (n=42, f=1)  ############
72: 1,15 (n=42, f=2)  ###############
73: 1,44 (n=41, f=3)  ############################
74: 1,06 (n=41, f=0)  ###########
75: 1,50 (n=40, f=2)  ##############################
76: 1,12 (n=40, f=1)  ##############
77: 1,28 (n=40, f=1)  ####################
78: 1,18 (n=39, f=1)  ################
79: 1,25 (n=39, f=1)  ##################
80: 1,22 (n=38, f=2)  ##################
81: 1,18 (n=37, f=0)  ################
82: 1,39 (n=38, f=2)  ########################
83: 1,27 (n=37, f=1)  ####################
84: 1,56 (n=36, f=3)  ################################
85: 0,80 (n=38, f=0)
86: 1,27 (n=38, f=1)  ####################
87: 1,01 (n=38, f=0)  #########
88: 0,94 (n=37, f=0)  ######
89: 0,87 (n=37, f=0)  ###
90: 1,03 (n=37, f=0)  #########
91: 1,23 (n=36, f=0)  ##################
92: 1,19 (n=36, f=0)  ################
93: 1,22 (n=36, f=0)  ##################
94: 1,11 (n=36, f=1)  ##############
95: 1,22 (n=36, f=2)  ##################
96: 1,23 (n=35, f=0)  ##################
97: 0,90 (n=35, f=0)  ####
98: 1,01 (n=35, f=0)  #########
99: 1,17 (n=35, f=0)  ###############
```

(when n is much less than the average number of subjects per cluster different symbols are used: 0 for n < 80% and ~ for n < 40%; The numbers marked "f" are the numbers of SMART flags found in the different time points)