



United Republic of Tanzania

TANZANIA NATIONAL **NUTRITION** SURVEY 2018

JUNE 2019





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FINAL REPORT

This survey was possible thanks to technical and financial support from the following partners:



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Foreword

The 2018 Tanzania National Nutrition Survey using SMART Methodology (TNNS) is the second survey of this kind to be conducted in Tanzania. Tanzania Food and Nutrition Centre (TFNC), National Bureau of Statistics (NBS), Tanzania Mainland; and Office of the Chief Government Statistician (OCGS), Zanzibar; conducted the survey in collaboration with the President's Office – Regional Administration and Local Governments; Ministry of Health, Community Development, Gender, Elderly and Children (MoHCDGEC), Tanzania Mainland; the Ministry of Health (MoH), Zanzibar and the University of Dodoma (UDOM). The 2018 TNNS follows up the previous survey conducted in 2014. The availability of data and reports from these surveys grants us with massive data for measuring the extent of implementation of several health and nutrition indicators identified in the national nutrition plans as well as in country's development agenda.

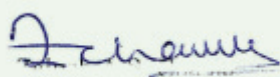
The objectives of this survey were to obtain the current and reliable information on nutrition indicators in order to assess nutritional status of children aged 0-59 months and women aged 15-49 years, infant and young child feeding (IYCF) practices, micronutrients interventions (coverage of vitamin A and iron/folic acid supplementation, deworming and iodized salt) and handwashing practices. In addition burden of anaemia among women of reproductive age was measured as this is a major nutritional concern in Tanzania.

The 2018 TNNS was implemented with financial support from various donors, including the Government of the United Republic of Tanzania, United Nations Children's Fund (UNICEF), The United Kingdom's government under the Department for International Development (DFID), Irish Aid and Nutrition International (NI). Technical and logistical assistance to this survey was provided by University of Dodoma (UDOM), Doctors with Africa CUAMM, Action Against Hunger – Canada (ACF), Catholic Relief Services (CRS), IMA World Health, World Vision, World Health Organization (WHO) and World Food Program (WFP). Enormous support was rendered by the SMART survey Consultant supported by the Steering Committee and Technical Committee of the 2018 TNNS.

This report presents the detailed findings from the 2018 TNNS at national and regional levels. The report provides useful information for assessing the country's performance with regard to some of the health and nutrition indicators included in the national and international development agendas, such as the Second National Five Year Development Plan (FYDP II), the 2030 Agenda for Sustainable Development, the 2025 World Health Assembly (WHA) targets, Health Sector Strategic Plan IV (2015-2020), and the National Multisectoral Nutrition Action Plan (NMNAP) 2016–2021.

I, therefore, take this opportunity to encourage policy makers, planners, program managers, and other stakeholders in the nutrition spectrum to make use of these enormous findings for making informed policy decisions based on quality planning, monitoring, and evaluating programmes in the desire of getting rid of all forms of malnutrition.

Finally, I also advise researchers and other nutrition experts to undertake further analysis of the available data, particularly in the areas that calls for in-depth relational analysis to unfold the reasons behind the results produced in this report. It is expected that the analysed data will ultimately be made available for use by nutrition stakeholders and general public as well.



Dr. Zainab A.S. Chaula

PERMANENT SECRETARY

MINISTRY OF HEALTH, COMMUNITY DEVELOPMENT, GENDER, ELDERLY AND CHILDREN

Acknowledgements

It gives us great pleasure to present the report of the 2nd National Nutrition Surveys using SMART (Standardized Monitoring and Assessment of Relief and Transitions) methodology. The successful completion of this survey and the quality of information presented in this report is a result of high level of commitment of many individuals and institutions, we utter a big thank to all of them. Our appreciation goes to all individuals who were involved for their enthusiasm, technical advice and financial assistance.

Sincere gratitude is expressed to the Government of the United Republic of Tanzania for its support in the whole process of implementing the survey. Also, we extend our appreciation to Ethical Committees both in Zanzibar and Mainland for their valuable comments and recommendations which led to a successful completion of the survey.

Similarly, we would like to thank the Government through Regional Administration and Local Government Authorities who supported field work process in their localities. It is through their courtesy during our team's visits in regions, districts, wards, *shelia*, villages and *mitaa* which enabled smooth process of data collection. To an exemplary degree, we thank all members of selected households who responded positively on the day of data collection as well as mothers and children who participated in this survey.

Likewise, our sincere gratitude goes to Ms. Fanny Cassard (SMART Survey Consultant) for her tireless efforts to ensure that the survey is implemented in highest standard possible and Ms. Lydia Ndungu of Action Against Hunger-Canada for technical support during survey training and piloting. In addition, the success in terms of quality of information presented in this report is due to the outstanding contribution supervisors, team leaders and enumerators used in this survey.

Our sincere appreciation goes to UNICEF for overall financial patronage; to DFID and Irish Aid who covered a significant share of the total survey cost; and NI for providing additional financial contribution. Moreover, technical and logistical support provided by University of Dodoma, Doctors with Africa CUAMM, ACF, CRS, IMA World Health, World Vision, WHO and WFP is highly commended and cherished. Indeed, your enormous support, enabled us to realize our expectation of having a considerably smooth, rapid and transparent undertaking.

Sincerely, our gratitude is expressed to the members of the SMART Survey Steering Committee for their high level commitment in making this important endeavor a success. Those are: Mr. Obey Assery (SUN National Focal Person); Dr. Ntully Kapologwe (PORALG); Dr. Leonard Subi and Dr. Zainabu Chaula (MoHCDGEC); Mr. Geoffrey E. Chiduo (TFNC); Dr. Fadhil Abdallah (MoH – Zanzibar) and Mr. Mauro Brero (UNICEF). In addition, the success in terms of quality of information presented in this report is due to outstanding contribution of members of the SMART Survey Technical Committee who were: Mr. Adam Hancy and Ms. Maria Ngilisho (TFNC); Dr. Ramadhani Mwiru (UNICEF); Mr. Bernard Makene (NI); Mr. Shabbir Lalji (IMA World Health); Mr. Peter Kaswahili (MoHCDGEC); Mr. Abbasy Mlemba (NBS); Ms. Asha Hassan and Ms. Sabiha Khalfan Said (MoH – Zanzibar); Mr. Abdul-Majid Ramadhan (OCGS), Dr. Stephen Kibusi (UDOM) and Dr. Giulia Segafredo (CUAMM). The work of these committees made this survey possible.

Lastly, we expect that this report plays a crucial role in provision of data to track progress on attaining nutrition results outlined in the National Multisectoral Nutrition Action Plan (NMNAP) 2016-21, in the second Five Year Development Plan (FYDP II) 2016-21, the Scaling Up Nutrition (SUN) Movement, the 2025 World Health Assembly (WHA) targets and on the 2030 Sustainable Development Goals (SDGs). Advantage should be taken of the availability of this information to further strengthen nutrition programming in Tanzania.

Dr. Vincent D. Assey
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List of Acronyms

ACF	Action Contre la Faim
AIDS	Acquired Immune Deficiency Syndrome
BMI	Body Mass Index
CI	Confidence Interval
CRRAF	Common Results Resources and Accountability Framework
CRS	Catholic Relief Services
CUAMM	Collegio Universitario Aspiranti e Medici Missionari
DHS	Demographic and Health Survey
DNuO	District Nutrition Officer
DPS	Digit Preference Score
EA	Enumeration Area
ENA	Emergency Nutrition Assessment
EPI	Expanded Program on Immunization
FEWSNET	Famine Early Warning Systems
GAM	Global Acute Malnutrition
HAZ	Height-for-Age Z-scores
Hb	Haemoglobin
HH	Household
HIV	Human Immunodeficiency Virus
HLSCN	High Level Steering Committee for Nutrition
IFA	Iron-Folic Acid
IHI	Ifakara Health Institute
IMA	Interchurch Medical Assistance
IPC	Integrated Food Security Phase Classification
IYCF	Infant and Young Child Feeding
LGA	Local Government Authority
MAD	Minimum Acceptable Diet
MAM	Moderate Acute Malnutrition
MDC	Mobile Data Collection
MICS	Multiple Indicator Cluster Surveys
MoH	Ministry of Health
MoHCDGEC	Ministry of Health, Community Development, Gender, Elderly and Children
MUAC	Mid-Upper Arm Circumference
NBS	National Bureau of Statistics
NI	Nutrition International
NICS	Nutrition Information in Crisis Situation
NIMR	National Institute for Medical Research
NMNAP	National Multisectoral Nutrition Action Plan
NNS	National Nutrition Survey
OCGS	Office of Chief Government Statistician
ODK	Open Data Kit
ORS	Oral Rehydration Salt
PO-RALG	President's Office – Regional Administration and Local Governments
PPS	Probability Proportion to Size
RC	Reserve Cluster
RNuO	Regional Nutrition Officer
SAM	Severe Acute Malnutrition
SD	Standard Deviation

SDG	Sustainable Development Goal
SMART	Standardized Monitoring and Assessment of Relief and Transitions
STATA	Data analysis and statistical software
SUN	Scaling Up Nutrition
TC	Technical Committee
TDHS	Tanzania Demographic and Health Survey
TFNC	Tanzania Food and Nutrition Centre
TNNS	Tanzania National Nutrition Survey
ToT	Training of Trainers
U5	Under five years of age
UDOM	University of Dodoma
UNICEF	United Nations Children’s Fund
VAS	Vitamin A supplementation
VIP	Ventilated Improved Pit (latrine)
WASH	Water, Sanitation and Hygiene
WAZ	Weight-for-Age Z-scores
WFP	World Food Programme
WHA	World Health Assembly
WHO	World Health Organization
WHZ	Weight-for-Height Z-scores
ZAMREC	Zanzibar Medical Research and Ethics Committee

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Executive Summary

This report presents the results of the second National Nutrition Survey (NNS) using the SMART Methodology in Tanzania. This nutrition survey was conducted from September 25th to November 17th, 2018. The objectives of the survey were to assess nutritional status of children aged 0-59 months and of women aged 15-49 years, coverage level of infant and young child feeding practices, coverage of micronutrient interventions and access to sanitation and hygiene facilities 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 1081 clusters of between 16 and 20 households and 17,524 children less than 5 years of age and 9,426 women in reproductive age group were surveyed. Sample sizes were calculated at regional level in order to estimate global acute malnutrition with a desired precision of between 1.5-3 percent with design effect of 1.226. Ninety-nine 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 31 domains were selected based on the current administrative structure (31 regions).

Data Quality Summary

Following the SMART recommendations, issues of data quality are reported and addressed for this survey in order to identify mistakes to avoid in future and to consistently improving the quality of nutrition surveys. The full data quality report from the ENA software is included in the annexes of the report.

In the raw data, 84% of the children were found to have an age calculated from an exact day, month and year of birth, ranging from 70% to 97% 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 varied from 0.8 to 1.2. It is within acceptable range.

All age groups were represented in proportions between 19.8% and 21.9%; only the 48-59 months age group was slightly less represented since it represented only 17.6% of the sample. There was no difference by age group regarding the sex-ratio. The overall age distribution showed fewer older children were measured compared to younger children.

At national level, the distributions of curves of Weight/Height, Height/Age and Weight/Age all followed bell shaped curves. The standard deviation for the distribution of Height/Age z-score was found to be above 1.2 in Arusha, Mainland, Zanzibar and at national level. The standard deviations of Weight/Height z-score and Weight/Age z-score for the 31 regions were inside the acceptable range of standard deviations 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 significantly decreased from 34.7% (TNNS 2014) to 31.8% (30.7-32.9 95% CI). Severe stunting was found in 10.0 % of children countrywide. In Mainland, according to the new, 2018 UNICEF-WHO classification, the level of stunting was considered “very high” ($\geq 30\%$) in 15 regions out of 26. The most affected regions with a prevalence of stunting exceeding 40% were: Ruvuma (41.0%), Iringa (47.1%), Rukwa (47.9%), Kigoma (42.3%), Njombe (53.6%) and Songwe (43.3%). In Zanzibar, stunting rates were ranging from 20.4% in Stone Town to 23.8% in Unguja North. Between 2014 and 2018, a significant decrease of the prevalence of stunting was observed in Dodoma, in Morogoro, in Pwani, in Lindi, in Tabora, in Kagera, in Mwanza and in Katavi.

Nevertheless, according to those results, approximately 3 million children under five years of age are stunted in Tanzania in 2018. Nutrition interventions should be prioritized in the regions with the higher number of

stunted children and the higher prevalence of chronic malnutrition i.e. Kagera, Kigoma, Dodoma, Geita, Tanga, Ruvuma and Mbeya followed by Mara, Morogoro, Dar es Salaam and Tabora.

At national level, 3.5% (3.2-3.9 95% CI) of children aged 0-59 months were found to have Global Acute Malnutrition (GAM) and 0.4% (0.3-0.5 95% CI) suffered from Severe Acute Malnutrition (SAM) versus 3.8% and 0.9% respectively in TNNS 2014. For Tanzania Mainland, the survey results showed a level of GAM considered “very low” (<2.5%) in 7 regions out of 26: Kilimanjaro, Mtwara, Lindi, Rukwa, Mara, Njombe and Songwe. The prevalence of GAM was exceeding the 5% threshold in Singida with 5.2%. In Zanzibar, the prevalence of GAM was ranging from 4.3% in Unguja South to 7.7% in Unguja North. In Zanzibar, the GAM prevalence decreased from 7.2% in 2014 to 6.1%. There are approximately 440,000 moderately acute malnourished children and 90,000 severely acute malnourished children in Tanzania in 2018¹.

At national level, the prevalence of underweight of 14.6% (13.9-15.3 95% CI) was significantly higher than in 2014 (13.4%; $p < 0.05$).

The prevalence of overweight among children 0 to 59 months of age was ranging from 0.8% in Pemba North to 5.3% in Mbeya. At national level, the overweight rate was 2.8% including 0.5% of severe overweight, which was significantly lower than in 2014 (4.5%).

Child's size and weight at birth

Among all births of surveyed children, 2.5% of infants were reported as very small and 4.0% smaller than average. The percentage of children considered very small or smaller than average was slightly higher in the 2015-16 TDHS with respectively 3% and 7.2%. Weight at birth was available for 80.9% of surveyed children. Among the infants whose birth weight was reported, 6.3% weighed less than 2.5 kg at birth. The prevalence of low birth weight was ranging from 3.8% in Manyara and Mara to 11.0% in Ruvuma. In Zanzibar the percentage of births with a reported birth weight less than 2.5 kg was higher than for Mainland with 8.3%.

Vitamin A Supplementation and Deworming

The proportion of all children aged 6-59 months who had received vitamin A in the last 6 months was 63.8% (62.1-65.6 95% CI) which is lower than in 2014 (72.2%), but better than in 2015-16 (41.2%). About 36.2% of the children did not receive vitamin A supplement, which is alarming. The lowest coverage of vitamin A supplementation were noted in Tanga, Rukwa, Shinyanga and Katavi, with less than 50%. The coverage of vitamin A supplementation was ranging from 30.0% in Katavi to 84.9% in Iringa. In Zanzibar, the coverage of vitamin A supplementation increased from 58.2% in 2014 to 78.9%.

At national level, the proportion of all children aged 12-59 months who had received deworming tablets in the last 6 months was 59.0% (57.2-60.8 95% CI). Coverage of deworming decreased from 70.6% in 2014 to 59.0%. The lowest coverage of deworming were noted in Tanga, Rukwa, Shinyanga, Tabora, Kigoma, Manyara and Katavi, with less than 50%. The coverage of deworming was ranging from 33.0% in Shinyanga to 85.0% in Pemba North. In Zanzibar, like for the coverage of vitamin A supplementation, the coverage of deworming increased from 68.4% in 2014 to 80.7%.

The coverage of vitamin A supplementation and deworming was below 90% in all regions.

Infant and Young Child Feeding (IYCF) practices

The survey indicated that 96.6% of children 0-23 months reported to have been ever breastfed. A marked improvement in timely initiation of breastfeeding was observed as 53.5% of children 0-23 months initiated breastfeeding within 1 hour, which was significantly higher than the rate found in 2014 (50.8%). Almost 58% of infants under six months of age were exclusively breastfed. A significant improvement was noticed from 2014 (41.1%) to 2018. In Zanzibar, timely initiation of breastfeeding significantly decreased from 61.7% in 2014 to 52.7% but a significant increase of the exclusive breastfeeding rate was noticed between 2014 and 2018 (from 19.7% to 30.0%). The survey revealed that 92.2% of children 12-15 months were fed breast milk during the day prior to survey. Less than 45% of children 20-23 months were still breastfed (43.3%).

¹ MAM Caseload = Population 0-59 months x Prevalence x 1.5. SAM Caseload = Population 0-59 months x Prevalence x 2.6.
Sources: (1) UNICEF Global SAM Management Update. Summary of findings. September 2013. (2) How do we estimate case load for SAM and/or MAM in children 6-59 months in a given time period. Mark Myatt, June 2012

At national level, the survey showed that 86.8% of children from 6 to 8 months had a timely introduction of complementary food which is close to the result found in 2014 (89.5%). The proportion of children aged 6-23 months who received foods from 4 or more food groups was 35.1%. The survey showed a significant improvement of the minimum dietary diversity for children 6-23 months of age, between 2014 and 2018 (24.5% vs 35.1%). On average, 3 food groups out of 7 were consumed. The proportion of children aged 6-23 months who received solid, semi-solid or soft foods the minimum number of times or more was 57.4%. The minimum meal frequency was significantly higher than in 2015-16 (39.9%), but significantly lower than in 2014 (65.7%). The survey revealed that 30.3% of children 6-23 months received a minimum acceptable diet. A significant improvement was observed for this indicator between 2014 and 2018 (from 20.0% to 30.3%).

Women Nutritional Status

At national level, according to Body Mass Index (BMI) classification, 7.3% of non-pregnant women 15-49 years of age were classified being in underweight (BMI<18.5). The prevalence of underweight is oscillating between 5 and 10% for several decades now. A prevalence of underweight exceeding 10% was found in Unguja North (14.9%), in Pemba North (12.1%), Manyara (12.9%), Kagera (11.2%) and Singida (10.8%). Prevalence of underweight were higher in age groups 15-19 years and 20-24 years with respectively 14.8% and 7.6%. At national level, the proportion of pregnant women of reproductive age who were malnourished (MUAC<220 mm) was 1.6%. By age group, the prevalence of low MUAC was higher among the adolescent girls aged from 15 to 19 years with 3.4% than among older age groups (from 0.0% to 1.9%).

In contrast to the prevalence of thinness, 31.7% of women were found to be overweight or obese. The prevalence of obesity was 11.5%. The prevalence of overnutrition (overweight or obese) increased from 11.3% in 1991-92 to 31.7% in 2018. High levels of obesity were found in Kilimanjaro (20.6%), Dar es Salaam (24.0%), Stone Town (26.0%) and Unguja South (24.6%). In Zanzibar, the prevalence of overweight was 41.8%. Prevalence of obesity among women 15-49 years was increasing with age ranging from 1.9% among women aged 15-19 years to 21.0% among women aged 45-49 years.

Iron-Folic Acid (IFA) Supplementation

At national level, 28.5% of women 15-49 years of age with children under five years of age took an iron-folic acid supplementation for 90 days or longer during pregnancy for past birth, as recommended by WHO. In Zanzibar this rate was much lower with 12.8%. The proportion of pregnant women taking iron-folic acid supplements has increased over time from 3.5% in TDHS 2010 to 17.5% in the TNNS 2014, to 21.4% in the TDHS 2015-16, and further to 28.5% in 2018.

Women Anaemia

At national level, the prevalence of anaemia significantly decreased from 44.8% in 2015-16 to 28.8% in 2018. In Mainland like in Zanzibar, the decrease between 2015-16 and 2018 was mainly due to the reduction of the prevalence of mild anaemia. The highest prevalence were found in Mwanza (38.4%), Simiyu (37.4%), Geita (36.3%) and Mara (35.7%). The lowest prevalence were found in Kilimanjaro (13.5%), Iringa (16.8%), Singida (17.0%) and Songwe (19.1%). In Zanzibar, the prevalence of anaemia was ranging from 37.5% in Stone Town to 49.2% in Pemba South.

Salt Adequately Iodized

At national level, the salt was adequately iodized (iodine content $\geq$ 15 ppm), in only 61.2% of households. There is no significant improvement between 2015-16 and 2018 as the percentage of household with adequately iodized salt was 60.6% in 2015-16. In Zanzibar, the percentage of households with adequately iodized salt is significantly lower than in Mainland, with respectively 39.0% and 61.8%. Four regions had a percentage of salt non-iodized above 10%: Dodoma (11.0%), Simiyu (18.9%), Manyara (28.6%) and Singida (34.2%).

Sanitation Facilities

In Tanzania, one in four households (25.0%) used improved toilet facilities. Use of improved non-shared toilet facilities was much higher among households in Zanzibar (59.2%) than in Mainland (24.0%). Fifty five percent of households in Tanzania used unimproved toilet facilities or had no toilet facilities at all, which increases

the risk of disease transmission (55.9% in Mainland and 26.9% in Zanzibar). Use of improved non-shared toilet facilities increased from 19.1% in TDHS 2015-16 to 25.0% in 2018. The percent of households using unimproved toilet facilities decreased from 64.5% in TDHS 2015-16 to 55.1% in 2018.

At national level, 87.1% of the households were disposing children's faeces safely. This rate was higher than in TDHS 2015-16 where the proportion of households with children under three years old that dispose of faeces safely was 71.9%.

Diarrhoea in the past two weeks

At national level, the survey findings indicated that 14.0% of children had diarrhoea (3 or more times loose or watery stools in a day) in the past two weeks preceding the survey; this prevalence was higher than in TDHS 2015-16 (11.8%). The highest rates were in Manyara (27.8%), Arusha (25.2%), Songwe (23.8%) and Kigoma (20.9%) where approximately one child out of four was suffering from diarrhoea.

Use of Soap and Handwashing Practices

At national level, use of soap was 69.4%. Availability of soap was ranging from 46.1% in Songwe to 86.9% in Njombe. In Zanzibar, use of soap was ranging from 40.5% in Unguja North to 63.6% in Pemba North.

In the TDHS 2015-16, use of soap² was lower than in 2018 with 59.2% of households who report having soap.

At national level, only 2.7% of the interviewed households members reported having used soap for handwashing at least at two critical times during past 24 hours (including "after defecating") (2.8% in Mainland and 0.6% in Zanzibar). Those results were much lower than in 2014 where 11.7% of households were reported having used soap for handwashing at least at two critical times during past 24 hours.

Conclusion and Recommendations

The second National Nutrition Survey conducted in 2018 showed a marked improvement in the prevalence of stunting among children under five years in Tanzania. Between 2014 and 2018, chronic malnutrition, or stunting, was reduced from 34.7% to 31.8%. The National Multi-Sectoral Nutrition Action Plan (NMNAP, 2016-2021) among other targets aims to reduce the percentage of stunted children in Tanzania from 34.5% to 28% by 2021; the mid-term target 2018-19 of 32% was met. Despite this progress, it is estimated that more than 2,700,000 children under five years of age are stunted in 2019.

The prevalence of global acute malnutrition among children under five years decreased from 3.8% in 2014 to 3.5% in 2018. In 2019, it is estimated that approximately 420,000 children under five years will suffer from acute malnutrition. Among them approximately 85,000 will suffer from severe acute malnutrition with high risk of dying if they do not receive appropriate treatment.

The coverage of vitamin A supplementation and deworming was below 90% in all regions of Tanzania, and below 50% in Tanga, Rukwa, Shinyanga, Tabora, Kigoma, Manyara and Katavi.

Regarding the breastfeeding practices some improvements were noticed as compared to the 2014 survey results (timely initiation of breastfeeding and exclusive breastfeeding under 6 months). The survey showed also a significant improvement of the minimum dietary diversity and the minimum acceptable diet. The mid-term target from the NMNAP regarding the minimum acceptable diet was also met with a prevalence of 30% against a target of 25%.

Survey results showed that it is important to strengthen interventions to improve maternal nutrition and health, beginning with adolescent girls. An important improvement was noticed regarding the proportion of pregnant women taking iron-folic acid supplements which has increased over time from 3.5% in TDHS 2010 to 28.5% in 2018. Also, the prevalence of anaemia among non-pregnant women significantly decreased from 44.8% in 2015-16 to 28.8% in 2018.

Nevertheless, another form of malnutrition, linked to the economic development, is raising in Tanzania. According to the survey results, 31.7% of women 15-49 years were found to be overweight and 11.5% were obese. In Zanzibar, the prevalence of overweight was exceeding 40%.

2 TDHS: Soap, detergent and other cleaning agent

Because stunting results from several household, environmental, socioeconomic and cultural factors, reduction of stunting requires that direct nutrition interventions are integrated and implemented in tandem with nutrition-sensitive interventions. For example, prevention of infections requires household practices such as handwashing with soap.

At national level, use of soap was 69.4% and only 2.7% of the interviewed households members reported having used soap for handwashing at least at two critical times during past 24 hours (including “after defecating”). Fifty five percent of households in Tanzania used unimproved toilet facilities or had no toilet facilities at all, which increases the risk of disease transmission (55.9% in Mainland and 26.9% in Zanzibar). Although it is difficult to compare cross sectional survey data collected during different seasons, there was no reduction in the number of children who had diarrhoea in the current survey compared to the previous TDHS. This may be due to poor hygienic practices.

Several general recommendations are provided below. It is important to note that those recommendations are preliminary and that the survey findings will be reviewed and analyzed in-depth to support the mid-term review of the National Multisectoral Nutrition Action Plan 2016-21. More in-depth analyses related to context need to be done to better understand the results and the trends.

With regards to stunting, it is highly recommended to target children under 2 years of age and pregnant women through improving infant and young child feeding practices and maternal education towards behavioral and practice changes. It is recommended to:

- Continue promoting appropriate IYCF practices (Early initiation of breastfeeding, exclusive breastfeeding, continued breastfeeding up to 2 years, timely introduction of appropriate and adequate complementary feeding) through nutrition education sessions and using behavior change communication interventions;
- Continue to improve the health and nutrition programmes for promoting, supporting and protecting exclusive breastfeeding for the first six months of life, continued breastfeeding up to two years of age and beyond;
- Scale-up community-based programmes to provide information and counselling on optimal and appropriate breastfeeding and complementary feeding practices;
- Conduct communication campaigns on preventative activities more frequently (prenatal care, nutrition of pregnant women, promotion of exclusive breastfeeding, complementary feeding and continued breastfeeding, good hygienic practices, etc.).

With regards to acute malnutrition, it is recommended to:

- Continue and strengthen the existing nutrition programmes (Community-based Management of Acute Malnutrition (CMAM), screening activities especially at community level) in order to maintain these low levels of acute malnutrition and decrease prevalence of moderate acute malnutrition.

With regards to vitamin A supplementation and deworming, it is recommended to:

- Strengthen integrated child health days (improved planning at district level, strengthening distribution channels of vitamin A and deworming supplies and monitoring and evaluation of child health days;
- Increased social mobilization and community involvement before and during child health days;
- Strengthen integration of vitamin A supplementation into routine health services and health campaigns.

With regards to women of reproductive age and pregnant and lactating women, it is recommended to:

- Review of policies and strategic planning documents that are relevant for the prevention of overweight and obesity;
- Improve adolescent girl and adult women’s knowledge on diet quality (focus on adolescent women and pregnant women food needs and on low birth weight matter).
- Promote the multiple micronutrient supplementation in pregnancy (including iron and folic acid) and a balanced food intake.

Iodine deficiency has adverse effects on both pregnant outcome and child development, and school performance. Tanzania has adopted universal salt iodization as a measure to prevent iodine deficiency disorders among children and adults. Consequently, it is recommended to strengthen action towards universal iodization of salt in all regions, especially in Zanzibar, in regions with a low percentage of use of adequately iodized salt

at household level and in the four regions with the highest percentage of salt non-iodized (Dodoma, Simiyu, Manyara and Singida).

With regards to management of diarrhoea episodes and hygiene it is recommended to:

- Strengthen sensitization about handwashing practices (critical times) and use of soap. Soap eliminates diarrhea-inducing pathogens from the skin;
- Increase awareness about the importance of oral rehydration therapy (ORS or increased fluids) and continuous feeding to treat an episode of diarrhea.

Finally, it was agreed with the Government of Tanzania to repeat the National Nutrition Survey every four years, in between Demographic Health Surveys that are carried out every five years, to ensure regular monitoring of the situation of the nutritional status of Tanzanian children, adolescents and women and provide essential information for evidence-based planning and programming for nutrition. It is recommended to plan for the next survey in September-November 2022 following the same methodology as the present investigation.

Summary of Main Results

Surveys	TNNS 2014	TNNS 2018
CHILDREN 0-59 months %		
Acute Malnutrition (WHO 2006 Growth Standards)		
Global Acute Malnutrition (GAM)	3.8	3.5
Moderate Acute Malnutrition (MAM)	2.9	3.1
Severe Acute Malnutrition (SAM)	0.9	0.4
Oedema	0.07	0.03
Overweight	3.5	2.8
Stunting (WHO 2006 Growth Standards)		
Total Stunting	34.7	31.8
Severe Stunting	11.5	10.0
Programme coverage		
Vitamin A supplementation within past 6 months with card or recall (6-59 months)	72.2	63.8
Deworming within past 6 months with card or recall (12-59 months)	70.6	59.0
Diarrhoea		
Diarrhoea in last 2 weeks	n/a	14.0
Low birth weight		
Births with a reported birth weight less than 2.5 kg	n/a	6.3
All births with a reported birth weight	n/a	80.9
CHILDREN 0-23 months %		
Infant and Young Child Feeding indicators		
Children ever breastfed	98.4	96.6
Timely initiation of breastfeeding	50.8	53.5
Exclusive breastfeeding under 6 months	41.1	57.8
Continued breastfeeding at 1 year	90.0	92.2
Continued breastfeeding at 2 years	48.2	43.3

Timely introduction of complementary food	89.5	86.8
Minimum dietary diversity	24.5	35.1
Minimum meal frequency	65.7	57.4
Minimum acceptable diet	20.0	30.3
WOMEN 15-49 years %		
Nutritional Status		
Overweight (BMI $\geq$ 25.0)	29.7	31.7
Obesity (BMI $\geq$ 30.0)	9.7	11.5
Underweight (BMI<18.5)	5.9	7.3
Low MUAC (MUAC<220mm - pregnant women only)	n/a	1.6
IFA supplementation		
Women 15-49 years of age with children under five years of age who took an IFA supplementation during pregnancy for past birth for 90 days or more	17.5	28.5
Anaemia (non-pregnant)		
Total Anaemia (Hb <12.0 g/dl)	n/a	28.8
Mild (Hb 11.0-11.9 g/dL)	n/a	16.1
Moderate (Hb 8.0-10.9 g/dL)	n/a	11.7
Severe (Hb<8.0 g/dL)	n/a	1.0
HOUSEHOLD %		
SALT		
Households with salt adequately iodized	n/a	61.2
WASH		
Households with soap	91.4	69.4
Households who report having used soap for hand-washing at least at two critical times during past 24 hours	11.7	2.7
Household that use an improved excreta disposal facility (improved toilet facility, not shared)	n/a	25.0
Household that use a shared facility (improved toilet facility, 2 households or more)	n/a	19.9
Household that use an unimproved toilet (unimproved toilet facility or public toilet)	n/a	55.1
Households with children under three years old that dispose of faeces safely	n/a	87.1

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 51.6 million people (50.0 million in Mainland; 1.6 million in Zanzibar), Tanzania is characterized by high population growth rate (2.7%) [1]. The population of Tanzania is young, with 46% of the population under age 15 [2]. Tanzania's real gross domestic product grew by 7.1 % in 2017 according to official statistics. Growth in 2017 was supported by expansion in both the industrial and agriculture sectors. Improvement in infrastructure and relatively stable power supply facilitated the expansion in the industrial sector while favorable weather conditions supported increased crop production. Poverty has declined since 2007 and continues at a modest pace, with a fall in the poverty rate from 28.2% in 2012 to 26.9% in 2016. This decline has been accompanied by improvements in human development outcomes and living conditions (the country was ranked 154th out of 189 in the 2018 UN Human Development Index). Improved health outcomes have driven this progress, along with robust gains in education and incomes. [3; 4].

Despite significant improvements in recent years, Tanzania has high level of malnutrition among children and women. According to Tanzania Demographic and Health Surveys (TDHS), stunting prevalence among children under five years decreased from 50% in the 1990s to 34% in 2015 (34.8% for Mainland and 23.5% for Zanzibar) [2; 5]. During the same period, the prevalence of underweight among children under five years decreased from 25% to 14% (13.6% for Mainland and 13.8% for Zanzibar), and the prevalence of global acute malnutrition among children under five years decreased from 8% to 5% (4.4% for Mainland and 7.1% for Zanzibar) [2; 5]. Prevalence of anaemia among children decreased from 72% in 2005 [6] to 59% in 2010 [7], but stagnated at 58% in 2015/16 (57.4% for Mainland and 64.5% for Zanzibar) [6]. Prevalence of anaemia among women of reproductive age decreased from 48% in 2005 to 41% in 2010, but increased again to 45% in 2015/16 (TDHS) (44.3% for Mainland and 60.1% for Zanzibar) [2; 6; 7]. Additionally, Tanzania is now facing the double burden of malnutrition, with the effects of overnutrition - including overweight obesity and diet related non-communicable diseases - being increasingly visible in Tanzania. For example, according to the TDHS 2015/16, 28% of women of reproductive age are overweight and obese (28.1% for Mainland and 38.9% for Zanzibar); in the highest wealth quintile, 47% are overweight and obese. Generally, rural areas are more affected by undernutrition, while urban areas are more affected by overweight and obesity. The prevalence of stunting among children living in urban areas was 24.7% compared to 37.8% for children living in rural areas [2].

Nutrition is among development priorities in Tanzania, and the Government has taken important initiatives to address it. A National Nutrition Strategy 2011-16 was developed in Mainland Tanzania and in 2016 nutrition was included for the first time in the second Five-Year Development Plan (2016-2021) to guide national response [8; 9]. In the Revolutionary Government of Zanzibar, a multi-sectoral national nutrition strategy and implementation plan was developed in 2013 [10]. Tanzania is also actively contributing to the Scaling-Up Nutrition (SUN) Movement. After joining in 2011 as an early rising country, former President of the United Republic of Tanzania, H.E Jakaya Mrisho Kikwete became a member of the high-level international SUN Lead Group and launched a Presidential Call to Action for Nutrition in Tanzania in May 2013. A High-Level Steering Committee for Nutrition (HLSCN) was established at the Prime Minister's Office as a multi-stakeholder and multi-sectoral platform for coordination of nutrition in the country. At the decentralized level, District Steering Committees for Nutrition were also established to ensure the same multisectoral and multi-stakeholders nutrition coordination. Qualified Nutrition Officers were appointed in all the districts and regions of Tanzania to manage and coordinate nutrition interventions. Specific Planning and Budgeting guidelines for nutrition were also developed for local government authorities (LGAs) at the district level, and a series of tools for evidence-based planning as well as for tracking progress towards scaling-up nutrition were adopted [11].

In 2016, the Government developed and adopted a new National Multisectoral Nutrition Action Plan (NMNAP) 2016-21, which replaced the National Nutrition Strategy 2011-16. The NMNAP was developed through an inclusive and evidence-based multi-stakeholder process, and embraces seven outcomes areas, including: 1) Maternal, infant and young child and adolescent nutrition, 2) Prevention and control of micronutrients deficiencies, 3) Integrated management of acute malnutrition; 4) Nutrition-related non-communicable diseases; 5) Nutrition

sensitive interventions; 6) Multi-sectoral Nutrition Governance; 7) Multi-sectoral Nutrition Information System [8]. The NMNAP was costed and has detailed activity-based budgets for each output. In order to track progress towards implementation of the NMNAP, a Common Results, Resources and Accountability Framework (CRRAF) was established. The CRRAF summarizes all targets to be achieved within the NMNAP in terms of nutrition results at the impact, outcome and output level, as well as necessary funding to achieve those results, by each sector involved, including: i) Health / HIV, ii) Agriculture and Food Security, iii) Water, Sanitation and Hygiene (WASH), iv) Education, v) Social Protection and vi) Environment. Within Outcome 7, the NMNAP aims at strengthening the multisectoral nutrition information system (MNIS) at the national, regional, district and community level. The MNIS includes three key components: i) Surveys; ii) Routine information system; iii) Periodic review and learning.

1.2 Justification for the survey

In order to track progress of nutrition at the impact level using selected key indicators, the Government started to implement National Nutrition Surveys using SMART (Standardized Monitoring and Assessment of Relief and Transitions) methodology [12]. This methodology is simple, rapid and transparent with daily data review of the quality of data collected and thus provide reliable nutrition information for action.

The first National Nutrition Survey using SMART methodology in Tanzania was successfully conducted in 2014 [13], and it was agreed with the Government of Tanzania to repeat it every four years, in between Demographic Health Surveys that are carried out every 5 years. This will ensure regular monitoring of the situation of the nutritional status of Tanzanian children, adolescents and women and provide essential information for evidence-based planning and programming for nutrition. In fact, the National Nutrition Survey 2014 was instrumental to identify the regions with the highest prevalence and burden of malnutrition during the preparation of the NMNAP 2016-21, prioritizing interventions and to leverage new funding from donors to support stunting reduction programmes in high burden regions of Tanzania.

This second National Nutrition Survey using the SMART methodology in Tanzania provides data to track progress on attending Nutrition Results outlined in the NMNAP 2016-21, in the second Five-Year Development Plan and in the SUN Country progress report. The Government of Tanzania will also be required to report on the 2025 World Health Assembly (WHA) targets³ and on the 2030 SDGs progress for nutrition indicators⁴.

Therefore, the Ministry of Health, Community Development, Gender, Elderly and Children (MoHCDGEC) through Tanzania Food and Nutrition Centre (TFNC) and the Ministry of Health, Zanzibar conducted a second National Nutrition Survey (NNS) by using SMART methodology. This second NNS was coordinated by the Tanzanian Food and Nutrition Centre and supported by a Technical Committee. The survey is a cross-sectional household survey with a two-stage cluster sampling. All efforts were made to follow SMART methods to ensure a high-quality nutrition survey. The results are representative at national and regional levels (31 regions).

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.

The SMART Methodology is an improved survey method that balances simplicity (for rapid assessment of acute emergencies) and technical soundness. It draws from the core elements of several methodologies with continuous upgrading informed by research and current best practices [12].

3 Global target 1: 40% reduction of childhood stunting by 2025; Global target 2: 50% reduction of anaemia 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% [14].

4 SDG 2: End hunger, achieve food security and improved nutrition, and promote sustainable agriculture.
2.1 By 2030, end hunger and ensure access by all people, in particular the poor and people in vulnerable situations, including infants, to safe, nutritious and sufficient food all year round.
2.2 By 2030, end all forms of malnutrition, including achieving, by 2025, the internationally agreed targets on stunting and wasting in children under 5 years of age, and address the nutritional needs of adolescent girls, pregnant and lactating women and older persons.

SMART ensures that consistent and reliable survey data is collected and analyzed using a single standardized methodology. It provides technical capacity for decision-making and reporting, and comprehensive support for strategic and sustained capacity building.

The key SMART innovations are as following:

- Plausibility Check to verify data quality and flag problems.
- User-friendly software ENA and manuals that are easy to use even for non-epidemiologists.
- Flexibility in sample size calculation and cluster sizes, with standardized survey protocols with the use of replacement clusters, household selection techniques, and best field practices (e.g. for absent children or empty households).
- Rigorous standardization test procedures and analysis.
- Regularly updated, clear sampling guidance based on field experiences, research and best practices.
- Improved census procedure for mortality assessments.
- The widely used combination of SMART and ENA has improved data quality review and assurance in larger surveys (e.g. Multiple-Indicator Cluster Surveys- MICS and Demographic Household Surveys- DHS) and has also been incorporated into many national nutrition protocols.

Additionally, SMART survey results are now used in early warning systems such as FEWSnet, IPC, NICS.

SMART Methodology looks to reform and harmonize assessments of and responses to emergencies and for surveillance if used at equal time intervals. It ensures that policy and programming decisions are based on reliable, standardized data and that humanitarian aid is provided to those most in need.

2. Objectives

The objectives of the survey were to assess nutritional status of children aged 0-59 months and of women aged 15-49 years, coverage level of infant and young child feeding practices, coverage of micronutrient interventions and access to sanitation and hygiene facilities, in Tanzania (at regional and national level).

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.
- Estimate the prevalence of overweight (global and severe) among children aged 0-59 months.
- Estimate the percentage of births with a reported birth weight <2.5 kilograms (low birth weight) regardless of gestational age.
- Evaluate the Infant and Young Child Feeding (IYCF) practices among children aged 0-23 months.
- Estimate the coverage of vitamin A supplementation among children aged 6-59 months six months prior to survey.
- Estimate the deworming coverage among children aged 12-59 months six months prior to survey.
- Determine the two-week period prevalence of diarrhoea among children aged 0-59 months.
- Assess the prevalence of underweight and overweight among non-pregnant women of reproductive age (15-49 years) through Body Mass Index (BMI).
- Assess the prevalence of low MUAC (<220 mm) in pregnant women of reproductive age (15-49 years).
- Estimate the coverage of iron and/or folic acid supplementation during last pregnancy of women aged 15-49 years with children under age 5.
- Estimate the proportion of household with adequately iodized salt.
- Estimate the proportion of household with soap and the percentage of mothers/caretakers of children aged 0-59 months who report having used soap for handwashing at critical times.
- Determine the proportion of households using an improved excreta disposal facility and the proportion of households with children under three years old whose (last) stools were disposed safely.

3. Methodology

This survey was based on the SMART methodology. Based on the latest SMART methodology (Version 2.0, 2017), 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 were made to follow SMART methodology to ensure a high quality nutrition data.

3.1 Target population

The target population for the anthropometric part of the 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. For this reason women in this age category were also considered for the anthropometric survey. In selected households, all children from 0 to 59 months were measured. In half of the selected household, all women from 15 to 49 years were measured and assessed for anaemia (non-pregnant women), and a sample of salt used by the household to cook meals, a day prior to survey, was collected to be tested for iodine concentration. In all selected households, the handwashing practices and the sanitation facilities were assessed. The target group for the IYCF questions was all children between 0 and 23 months of age as recommended in the IYCF indicators [15]. Questions on IYCF were asked to parents and caregivers of these 0-23 months aged children.

3.2 Study Design

The survey was designed as a cross-sectional household survey using a two-stage cluster sampling using Probability Proportional to Size (PPS), representative at regional and national level.

Tanzania is administratively divided into 31 regions. In order to determine the differences that exist within the regions concerning the prevalence of malnutrition and to provide relevant data for planning and evaluating nutrition programmes, the existing regions were used as survey domains. Each region constituted a domain. The domains used by TDHS conducted in 2015-16 are similar to the one this survey used which allow further comparison of results from this survey.

However, one new region (Songwe) was created on the 29th of January 2016 from the Western part of Mbeya region, whereby Songwe was allocated 5 councils and Mbeya remains with 7 councils. The survey domains with their population figures are presented in Table 1 below.

Table 1: Population figures from the 2012 Census and Population projections for 2018⁵

No	Region/Survey Domain	Population (2012 - Census)	Population projections (2018)
Mainland			
1	Dodoma	2,083,588	2,492,989
2	Arusha	1,694,310	1,999,907
3	Kilimanjaro	1,640,087	1,864,329
4	Tanga	2,045,205	2,337,053
5	Morogoro	2,218,492	2,596,287
6	Pwani	1,098,668	1,265,504
7	Dar es Salaam	4,364,541	5,147,070
8	Lindi	864,652	983,738
9	Mtwara	1,270,854	1,424,083
10	Ruvuma	1,376,891	1,579,811
11	Iringa	941,238	1,095,172
12	Mbeya ⁶	1,708,548	2,070,412
13	Singida	1,370,637	1,612,854

5 Source: National Population Projections. National Bureau of Statistics, Ministry of Finance and Planning, Dar-es-Salaam and Office of the Chief Government Statistician, Ministry of Finance and Planning, Zanzibar. February 2018.

6. After a split of Songwe Region, from Mbeya Region it has been reported a combined population of 1,708,548 in the 2012 census with seven districts.

No	Region/Survey Domain	Population (2012 - Census)	Population projections (2018)
14	Tabora	2,291,623	2,870,522
15	Rukwa	1,004,539	1,195,550
16	Kigoma	2,127,930	2,616,200
17	Shinyanga	1,534,808	1,874,709
18	Kagera	2,458,023	3,022,037
19	Mara	1,743,830	2,209,143
20	Mwanza	2,772,509	3,532,378
21	Manyara	1,425,131	1,750,864
22	Njombe	702,097	803,299
23	Katavi	564,604	738,237
24	Simiyu	1,584,157	2,094,798
25	Geita	1,739,530	2,239,949
26	Songwe ⁷	998,862	1,202,419
Total Mainland		43,625,354	52,619,314
Zanzibar			
27	Ungunja North	187,455	222,066
28	Ungunja South	115,588	133,767
29	Stone Town	593,678	700,791
30	Pemba North	211,732	271,594
31	Pemba South	195,116	251,631
Total Zanzibar		1,303,569	1,579,849
TOTAL		44,928,923	54,199,163



Figure 1: Administrative regions of Tanzania

⁷ Songwe Region was formed as a split from the western part of Mbeya Region in 2016. The four districts and one town now comprising Songwe Region reported a combined population of 998,862 in the 2012 census.

3.3 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 the probability proportional to size (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 was 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) was used for cluster selection. The clusters were randomly selected according to the PPS method by NBS. The master sample that includes the list of EAs from the 2012 Tanzania Population and Housing Census was used and random selection of the clusters was 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 households per cluster with detailed map were provided by NBS and OCGS. The team leader was responsible to verify the number of households in the cluster as the number of households in the EA/cluster may have changed since 2012. The total number of household was 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 was 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 was 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 collected a sample of salt and completed the household

questionnaire about the handwashing practices and the use of sanitation facilities. 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, a note that the child/woman was absent was recorded in the cluster control form.

Disabled children/women

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

3.4 Sample Size

The sample size for the nutrition survey was calculated using the ENA software (ENA for SMART 2011, July, 9th 2015) (Table 2). The assumptions for the sample size calculation are given below.

Expected prevalence

The sample size calculations were based on the prevalence of wasting from the TDHS 2015-16 ⁸. In 2015-16, the prevalence of wasting varied from 1.2% (Lindi) to 9.0% (Pemba South). For Songwe region (created in 2016), the prevalence of wasting from TDHS 2015-16 for Mbeya was used to calculate the sample size.

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 1.5% to 3%, according to the wasting prevalence.

Design effect

As nutrition outcomes are known to generally create relatively low design effects [16], the choice was made to use the design effect from the TDHS 2015-16 to inflate the sample size and compensate the possible heterogeneity between clusters. The design effect was 1.226.

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. In selected households, all children from 0 to 23 months will be included for the IYCF questions to ensure a minimal acceptable precision for the IYCF indicators.

⁸ 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.

Table 2: Summary of parameters used for sample sizes calculations

No.	Region	Estimated Prevalence of wasting (%) (WHO Ref. - TDHS 2015-16)	P	q	t (98 %)	Precision	Design Effect (TDHS 2015-16)	Number of chil- dren to include	Average Num- ber of persons per HH (Census 2012)	Percent of children U5 in total population (Census 2012)	Average Number of chil- dren U5 per HH	Non-re- sponse rate	Num- ber of HH to include	Number of Clus- ters (20 HH or 18 HH or 16 HH/per cluster)	Number of days for data col- lection (2-5 teams per region)
Mainland															
1	Dodoma*	5.5	0.055	0.945	2.045	0.025	1.226	426	4.60	0.162	0.75	0.04	595	64x10 HH	2
2	Arusha	6.5	0.065	0.935	2.045	0.025	1.226	499	4.50	0.162	0.73	0.04	712	36	18
3	Kilimanjaro	3.1	0.031	0.969	2.045	0.02	1.226	385	4.30	0.162	0.70	0.04	575	30	15
4	Tanga	3.4	0.034	0.966	2.045	0.02	1.226	421	4.70	0.162	0.76	0.04	575	30	15
5	Morogoro	6.0	0.06	0.94	2.045	0.025	1.226	463	4.40	0.162	0.71	0.04	676	34	17
6	Pwani	4.3	0.043	0.957	2.045	0.02	1.226	527	4.30	0.162	0.70	0.04	787	40	20
7	Dar es Sa- laam	4.7	0.047	0.953	2.045	0.02	1.226	574	4.00	0.162	0.65	0.04	921	58	12
8	Lindi	1.2	0.012	0.988	2.045	0.015	1.226	270	3.80	0.162	0.62	0.04	456	30	15
9	Mtwara	3.2	0.032	0.968	2.045	0.02	1.226	397	3.70	0.162	0.60	0.04	689	36	18
10	Ruvuma	2.6	0.026	0.974	2.045	0.02	1.226	325	4.50	0.162	0.73	0.04	464	30	15
11	Iringa	3.6	0.036	0.964	2.045	0.02	1.226	445	4.20	0.162	0.68	0.04	680	34	17
12	Mbeya	4.7	0.047	0.953	2.045	0.02	1.226	574	4.30	0.162	0.70	0.04	857	44	9
13	Singida	4.7	0.047	0.953	2.045	0.02	1.226	574	5.30	0.162	0.86	0.04	695	36	18
14	Tabora	3.5	0.035	0.965	2.045	0.02	1.226	433	6.00	0.162	0.97	0.04	463	30	15
15	Rukwa	5.3	0.053	0.947	2.045	0.025	1.226	412	5.00	0.162	0.81	0.04	529	34	17
16	Kigoma	6.0	0.06	0.94	2.045	0.025	1.226	463	5.70	0.162	0.92	0.04	521	34	17
17	Shinyanga	3.3	0.033	0.967	2.045	0.02	1.226	409	5.90	0.162	0.96	0.04	445	30	15
18	Kagera	2.3	0.023	0.977	2.045	0.02	1.226	288	4.70	0.162	0.76	0.04	393	28	14
19	Mwanza	4.3	0.043	0.957	2.045	0.02	1.226	527	5.70	0.162	0.92	0.04	594	30	15
20	Mara	4.1	0.041	0.959	2.045	0.02	1.226	504	5.60	0.162	0.91	0.04	578	30	15
21	Manyara	6.4	0.064	0.936	2.045	0.025	1.226	491	5.20	0.162	0.84	0.04	606	34	17
22	Njombe	1.3	0.013	0.987	2.045	0.015	1.226	292	4.10	0.162	0.66	0.04	457	30	15
23	Katavi	3.4	0.034	0.966	2.045	0.02	1.226	421	5.60	0.162	0.91	0.04	483	32	16
24	Simiyu	5.0	0.05	0.95	2.045	0.025	1.226	390	6.90	0.162	1.12	0.04	363	28	14
25	Geita	6.2	0.062	0.938	2.045	0.025	1.226	477	6.10	0.162	0.99	0.04	502	32	16

No.	Region	Estimated Prevalence of wasting (%) (WHO Ref. - TDHS 2015-16)	P	q	t (98 %)	Precision	Design Effect (TDHS 2015-16)	Number of chil- dren to include	Average Num- ber of persons per HH (Census 2012)	Percent of children U5 in total population (Census 2012)	Average Number of chil- dren U5 per HH	Non-re- sponse rate	Num- ber of HH to include	Number of Clus- ters (20 HH or 18 HH or 16 HH/per cluster)	Number of days for data col- lection (2-5 teams per region)
26	Songwe**	4.7	0.047	0.953	2.045	0.02	1.226	574	4.30	0.162	0.70	0.04	857	44	9
Zanzibar															
27	Unguja North	6.3	0.063	0.937	2.045	0.025	1.226	484	5.00	0.156	0.78	0.04	645	36	12
28	Unguja South	7.9	0.079	0.921	2.045	0.3	1.226	414	4.40	0.156	0.69	0.04	627	36	12
29	Stone Town	5.4	0.054	0.946	2.045	0.025	1.226	419	5.20	0.156	0.81	0.04	537	34	12
30	Pemba North	8.7	0.087	0.913	2.045	0.03	1.226	453	5.30	0.156	0.83	0.04	570	30	15
31	Pemba South	9	0.09	0.91	2.045	0.03	1.226	467	5.40	0.156	0.84	0.04	577	30	15
TOTAL								13,798					18,428	1,084	

* : All the teams start in Dodoma (64 clusters of 10 HH)

** : Region created in 2016 – Use of the prevalence of wasting from Mbeya (TDHS 2015-16)



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. Twenty households per cluster is considered to be a maximum accounting for these parameters and to ensure adequate time for quality data collection. The number of households per cluster varied from 16 to 20 according to the sample size in terms of households to investigate.

It is also recommended to have a minimum of 25 clusters per domain, so it was decided to have at least 28 clusters per domain in order to avoid to be below 25 clusters in case of issues during data collection⁹.

⁹ In 2014, 23 clusters out of 1014 were not 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 map (1 cluster in Manyara), and 2 clusters in Geita (one was not found by the Administrative Officer and no local leader was found to give permission to enter for the second). These missing clusters were randomly distributed among the different regions and the minimum total number of clusters per region was 27.

3.5 Data collected

The questionnaire was divided into three main sections: household questionnaire (salt, handwashing practices and use of sanitation facilities), children questionnaire (anthropometry and health) and women questionnaire (anthropometry, health and anaemia) (TNNS Questionnaire – Annex 1). The final survey questionnaire was translated into Kiswahili. The survey questionnaire was pre-tested before the ToT. Interviews were held in Kiswahili and information was recorded on Android operated tablets (Samsung Galaxy Tab A). The survey questionnaire on the tablets was available both in English and in Kiswahili.

1- Household Questionnaire

Salt adequately iodized (all selected household)

In half of the selected households, interviewers asked for a full tablespoon of salt to be collected for iodine content analysis. The salt specimens were placed in special containers and transported to TFNC Laboratory in Dar es Salaam for analysis.

Sanitation and Hand-washing practices

Several questions on sanitation facilities and hand-washing practices were asked to key respondents at household level. For some questions, the interviewer observed keenly the household surroundings rather than relying on the self-reported information. The availability of soap at household level was also assessed.

2- Children Questionnaire (children from 0 to 59 months of age)

Sex

The child's sex was recorded 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, health card/clinic card 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. The birth date was recorded in the day/month/year (DD/MM/YYYY) of format.

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 enumerators received the instructions to record if the weight of the child was measured with clothes. Smaller children when 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.

Clothes

The team leaders recorded if the measurers measured weight with or without clothes

Y = yes, with minimum clothes (100 grams are automatically removed from the weight result in the ENA software)

N = no, without clothes

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.

Measurement

The team leaders recorded if the measurers measured height or length.

L = length (recumbent length)

H = height (standing height)

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.

Additional Data

Low birth weight questions

Several questions on the child’s weight at birth were asked to the mothers/caregivers of children from 0 to 59 months of age in order to determine if the child had a low birth weight at birth (<2.5 kg). If available, the child’s weight at birth was taken from the health card/clinic card.

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 (health card/clinic card). 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 (health card/clinic card). If there was no document, the interviewer showed a deworming tablet (mebendazole) to the respondent and asked him/her if the child received a “worm medicine” in the past six months.

Diarrhoea episode in the last 2 weeks

A question was asked to caregivers to find out if their children have had an episode of diarrhoea in the two weeks preceding the survey. An episode of diarrhoea is defined by the occurrence of at least three liquid stools during the same 24 hours. The enumerators ensured that the definition of diarrhoea was understood by the respondent by assessing the number of liquid stools the child has had in 24 hours.

Infant and Young Child Feeding practices (IYCF) (children from 0 to 23 months of age)

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.

3- Women Questionnaire (women from 15 to 49 years of age)

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 100 grams 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.

Mid-Upper Arm Circumference (MUAC)

The MUAC was measured in millimeters on the left arm, at midpoint between the shoulder’s tip and the

elbow, on a relaxed arm for all pregnant women.

Additional Data

Pregnant and Lactating Status

The team leader asked all women if they were pregnant and/or lactating. If the woman was pregnant, she was not assessed for haemoglobin concentration. The MUAC was measured for all pregnant women.

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.

Haemoglobin concentration (Hb)

The haemoglobin concentration was measured from a blood sample taken at the fingertip and recorded in grams per decilitre using a portable HemoCue Hb 301 analyzer. The measure was carried out after obtaining a written consent. All non-pregnant women were assessed for their haemoglobin concentration, in half of the households selected for the survey.

3.6 Survey Personnel

The survey was led by TFNC and supported by a Technical 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, MoHCDGEC, NBS, IMA World health, Nutrition International (NI), Doctors with Africa CUAMM, University of Dodoma (UDOM), UNICEF, OCGS and Zanzibar MoH.

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 32 teams and 16 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 into tablets and review of data quality with the supervisor. She/he was also responsible for the correct selection of households within the selected clusters. The measurers took anthropometric measurements and assessed haemoglobin concentration. The list of all persons involved in the 2018 National Nutrition Survey is presented in Annex 2.

3.7 Training

In order to train properly all the personnel of the survey, three different trainings were organized:

- A training on the SMART methodology;
- A Training of Trainers (ToT) on the survey methodology and on the survey training;
- A survey training.

Training on SMART Methodology

The SMART training organized by TFNC and UNICEF took place from Monday 4th to Saturday 9th of June, 2018 at the Nursing College in Bagamoyo, Tanzania, bringing together members of the Technical Committee as well as nutrition officers, nutritionists, statisticians and lecturers. The participants were from Mainland and Zanzibar.

The purpose of this training was to train all Technical Committee members on the SMART methodology and to identify among them and among other participants the 16 supervisors needed for the National Nutrition Survey (NNS).

Thirty five persons were identified to participate to this training. In 2015, three members of the Technical Committee (TC) were trained as SMART Survey Managers by ACF-Canada (ACF-Canada Regional Office, Nairobi, Kenya), therefore they co-facilitated the training with the SMART survey consultant for some sessions and exercises. The rest of the TC members (7 persons) was trained. In addition, 24 pre-selected persons (nutrition officers, nutritionists, statisticians or lecturers) were invited to participate in this training.

The training on SMART methodology was done by the SMART Survey consultant in collaboration with the 3 members of the TC who were trained as SMART Survey Managers.

The training included the following:

- Overview of Nutrition 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 the ENA software);
- Standardization test (principles and organization, interpretation of results, practical session);
- Data collection using tablets and the ODK application (overview);
- Anthropometric data analysis and plausibility check (data review and analysis, flags, use of weights, statistical test used in the plausibility check, reporting).

All the participants were 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, 16 participants were retained as supervisors (13 from Mainland and 3 from Zanzibar). For this survey, 2 supervisors were members of the Technical Committee (1 from Mainland and 1 from Zanzibar).

Training of Trainers (ToT) on the survey training

The ToT organized by TFNC and UNICEF took place from Tuesday 28th to Friday 31st of August, 2018 at the TFNC Conference Room in Dar es Salaam, Tanzania, bringing together some members of the Technical Committee (9 persons including 2 supervisors) as well as the supervisors of the NNS (14 persons), selected after the training on SMART Methods.

The ToT aimed to capacitate the 16 supervisors retained after the first training on the National Nutrition Survey methodology, on the different data collection tools, and on the Power Point presentations designed for the survey training. These persons were the trainers during the survey training.

This ToT was conducted by the SMART Survey consultant from UNICEF Tanzania. The training lasted 4 days.

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, clusters selection, concept of representative sample, systematic random sampling and segmentation);
- Field procedures (special cases and daily organization);
- Survey teams (organization, evaluation and supervision);
- Anthropometric measurements (weight, height, MUAC and oedema), malnutrition and process for referral, age estimation and use of the calendar of local events;
- Anaemia (equipment, standard procedures and quality assurance);
- Standardization test (principles and organization) and standardization of the anthropometric equipment;
- Review of the TNNS questionnaires (household questionnaire, child questionnaire and women questionnaire);
- Mobile Data Collection (MDC) methods (use of tablets, ODK Collect, data review).

The theory of the survey training was divided into 7 sessions, as described below:

- **Session 1: Anthropometry** (Weight; Height/Length; MUAC; Oedema);
- **Session 2** (Overview on SMART Methods; Survey presentation; Age estimation and use of the calendar of local events; Child questionnaire; Women questionnaire);
- **Session 3** (Sampling design: study design, cluster selection, household selection; Segmentation);
- **Session 4** (Standardization of anthropometric equipment; Organization of the standardization test; Malnutrition and referral slip);
- **Session 5** (Survey Team; Field Procedures: daily organization, special cases; Household questionnaire);
- **Session 6: Anaemia** (Generalities, target group and sampling; Equipment and material needed; Standard procedures and quality assurance; Standardization exercise); and
- **Session 7: MDC methods** (Android tablets; ODK Collect; Data review).

At the end of this training, the SMART Survey Consultant assigned 2-4 persons to each survey training session. The assignment of the trainers to the sessions was mainly based on the knowledges/functions and /or previous experiences of those persons.

Survey training

The survey training organized by TFNC, UDOM and UNICEF took place from Thursday 13th to Monday 24th of September, 2018 at the UDOM in Dodoma. The Technical Committee selected 120 potential enumerators for the Survey Training: Tanzania Mainland selected 100 students from School of Nursing and Public Health of the University of Dodoma while Zanzibar selected 5 enumerators who participated to the first NNS in 2014 and other health personnel (15 persons).

The purpose of this training was to train the potential enumerators on the National Nutrition Survey methodology and on the different tools designed for data collection.

The Survey Training was conducted by the 16 trainers/supervisors trained during the ToT in collaboration with the SMART Survey Consultant, the SMART specialist from ACF-Canada (ACF-Canada Regional Office, Nairobi, Kenya) and some Technical Committee members. Each supervisor/trainer trained the participants on only one specific session in order to give the same messages to all of them. The SMART survey consultant and the SMART specialist trained the team leaders and supervisors on the use of the tablets with ODK Collect as well as on the data quality review process.

The Survey Training lasted for 9 days and included the following areas:

- An overview of the survey and its objectives, as well as a brief introduction to the SMART methodology.
- Segmentation, community mapping, and random selection of households
- Identification of individuals to measure or interview
- How to complete the questionnaires
- Correct age in month estimation or validation using the calendar of local events
- How to make correct anthropometric measurements
- How to take correct haemoglobin concentration
- The standardization of anthropometric measures: Each participant had to measure 10 children less than five years of age twice (height, weight and MUAC). The results of the standardization test were produced immediately to determine if further training and standardization were needed.
- The identification of bilateral oedema and how to refer children with acute malnutrition to the nearest health centre
- Data collection using Mobile Data Collection (MDC) and data review (only for team leaders and supervisors)
- Pilot test

Selection of the Team Leaders

Among the 120 potential enumerators, only 32 were retained as team leaders for data collection. All the 120 potential enumerators were assessed during a pre-test at the beginning of the training and during a post-test

after the 3 first days of the training (end of the theoretical sessions). The selection of the team leaders was based on the results of the two written tests. For Zanzibar, the 5 persons retained as team leaders obtained between 78% and 84% at the post-test; For Mainland, the 27 persons retained as team leaders obtained between 80% and 90% at the post-test.

Standardization of the anthropometric tools

Before testing the enumerators for accuracy and precision of measurements, all anthropometric tools were 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 after the post-test and only 88 persons who were not retained as team leaders were tested. The standardization test was organized in six sessions (16 or 12 interviewers 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.

Evaluation for anaemia

The practical training on haemoglobin measurement was conducted during the training session on anaemia (Session 6), and after the theory sessions. This training included the following activities:

- A demonstration with the trainers;
- A practical exercise where all participants practiced on each other, taking at least two measurements;
- An exercise to standardise the participants' Hb measurements. This exercise was conducted parallel to the standardization exercise for anthropometric measurements.

Final Selection of the Enumerators

Among the 120 potential enumerators, only 96 were retained for data collection: 32 team leaders and 64 measurers in order to have 32 teams of 3 persons. All the 120 potential enumerators were assessed during a pre-test at the beginning of the training and during a post-test at the end of the training. The final selection was done based on the results of the two written tests, based on the results of the standardization test and on the evaluation for anaemia.

Pilot Test

The pilot test was conducted in Dodoma Region, in Dodoma Municipal Council (Wards of Nzuguni and Mkonze). The pilot test held one day (Day 9) and 16 Enumeration Areas not included in the nutrition national survey sample were selected for this exercise. The enumerators were divided into teams (teams of 3 persons), then into groups of 2 teams with one supervisor (16 groups – 2 teams per EA). Each team selected a number of households to survey among households listed in the EA and interviewed a minimum of 3-4 households. This process allowed to validate the methodology and the different tools used for survey, but also to complete the training of enumerators with the tablets.

Additional session on the use of the tablets and ODK collect application

An additional session on the use of the ODK Collect application was organized on Monday 24th of September, 2018 for the supervisors and the team leaders. This session aimed to train the teams leaders and the supervisors on how to manage the special cases into the questionnaires and ODK. For examples, how to re-open a questionnaire for an absent child/woman, how to deal with a refusal, etc.

At the end of the survey training, 32 survey teams were devised to start data collection in Dodoma region.

3.8 Implementation of Fieldwork

Communication/Sensitization on the survey

A communication plan was developed and implemented in order to ensure that the Government and health authorities on the national, regional and council level, and cooperating partners know the objectives and implementation dates of the survey.

Fieldwork plan

Fieldwork began with 32 teams in Dodoma for 2 days (from Tuesday 25th to Wednesday 26th of September, 2018), allowing the supervisors and Technical Committee members to review the skills and implementation of all the survey teams before deploying them to remaining regions of the country. After Dodoma, the survey teams evolved by group of 2 teams (or 3 teams in Zanzibar, or 5 teams in Mbeya, Songwe and Dar es Salaam) with 1 supervisors (or 2 supervisors in Zanzibar or 3 supervisors in Mbeya, Songwe and Dar es Salaam). They covered 2 (or 3) regions and completed one cluster in one day (in two days in few difficult clusters where households were scattered). Teams in Pwani received help from one team at the end of data collection to avoid delays in fieldwork plan.

Data collection for Mainland started on the 25th of September and finished on the 17th of November 2018. In Zanzibar, data collection started on the 5th of October and finished on the 15th of November 2018.

Supervision

The enumerators for the survey were assessed before the launch of the survey and continually throughout 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, or five) supervised teams. In each closing of the day, the supervisors reviewed the data of the day before to submit them to the Kobo server. The SMART survey consultant verified the data quality, including the data quality of anthropometric measurements using the SMART plausibility check report from the ENA software. The SMART survey consultant sent a minimum of two reports on data quality to all supervisors during data collection. The Technical Committee members did supervision visits with the teams in Dodoma, Pemba, Kilimanjaro, Arusha, Mwanza, Mbeya, Songwe and Dar es Salaam.

3.9 Data entry and Data Analysis

Data entry and data checks

Data were collected using tablets operated by the Android operating system (Samsung Galaxy Tab A) and the ODK Collect application. During supervision in the field and at the end of each day, the supervisors checked the questionnaires in the tablets for completeness, consistency and accuracy. This check was also used to provide feedback to the teams to improve data collection as the survey progressed. Data were downloaded and analysed on a daily basis. The SMART plausibility check report from the ENA software (ENA for SMART 2011, July 9th 2015) was generated twice a week in order to identify any problems with anthropometric data collection such as digit preference for age, height, weight or MUAC, to improve the quality of the anthropometric data collected as the survey was on-going.

All data files were reviewed before analysis. Anthropometric data for children 0-59 months were reviewed and analysed using the ENA for SMART software. The nutritional indices were cleaned using flexible cleaning criterion ($-4/+3$ SD or $-3/+3$ from the observed mean for WHZ; $-3/+3$ SD from the observed mean for HAZ and WAZ; also known as SMART flags in the ENA software).

Analysis plan

The nutrition results are presented in the standard format following the report template from the ENA software (ENA for SMART 2011, July 9th 2015). 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. The anthropometric data for children and for women and all other data were loaded in STATA (version 11.1) for further analysis (results at national level, IYCF practices, anaemia, etc.). As

only descriptive analysis were performed during the analysis (means and proportions), design (household and individual) weight factors (1/sampling fraction) were applied to each region in order to obtain the results for Mainland, Zanzibar and at national level. A statistical procedure that adjusts for the impact of the weights on the standard errors was used ("svy" procedures in STATA – use of "pweight"). The data quality report at national level is included in the annexes of the final report (Annex 3).

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 3: Cut-offs for definition of acute malnutrition, 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

Body mass Index (BMI) is used to classify a person as underweight, normal, overweight or obese. It is defined as the weight in kilograms divided by the square of the height in metres (kg/m²). BMI is not age dependent and same cut-offs are used for both sex. Maternal undernutrition 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 4: 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

Table 5: Cut-offs for definition of acute malnutrition based on MUAC in Tanzania

Target	Classification	MUAC Cut-offs
Children 6-59 months	MAM	<125 mm
	SAM	<115 mm
Pregnant women 15-49 years	MAM	<220 mm
	SAM	<185 mm

Vitamin A Supplementation, Deworming and Two-week prevalence of Diarrhoea

To estimate vitamin A supplementation, deworming coverage and the two-week period prevalence of diarrhoea, the following formula presented in table 13 were used.

Table 6: 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 past six months	Total number of children aged 6-59 months x 100
Deworming	Number of children 12-59 months dewormed in the past six months	Total number of children aged 12-59 months x 100
Diarrhoea	Number of children aged 0-59 months who had diarrhoea in the past two weeks	Total number of children aged 0-59 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.

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

Timely initiation of breastfeeding: Proportion of children born in the last 24 months who were breastfed 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.

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

Continued breastfeeding at 2 years: Proportion of children 20-23 months of age who are fed breast milk.

$$\frac{\text{Children 20-23 months of age who received breast milk during the previous day}}{\text{Children 20-23 months of age}}$$

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.

Children 6-23 months of age who received foods from ≥ 4 food groups during the previous day
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:

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

And

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

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:

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

And

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

Anaemia

Anaemia is said to exist when the level of circulating haemoglobin (Hb) in the patient is lower than that of healthy persons of the same age group and sex in the same environment. The most common type of anaemia is due to iron deficiency resulting from inadequate iron intake from foods.

Hb concentrations were reported in g/dL for consistency purposes. Hb levels were categorised according to WHO recommended cut-offs (shown in Table 7) to determine the prevalence of anaemia (mild, moderate, severe).

Table 7: Haemoglobin levels to diagnose anaemia at sea level (WHO 2011)

Age/Sex groups	Categories of Anaemia (Hb g/dL)			
	Any form of anaemia	Mild	Moderate	Severe
Non-pregnant adult females 15-49 years*	<12.0	11.9 - 11.0	10.9 - 8.0	< 8.0

* This category includes lactating women

Residential elevation above sea level are known to increase haemoglobin concentrations. Consequently, the prevalence of anaemia may be underestimated in persons residing at high altitudes if the standard anaemia cut-offs are applied. Table 8 presents the recommended adjustments made to the measured haemoglobin concentration among non-pregnant women living at altitudes higher than 1000 metres above sea level. During data collection, GPS coordinates were taken in order to know the altitude of each household within a cluster.

Table 8: Altitude adjustments to measured haemoglobin concentrations (WHO 2011)

Altitude (metres above sea level)	Measured haemoglobin adjustment (g/dL)
<1000	0
1000-1499	-0.2
1500-1999	-0.5
2000-2499	-0.8
2500-2999	-1.3
3000-3499	-1.9
3500-3999	-2.7
4000-4499	-3.5
>5000	-4.5

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

Sanitation facilities

The table below (Table 9) provides an overview of the definitions of sanitation (toilet) facilities used in the survey.

Table 9: Sanitation facility definition and sanitation facility classification based on definition and sharing

	Improved category	Unimproved category
Sanitation facility definition	Flush/pour flush toilets to piped sewer systems, septic tanks and pit latrine; VIP; pit latrines with slabs, and composting toilets	Pit latrine without slab (slab with holes) /open pit
		No facilities or bush or field
Sanitation facility classification based on definition and sharing		
Improved excreta disposal facility	A toilet in the above “improved” category AND one that is not shared with other families	
Shared facility	A toilet in the above “improved” category AND one used by 2 families / households or more	
Unimproved facility	A toilet in the above “unimproved” category OR a public toilet which any member of the public can use e.g. in health facilities or markets	

Safe excreta disposal for children aged 0-3 years

The safe disposal of children’s faeces is of particular importance because children’s faeces are the most likely cause of faecal contamination to the immediate household environment. “Safe” is understood to mean disposal in a safe sanitation facility or by burying. This is the method that is most likely to prevent contamination from faeces in the household.

Salt

Enumerators requested a larger sample (at least 20g) of salt from households for laboratory testing to determine the actual iodine content in salt used. The salt samples collected from these households were sent to the Tanzania Food and Nutrition Center (TFNC) Laboratory in Dar es Salaam for analysis to determine the levels of iodine. The results of the laboratory testing were not provided to the households, rather combined with the results for other samples to determine the status of availability of salt at region and national level. To determine the prevalence of salt adequately iodized, seven samples were considered as over iodized (240-598 ppm) and were removed from the analysis.

3.10 Ethical Considerations

The study was approved by National Institute for Medical Research (NIMR) for Tanzania Mainland, Zanzibar Medical Research and Ethics Committee (ZAMREC) for Zanzibar, Mbeya Zonal Medical and Research Ethics Committee, and the National Bureau of Statistics (NBS).

This study carried minimal risks for participating respondents. To ensure privacy and confidentiality all interviews were undertaken in a convenient place where other people were unable 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 deemed sensitive, the data collection procedures and confidentiality. A consent statement was read by the enumerator prior interview, and the respondent was required to give a written consent before the commencement of the interview. No financial compensation was given or promised to the participating households or participants.

Questionnaires were given a unique identification number and confidentiality was observed for the names of the respondents. The names of the respondents are not used in any part of the report and any communication emanating from the study.

Results of weight, height and MUAC were verbally communicated to the caregivers of the children. All children with signs of severe acute malnutrition (WHZ<-3 and/or MUAC<115 mm and/or edema) were referred to the nearest health facility for management of their condition. Similarly, women with severe anaemia (Hb<8.0 g/dL) were also referred to the nearest facility for management.

3.11 Limitations and potential biases

Reliability of sample frame

The master sample frame used for the random selection of clusters (Enumeration Areas) was built in 2012. 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 population figures

The mapping of the enumeration areas dated from the 2012 Census, which means that the houses and population might have change since then (movements into different wards/districts due to restructuring/building and/or introduction of new districts/wards). The choice was made to use the original population figures for the household selection using systematic random sampling method.

Missing salt samples

According to the survey questionnaires filled by the teams during data collection and the laboratory results, a total of 142 salt samples were missing. For Dodoma and Dar es Salaam regions, the salt samples from 8 and 15 clusters respectively were not analyzed by the laboratory. One cluster was missing in Pwani, Mtwara and Geita.

4. Results

4.1 Children Nutritional Status (0-59 months)

Description of sample

The number of cluster scheduled and number of clusters completed is included in Table 10. The percentage of completed clusters was ranging from 96.7% to 100%, with 99.7% overall.

Three clusters were not surveyed due to the following reasons:

- One cluster was not surveyed in Pwani: The cluster was a military area without any household.
- One cluster was not surveyed in Mwanza: The cluster was located in an island on the Victoria Lake. Due to bad weather conditions and for safety reasons this cluster was cancelled.
- One cluster was not surveyed in Rukwa: The cluster was very close to Lake Rukwa, houses were demolished on natural resources management ground. There were no human activities nor dwellings for humans since 2013/2014.

In all 31 surveyed regions the total number of children represented more than 80% of the calculated sample size, which is acceptable in nutrition survey using SMART Methodology.

Table 10: Number and percentage of surveyed clusters and assessed children as compared to number of planned clusters and number of children by region, Tanzania Mainland, Zanzibar and National

No.	Region/Overall	Number of cluster planned	Number of cluster surveyed	%	Number of children planned	Number of children assessed
	Mainland	918	915	99.7	11,561	15,212
1	Dodoma	64	64	100	426	558
2	Arusha	36	36	100	499	749
3	Kilimanjaro	30	30	100	385	470
4	Tanga	30	30	100	421	500
5	Morogoro	34	34	100	463	567
6	Pwani	40	39	97.5	527	642
7	Dar es Salaam	58	58	100	574	609
8	Lindi	30	30	100	270	274
9	Mtwara	36	36	100	397	461
10	Ruvuma	30	30	100	325	506
11	Iringa	34	34	100	445	621
12	Mbeya	44	44	100	574	543
13	Singida	36	36	100	574	692
14	Tabora	30	30	100	433	612
15	Rukwa	34	33	97.1	412	553
16	Kigoma	34	34	100	463	638
17	Shinyanga	30	30	100	409	715
18	Kagera	28	28	100	288	518
19	Mwanza	30	29	96.7	527	574
20	Mara	30	30	100	504	704
21	Manyara	34	34	100	491	689
22	Njombe	30	30	100	292	495
23	Katavi	32	32	100	421	590

No.	Region/Overall	Number of cluster planned	Number of cluster surveyed	%	Number of children planned	Number of children assessed
24	Simiyu	28	28	100	390	660
25	Geita	32	32	100	477	649
26	Songwe	44	44	100	574	623
	Zanzibar	166	166	100	2,237	2,312
27	Unguja North	36	36	100	484	406
28	Unguja South	36	36	100	414	389
29	Stone Town	34	34	100	419	347
30	Pemba North	30	30	100	453	599
31	Pemba South	30	30	100	467	571
	National	1084	1081	99.7	13,798	17,524

The sample included a total of 17,524 children under five years of age. There was a lack of information on age and sex for 25 children (6 in Dodoma, 1 in Tanga, 1 in Tabora, 7 in Mwanza, 4 in Manyara, 4 in Geita, 1 in Songwe and 1 in Unguja North). The final sample consisted of 15,594 children aged 6-59 months (89.1%) and 1,906 children aged 0-5 months (10.9%). Children less than 2 years (0-23 months) were 7,450 (42.6%).

Boys and girls are represented in the same proportion in the sample with an overall sex ratio equal to 1.05. At the level of the regions the sex ratio varies from 0.87 (Mwanza) to 1.24 (Pemba North) which is within the acceptable range.

Table 11: Distribution of children by sex and sex-ratio by region, Tanzania Mainland, Zanzibar and National

No.	Region/Overall	N	Boys (%)	Girls (%)	Ratio: Boys/Girls
	Mainland	15188	50.7	49.3	1.03
1	Dodoma	552	47.5	52.5	0.90
2	Arusha	749	53.7	46.3	1.16
3	Kilimanjaro	470	52.3	47.7	1.10
4	Tanga	499	54.3	45.7	1.19
5	Morogoro	567	49.9	50.1	1.00
6	Pwani	642	51.1	48.9	1.04
7	Dar es Salaam	609	51.4	48.6	1.06
8	Lindi	274	53.7	46.3	1.16
9	Mtwara	461	52.7	47.3	1.11
10	Ruvuma	506	51.8	48.2	1.07
11	Iringa	621	49.1	50.9	0.97
12	Mbeya	543	48.4	51.6	0.94
13	Singida	692	51.9	48.1	1.08
14	Tabora	611	52.2	47.8	1.09
15	Rukwa	553	49.0	51.0	0.96
16	Kigoma	638	48.1	51.9	0.93
17	Shinyanga	715	50.1	49.9	1.00
18	Kagera	518	49.0	51.0	0.96
19	Mwanza	567	46.4	53.6	0.87
20	Mara	704	51.0	49.0	1.04

21	Manyara	685	52.7	47.3	1.11
22	Njombe	495	49.3	50.7	0.97
23	Katavi	590	53.1	46.9	1.13
24	Simiyu	660	50.0	50.0	1.00
25	Geita	645	51.2	48.8	1.05
26	Songwe	622	50.0	50.0	1.00
	Zanzibar	2311	53.9	46.1	1.17
27	Unguja North	405	53.3	46.7	1.14
28	Unguja South	389	54.0	46.0	1.17
29	Stone Town	347	51.9	48.1	1.08
30	Pemba North	599	55.4	44.6	1.24
31	Pemba South	571	53.8	46.2	1.16
	National	17,499	51.1	48.9	1.05

The Table 12 presents the distribution of children by age group and sex. All age groups are represented in proportions between 19.8% and 21.9%. Only the 48-59 months age group is slightly less represented since it represents only 17.6% of the overall sample. In the last age group (48-59 months) there are fewer children than expected. There was no difference by age group regarding the sex-ratio.

Table 12: Distribution of children by sex and by age group at national level

Age group in months	N	Boys (%)	Girls (%)	Ratio: Boys / Girls
0-11	3,839	51.2	48.8	1.06
12-23	3,611	50.5	49.5	1.04
24-35	3,495	51.4	48.6	1.06
36-47	3,467	50.5	49.5	1.04
48-59	3,087	49.4	50.6	1.03
National	17,499	51.1	48.9	1.05

Review of Data Quality

At the national level, 84% of the children were found to have an age calculated from an exact day, month and year of birth. The percentage of exact date of birth reported was ranging from 63% in Mwanza to 97% in Morogoro. These findings highlight the good quality of age data.

Table 13: Proportion of children with an exact date of birth by region, Tanzania Mainland, Zanzibar and National

No.	Region/Overall	Percentage of exact date of birth
	Mainland	83
1	Dodoma	82
2	Arusha	84
3	Kilimanjaro	76
4	Tanga	76
5	Morogoro	97
6	Pwani	96
7	Dar es Salaam	85
8	Lindi	91
9	Mtwara	74
10	Ruvuma	92

11	Iringa	86
12	Mbeya	87
13	Singida	76
14	Tabora	70
15	Rukwa	81
16	Kigoma	90
17	Shinyanga	83
18	Kagera	92
19	Mwanza	63
20	Mara	92
21	Manyara	76
22	Njombe	90
23	Katavi	78
24	Simiyu	96
25	Geita	69
26	Songwe	88
	Zanzibar	89
27	Unguja North	89
28	Unguja South	90
29	Stone Town	95
30	Pemba North	85
31	Pemba South	85
	National	84

The overall age distribution (Figure 2) shows fewer older children who were measured compared to younger children. Nevertheless the age-ratio of 6-29 months to 30-59 months is close to the expected value of 0.85 with 0.89.

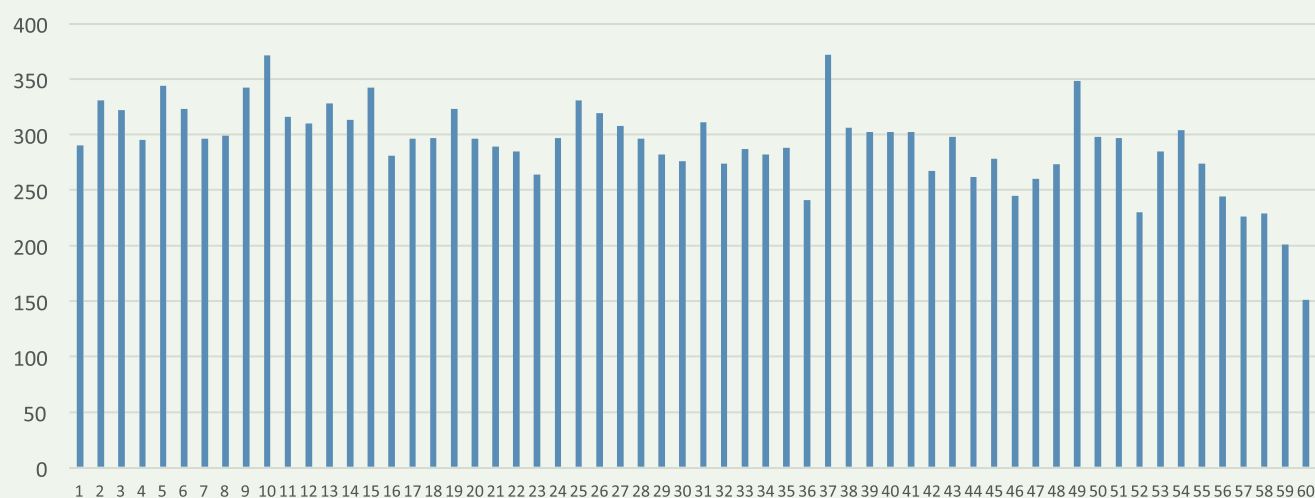


Figure 2: Distribution of children age in months

The data quality report (plausibility check report) at national level is included in the Annexes of the report (Annex 3). 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 difficulties encountered during data collection for age estimation.

The Plausibility Check report at national level highlighted the “Excellent” quality of the anthropometric data. There were no significant digit preferences for weight, height and MUAC measures.

The Table 14 shows the overall data quality score by region. Data quality was “Excellent” in all regions except for Arusha and Lindi where quality was “Good”.

Table 14: Overall data quality score by region

No.	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											4%
2	Arusha											12%
3	Kilimanjaro											0%
4	Tanga											4%
5	Morogoro											0%
6	Pwani											7%
7	Dar es Salaam											2%
8	Lindi											12%
9	Mtwara											0%
10	Ruvuma											6%
11	Iringa											1%
12	Mbeya											0%
13	Singida											3%
14	Tabora											3%
15	Rukwa											1%
16	Kigoma											5%
17	Shinyanga											5%
18	Kagera											5%
19	Mwanza											1%
20	Mara											0%
21	Manyara											6%
22	Njombe											0%
23	Katavi											1%
24	Simiyu											0%
25	Geita											0%
26	Songwe											3%
	Zanzibar											
27	Unguja North											0%
28	Unguja South											8%
29	Stone Town											4%
30	Pemba North											9%
31	Pemba South											3%

	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 or edema 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, Mainland, Zanzibar and at national level. The standard deviation for the distribution of Weight/Height z-score and Weight/Age z-score was within the acceptable range (0.8-1.2) for the 31 regions (Table 15).

Table 15: Mean z-scores, Design Effects and excluded subjects following SMART flags application by region, Tanzania Mainland, Zanzibar and National (WHO 2006 Growth References)

No	Indicator	Total	Mean z-scores $\pm$ SD	Design Effect (z-score < -2)	Z-scores not available	Z-scores out of range
1	Dodoma					
	Weight-for-Height	537	-0.15 $\pm$ 1.06	1.00	11	4
	Height-for-Age	521	-1.63 $\pm$ 1.15	1.37	10	21
	Weight-for-Age	535	-0.98 $\pm$ 1.03	1.18	8	9
2	Arusha					
	Weight-for-Height	719	-0.25 $\pm$ 1.06	1.00	21	9
	Height-for-Age	709	-1.20 $\pm$ 1.23	2.79	20	20
	Weight-for-Age	718	-0.80 $\pm$ 1.13	3.00	19	12
3	Kilimanjaro					
	Weight-for-Height	454	0.05 $\pm$ 0.99	1.00	11	5
	Height-for-Age	445	-1.09 $\pm$ 1.12	1.11	10	15
	Weight-for-Age	456	-0.58 $\pm$ 1.05	1.40	7	7
4	Tanga					
	Weight-for-Height	481	0.02 $\pm$ 1.02	1.35	13	5
	Height-for-Age	474	-1.58 $\pm$ 1.11	2.54	13	12
	Weight-for-Age	487	-0.89 $\pm$ 1.03	1.21	5	7
5	Morogoro					
	Weight-for-Height	562	-0.06 $\pm$ 1.09	1.00	2	3
	Height-for-Age	549	-1.26 $\pm$ 1.13	3.47	1	17
	Weight-for-Age	561	-0.74 $\pm$ 1.09	1.50	2	4
6	Pwani					
	Weight-for-Height	639	-0.03 $\pm$ 1.01	1.52	1	2
	Height-for-Age	623	-1.26 $\pm$ 1.07	1.37	1	18
	Weight-for-Age	637	-0.72 $\pm$ 0.99	1.27	0	5
7	Dar es Salaam					
	Weight-for-Height	585	-0.18 $\pm$ 1.07	1.20	13	11
	Height-for-Age	586	-1.08 $\pm$ 1.11	1.19	13	10
	Weight-for-Age	587	-0.73 $\pm$ 1.05	1.07	11	11
8	Lindi					
	Weight-for-Height	259	-0.06 $\pm$ 0.96	1.00	15	0
	Height-for-Age	256	-1.35 $\pm$ 0.99	1.61	15	3
	Weight-for-Age	257	-0.80 $\pm$ 0.90	1.23	15	2
9	Mtwara					
	Weight-for-Height	433	0.10 $\pm$ 1.03	1.00	27	1
	Height-for-Age	429	-1.43 $\pm$ 1.08	1.54	26	6
	Weight-for-Age	430	-0.74 $\pm$ 1.01	1.00	25	6
10	Ruvuma					

No	Indicator	Total	Mean z-scores $\pm$ SD	Design Effect (z-score < -2)	Z-scores not available	Z-scores out of range
	Weight-for-Height	498	0.07 $\pm$ 1.05	1.00	6	2
	Height-for-Age	490	-1.83 $\pm$ 1.14	2.07	6	10
	Weight-for-Age	497	-0.97 $\pm$ 1.04	1.14	5	4
11	Iringa					
	Weight-for-Height	599	-0.08 $\pm$ 0.99	1.00	15	7
	Height-for-Age	594	-1.94 $\pm$ 1.09	2.46	12	15
	Weight-for-Age	604	-1.15 $\pm$ 1.03	1.22	10	7
12	Mbeya					
	Weight-for-Height	526	0.23 $\pm$ 1.02	1.00	13	5
	Height-for-Age	523	-1.50 $\pm$ 1.12	1.50	11	10
	Weight-for-Age	525	-0.68 $\pm$ 1.01	1.00	12	7
13	Singida					
	Weight-for-Height	675	-0.42 $\pm$ 0.98	1.41	13	4
	Height-for-Age	667	-1.44 $\pm$ 1.05	1.70	10	15
	Weight-for-Age	675	-1.11 $\pm$ 1.01	1.48	12	5
14	Tabora					
	Weight-for-Height	604	-0.20 $\pm$ 0.99	1.09	7	0
	Height-for-Age	582	-1.34 $\pm$ 1.13	1.15	7	22
	Weight-for-Age	599	-0.86 $\pm$ 1.02	1.00	5	7
15	Rukwa					
	Weight-for-Height	546	-0.11 $\pm$ 0.96	1.33	6	1
	Height-for-Age	536	-1.93 $\pm$ 1.12	1.59	5	12
	Weight-for-Age	550	-1.18 $\pm$ 1.04	1.82	1	2
16	Kigoma					
	Weight-for-Height	632	-0.29 $\pm$ 0.99	2.02	3	3
	Height-for-Age	624	-1.76 $\pm$ 1.09	1.89	3	11
	Weight-for-Age	632	-1.19 $\pm$ 0.99	2.05	3	3
17	Shinyanga					
	Weight-for-Height	705	-0.26 $\pm$ 1.01	1.05	7	3
	Height-for-Age	692	-1.44 $\pm$ 1.10	2.06	7	16
	Weight-for-Age	706	-0.97 $\pm$ 1.01	1.40	6	3
18	Kagera					
	Weight-for-Height	511	-0.16 $\pm$ 1.02	1.63	2	5
	Height-for-Age	497	-1.65 $\pm$ 1.15	1.39	2	19
	Weight-for-Age	506	-1.04 $\pm$ 1.07	1.37	2	10
19	Mwanza					
	Weight-for-Height	555	-0.14 $\pm$ 1.04	1.00	10	2
	Height-for-Age	538	-1.35 $\pm$ 1.07	2.14	10	19
	Weight-for-Age	557	-0.86 $\pm$ 0.99	1.00	3	7
20	Mara					
	Weight-for-Height	690	0.11 $\pm$ 0.95	1.00	11	3
	Height-for-Age	666	-1.40 $\pm$ 1.13	1.89	10	28
	Weight-for-Age	690	-0.70 $\pm$ 0.96	1.00	8	6

No	Indicator	Total	Mean z-scores $\pm$ SD	Design Effect (z-score < -2)	Z-scores not available	Z-scores out of range
21	Manyara					
	Weight-for-Height	656	-0.42 $\pm$ 0.97	1.00	20	9
	Height-for-Age	643	-1.54 $\pm$ 1.19	1.81	19	23
	Weight-for-Age	664	-1.11 $\pm$ 1.02	1.23	17	4
22	Njombe					
	Weight-for-Height	485	0.27 $\pm$ 1.05	1.00	9	1
	Height-for-Age	478	-2.05 $\pm$ 1.08	1.61	8	9
	Weight-for-Age	486	-0.98 $\pm$ 0.99	1.23	8	1
23	Katavi					
	Weight-for-Height	583	-0.07 $\pm$ 1.08	1.12	5	2
	Height-for-Age	575	-1.55 $\pm$ 1.09	1.34	3	12
	Weight-for-Age	579	-0.88 $\pm$ 1.05	1.00	3	8
24	Simiyu					
	Weight-for-Height	653	-0.24 $\pm$ 1.02	1.33	4	3
	Height-for-Age	642	-1.46 $\pm$ 1.13	1.65	4	14
	Weight-for-Age	650	-0.97 $\pm$ 1.00	1.42	1	9
25	Geita					
	Weight-for-Height	636	-0.12 $\pm$ 0.99	1.27	6	3
	Height-for-Age	619	-1.67 $\pm$ 1.14	2.03	4	22
	Weight-for-Age	634	-1.04 $\pm$ 1.01	1.49	2	9
26	Songwe					
	Weight-for-Height	601	0.02 $\pm$ 0.98	1.31	17	4
	Height-for-Age	593	-1.74 $\pm$ 1.11	1.59	16	13
	Weight-for-Age	608	-0.97 $\pm$ 1.04	1.35	12	2
27	Unguja North					
	Weight-for-Height	391	-0.49 $\pm$ 1.01	1.35	9	5
	Height-for-Age	382	-1.14 $\pm$ 1.11	1.60	9	14
	Weight-for-Age	392	-0.98 $\pm$ 1.02	1.60	7	6
28	Unguja South					
	Weight-for-Height	372	-0.33 $\pm$ 1.00	1.00	13	4
	Height-for-Age	368	-1.06 $\pm$ 1.19	1.00	13	8
	Weight-for-Age	375	-0.79 $\pm$ 1.00	1.00	13	1
29	Stone Town					
	Weight-for-Height	333	-0.34 $\pm$ 1.03	1.22	6	8
	Height-for-Age	333	-1.12 $\pm$ 1.10	1.03	6	8
	Weight-for-Age	339	-0.85 $\pm$ 1.07	1.00	5	3
30	Pemba North					
	Weight-for-Height	591	-0.47 $\pm$ 0.94	1.00	4	4
	Height-for-Age	582	-1.17 $\pm$ 1.08	1.02	3	14
	Weight-for-Age	590	-0.96 $\pm$ 0.98	1.07	2	7
31	Pemba South					
	Weight-for-Height	563	-0.37 $\pm$ 1.00	1.14	6	2
	Height-for-Age	557	-1.17 $\pm$ 1.06	1.47	6	8

No	Indicator	Total	Mean z-scores $\pm$ SD	Design Effect (z-score < -2)	Z-scores not available	Z-scores out of range
	Weight-for-Age	565	-0.89 $\pm$ 0.98	1.52	4	2
	Mainland					
	Weight-for-Height	14919	-0.09 $\pm$ 1.06	1.24	268	6
	Height-for-Age	14922	-1.49 $\pm$ 1.28	4.11	246	20
	Weight-for-Age	14980	-0.92 $\pm$ 1.09	1.51	202	6
	Zanzibar					
	Weight-for-Height	2273	-0.40 $\pm$ 1.05	1.00	38	0
	Height-for-Age	2271	-1.12 $\pm$ 1.21	1.16	37	3
	Weight-for-Age	2280	-0.92 $\pm$ 1.05	1.28	31	0
	National Overall					
	Weight-for-Height	17187	-0.13 $\pm$ 1.07	1.09	306	6
	Height-for-Age	17193	-1.44 $\pm$ 1.27	3.64	283	23
	Weight-for-Age	17260	-0.92 $\pm$ 1.09	1.48	233	6

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/+3 z-scores for WHZ in Dodoma, Tanga, Pwani, Ruvuma, Iringa, Mbeya, Tabora, Shinyanga, Mwanza, Njombe, Katavi, Simiyu and Songwe in order to avoid to exclude some severely malnourished children ; -3/+3 z-scores for WHZ in Arusha, Kilimanjaro, Morogoro, Dar es Salaam, Lindi, Mtwara, Singida, Rukwa, Kigoma, Kagera, Mara, Manyara, Geita, Unguja North, Unguja South, Stone Town, Pemba North and Pemba South ; -3/+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 31 regions together. WHO flags were also used for overweight prevalence.

Prevalence of Chronic Malnutrition

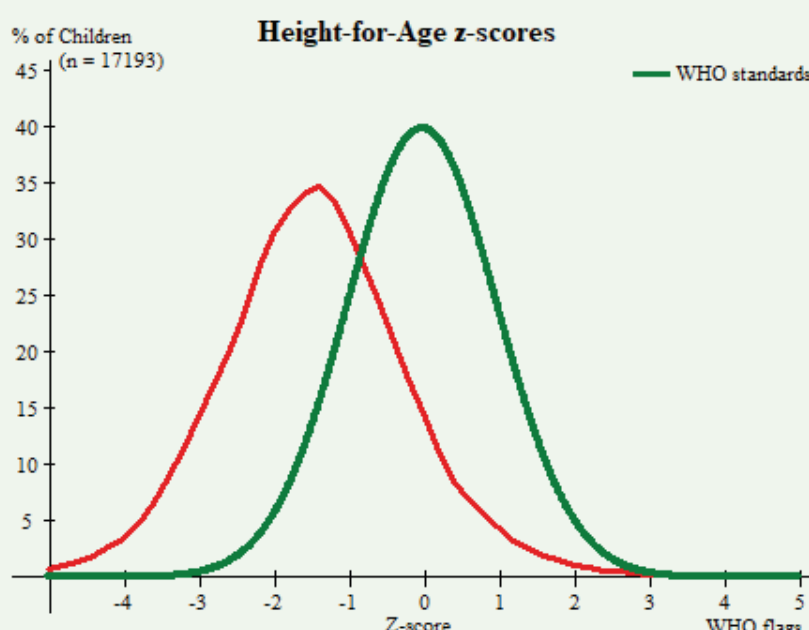


Figure 3: Height-for-Age z-score (WHO 2006)

The figure 3 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 -1.44 ± 1.27 SD. The distribution was flattened may be due to difficulties encountered during data collection for age estimation.

Table 16: Prevalence of Global, Moderate and Severe Chronic Malnutrition (Height-for-Age Z-score) in children 0 to 59 months of age by age group and sex in Tanzania (WHO 2006)

Back-ground 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 (Months)							
0-5	1,879	339	18.0 [15.9-20.2]	252	13.4 [11.6-15.2]	87	4.6 [3.5-5.8]
6-11	1,894	447	22.8 [20.5-25.1]	319	16.0 [14.0-18.0]	128	6.8 [5.5-8.1]
12-23	3,546	1,327	36.1 [34.1-38.1]	875	23.6 [22.0-25.2]	452	12.5 [11.2-13.8]
24-35	3,444	1,485	43.3 [41.0-45.5]	949	28.1 [26.2-29.9]	536	15.2 [13.7-16.7]
36-47	3,416	1,119	32.9 [30.9-35.0]	789	22.8 [21.1-24.5]	330	10.1 [8.8-11.4]
48-59	3,014	816	26.5 [24.6-28.4]	621	20.4 [18.7-22.1]	195	6.1 [5.0-7.1]
0-23	7,319	2,113	28.0 [26.7-29.4]	1,446	19.0 [17.9-20.1]	667	9.0 [8.2-9.8]
24-59	9,874	3,420	34.5 [33.2-35.9]	2,359	23.9 [22.8-25.0]	1,061	10.6 [9.8-11.5]
Sex							
Male	8,789	3,033	34.1 [32.7-35.4]	2,030	22.6 [21.6-23.7]	1,003	11.4 [10.6-12.2]
Female	8,404	2,500	29.4 [28.1-30.8]	1,775	21.0 [19.9-22.1]	725	8.4 [7.7-9.2]

Table 17: Prevalence of Global, Moderate and Severe Chronic Malnutrition (Height-for-Age Z-score) in children 0 to 59 months of age by region, Tanzania Mainland, Zanzibar and National (WHO 2006)

No.	Region/ Overall	N	Stunting (HAZ <2)						Moderate Stunting (HAZ <-2 and >=-3)			Severe Stunting (HAZ <-3)		
			All		Boys		Girls		All		All		All	
			n	% [CI 95%]	n	% [CI 95%]	n	% [CI 95%]	n	% [CI 95%]	n	% [CI 95%]	n	% [CI 95%]
	Mainland	14,922	5,035	32.1 [31.0-33.2]	2,736	34.4 [33.0-35.7]	2,299	29.8 [28.4-31.1]	3,433	22.0 [21.2-22.9]	1,602	10.1 [9.5-10.7]		
1	Dodoma	521	194	37.2 [32.4-42.3]	93	36.9 [29.9-44.5]	101	37.5 [32.1-43.3]	136	26.1 [21.9-30.8]	58	11.1 [8.7-14.2]		
2	Arusha	709	179	25.2 [20.1-31.2]	118	31.3 [24.3-39.3]	61	18.4 [13.3-24.8]	121	17.1 [13.9-20.8]	58	8.2 [5.4-12.3]		
3	Kilimanjaro	445	89	20.0 [16.2-24.4]	59	25.0 [19.6-31.3]	30	14.4 [10.1-20.0]	67	15.1 [11.5-19.5]	22	4.9 [3.4-7.1]		
4	Tanga	474	161	34.0 [27.3-41.4]	85	33.1 [25.2-42.1]	76	35.0 [26.8-44.2]	107	22.6 [18.0-27.9]	54	11.4 [8.0-16.0]		
5	Morogoro	549	145	26.4 [19.9-34.1]	74	27.1 [19.7-36.1]	71	25.7 [18.5-34.6]	116	21.1 [15.6-27.9]	29	5.3 [3.4-8.2]		
6	Pwani	623	148	23.8 [20.0-28.0]	75	23.8 [18.3-30.4]	73	23.7 [19.6-28.3]	117	18.8 [16.0-21.9]	31	5.0 [3.5-7.1]		
7	Dar es Salaam	586	118	20.1 [16.8-24.0]	61	20.5 [16.9-24.6]	57	19.8 [15.2-25.4]	94	16.0 [13.0-19.6]	24	4.1 [2.7-6.1]		
8	Lindi	256	61	23.8 [17.6-31.4]	38	27.1 [19.5-36.4]	23	19.8 [13.1-28.9]	46	18.0 [13.3-23.8]	15	5.9 [3.2-10.5]		
9	Mtwara	429	127	29.6 [24.4-35.4]	73	32.6 [26.5-39.3]	54	26.3 [18.7-35.7]	94	21.9 [17.5-27.0]	33	7.7 [5.3-11.0]		
10	Ruvuma	490	201	41.0 [34.7-47.7]	124	49.0 [40.9-57.2]	77	32.5 [24.7-41.4]	117	23.9 [19.9-28.4]	84	17.1 [13.3-21.8]		
11	Iringa	594	280	47.1 [40.7-53.7]	143	50.0 [42.1-57.9]	137	44.5 [36.7-52.5]	189	31.8 [27.4-36.6]	91	15.3 [12.1-19.3]		
12	Mbeya	523	177	33.8 [28.9-39.1]	88	34.9 [28.3-42.1]	89	32.8 [26.6-39.7]	128	24.5 [21.2-28.0]	49	9.4 [6.5-13.4]		

No.	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%]
13	Singida	667	199	29.8 [25.4-34.7]	110	31.7 [26.4-37.5]	89	27.8 [22.5-33.8]	150	22.5 [18.7-26.8]	49	7.3 [5.6-9.7]
14	Tabora	582	150	25.8 [22.0-29.9]	90	29.4 [23.6-35.9]	60	21.7 [17.3-27.0]	104	17.9 [14.5-21.9]	46	7.9 [6.1-10.2]
15	Rukwa	536	257	47.9 [42.5-53.5]	134	51.0 [43.9-58.0]	123	45.1 [38.9-51.3]	171	31.9 [27.2-37.1]	86	16.0 [11.6-21.7]
16	Kigoma	624	264	42.3 [36.9-47.9]	128	42.4 [35.6-49.5]	136	42.2 [35.4-49.3]	184	29.5 [25.5-33.8]	80	12.8 [9.9-16.4]
17	Shinyanga	692	222	32.1 [27.1-37.5]	119	34.5 [28.6-40.9]	103	29.7 [24.1-36.0]	170	24.6 [20.4-29.2]	52	7.5 [5.4-10.4]
18	Kagera	497	198	39.8 [34.7-45.3]	102	41.8 [35.6-48.2]	96	37.9 [31.8-44.5]	136	27.4 [23.7-34.7]	62	12.5 [9.6-16.1]
19	Mwanza	538	141	26.2 [20.9-32.3]	80	31.7 [25.3-38.9]	61	21.3 [15.2-29.1]	104	19.3 [15.2-24.3]	37	6.9 [4.6-10.1]
20	Mara	666	195	29.3 [24.6-34.5]	105	30.8 [24.7-37.6]	90	27.7 [22.5-33.6]	139	20.9 [17.0-25.4]	56	8.4 [6.6-10.7]
21	Manyara	643	232	36.1 [31.1-41.4]	132	39.6 [33.8-45.8]	100	32.3 [26.4-38.7]	155	24.1 [20.6-28.0]	77	12.0 [9.8-14.5]
22	Njombe	478	256	53.6 [47.6-59.4]	139	58.9 [52.1-65.3]	117	48.3 [40.3-56.4]	169	35.4 [31.9-39.0]	87	18.2 [13.8-23.6]
23	Katavi	575	194	33.7 [29.2-38.5]	107	35.4 [31.0-40.1]	87	31.9 [26.0-38.4]	134	23.3 [19.5-27.7]	60	10.4 [8.1-13.3]
24	Simiyu	642	200	31.2 [26.6-36.2]	104	32.4 [27.5-37.7]	96	29.9 [24.2-36.3]	142	22.1 [18.2-26.6]	58	9.0 [7.2-11.3]
25	Geita	619	241	38.9 [33.4-44.7]	131	41.5 [34.7-48.5]	110	36.3 [30.0-43.1]	161	26.0 [21.9-30.6]	80	12.9 [10.1-16.5]
26	Songwe	593	257	43.3 [38.3-48.6]	132	44.7 [38.1-51.6]	125	41.9 [35.5-48.7]	182	30.7 [26.1-35.7]	75	12.6 [10.4-15.3]

No.	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%]
	Zanzibar	2,271	498	21.5 [19.2-23.8]	297	25.0 [21.8-28.2]	201	17.6 [14.5-20.6]	372	15.9 [13.7-18.0]	126	5.7 [4.4-7.0]
27	Unguja North	382	91	23.8 [18.7-29.9]	52	25.5 [19.1-33.1]	39	21.9 [15.6-29.9]	76	19.9 [15.4-25.2]	15	3.9 [2.2-7.0]
28	Unguja South	368	78	21.2 [17.2-25.8]	37	18.6 [13.7-24.7]	41	24.3 [19.2-30.2]	56	15.2 [11.7-19.5]	22	6.0 [4.0-8.9]
29	Stone Town	333	68	20.4 [16.2-25.4]	44	25.3 [18.9-32.9]	24	15.1 [10.1-22.0]	50	15.0 [11.2-19.8]	18	5.4 [3.3-8.7]
30	Pemba North	582	125	21.5 [18.2-25.2]	78	24.3 [20.7-28.3]	47	18.0 [13.7-23.4]	94	16.2 [13.4-19.3]	31	5.3 [3.6-7.7]
31	Pemba South	557	116	20.8 [16.9-25.4]	76	25.3 [20.3-31.1]	40	15.6 [11.7-20.4]	96	17.2 [13.9-21.1]	20	3.6 [2.0-6.2]
	National	17,193	5,533	31.8 [30.7-32.9]	3,033	34.1 [32.7-35.4]	2,500	29.4 [28.1-30.8]	3,805	21.8 [21.0-22.7]	1,728	10.0 [9.4-10.5]

Table 18: Number of children 0-59 months suffering from stunting by region, Tanzania Mainland, Zanzibar and National

No.	Region/Overall	Estimated Population (Census 2012)	Estimated Population 2018 ¹	Population 0-59 months	Stunting	
					Prevalence (%)	Number of children
	Mainland	43,625,354	52,619,314	9,139,198		2,923,620
1	Dodoma	2,083,588	2,492,989	433,576	37.2	161,290
2	Arusha	1,694,310	1,999,907	301,426	25.2	75,959
3	Kilimanjaro	1,640,087	1,864,329	260,437	20.0	52,087
4	Tanga	2,045,205	2,337,053	315,965	34.0	107,428
5	Morogoro	2,218,492	2,596,287	404,280	26.4	106,730
6	Pwani	1,098,668	1,265,504	192,324	23.8	45,773
7	Dar es Salaam	4,364,541	5,147,070	792,404	20.1	159,273
8	Lindi	864,652	983,738	139,898	23.8	33,296
9	Mtwara	1,270,854	1,424,083	189,646	29.6	56,135
10	Ruvuma	1,376,891	1,579,811	221,627	41.0	90,867
11	Iringa	941,238	1,095,172	161,393	47.1	76,016
12	Mbeya	1,708,548	2,070,412	363,709	33.8	122,934
13	Singida	1,370,637	1,612,854	262,996	29.8	78,373
14	Tabora	2,291,623	2,870,522	570,865	25.8	147,283
15	Rukwa	1,004,539	1,195,550	188,864	47.9	90,466
16	Kigoma	2,127,930	2,616,200	490,307	42.3	207,400
17	Shinyanga	1,534,808	1,874,709	336,306	32.1	107,954
18	Kagera	2,458,023	3,022,037	564,408	39.8	224,634
19	Mwanza	2,772,509	3,532,378	736,817	26.2	193,046
20	Mara	1,743,830	2,209,143	455,654	29.3	133,507
21	Manyara	1,425,131	1,750,864	316,473	36.1	114,247
22	Njombe	702,097	803,299	108,780	53.6	58,306
23	Katavi	564,604	738,237	162,902	33.7	54,898
24	Simiyu	1,584,157	2,094,798	488,113	31.2	152,291
25	Geita	1,739,530	2,239,949	477,877	38.9	185,894
26	Songwe	998,862	1,202,419	202,151	43.3	87,531
	Zanzibar	1,303,569	1,579,849	269,149		57,078
27	Unguja North	187,455	222,066	34,652	23.8	8,247
28	Unguja South	115,588	133,767	18,553	21.2	3,933
29	Stone Town	593,678	700,791	104,810	20.4	21,381
30	Pemba North	211,732	271,594	57,276	21.5	12,314
31	Pemba South	195,116	251,631	53,858	20.8	11,202
	Total	44,928,923	54,199,163	9,408,347		2,980,698

According to those results, approximately 3 million children under five years of age are estimated to be 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 Dar es Salaam, Kagera, Kigoma, Mara, and Dodoma.¹⁰

¹⁰ Based on the Average Annual Rate 2002-2012 by region from the Census General Report

Prevalence of Global Acute Malnutrition

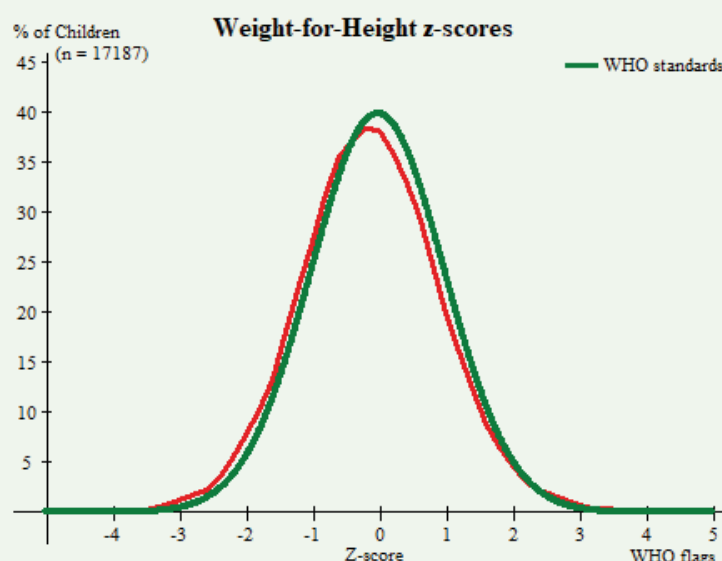


Figure 4: Weight-for-Height z-score (WHO 2006)

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 -0.13 ± 1.07 SD. The standard deviation indicates the good quality of weight and height measurements during data collection.

Table 19: 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 (Months)							
0-5	1,875	76	3.5 [2.6-4.5]	63	2.9 [2.0-3.7]	13	0.6 [0.3-1.0]
6-11	1,895	93	5.0 [3.9-6.1]	76	4.1 [3.1-5.2]	17	0.8 [0.4-1.3]
12-23	3,544	207	5.5 [4.5-6.4]	187	5.0 [4.1-5.9]	20	0.5 [0.2-0.7]
24-35	3,447	74	1.9 [1.4-2.5]	64	1.7 [1.2-2.2]	10	0.3 [0.0-0.5]
36-47	3,414	81	2.5 [1.9-3.1]	75	2.3 [1.7-2.9]	6	0.2 [0.0-0.4]
48-59	3,012	113	3.4 [2.6-4.1]	104	3.2 [2.5-3.9]	9	0.2 [0.0-0.4]
Sex							
Male	8,794	375	4.0 [3.6-4.5]	331	3.6 [3.1-4.1]	44	0.4 [0.3-0.6]
Female	8,393	269	3.0 [2.6-3.4]	238	2.7 [2.3-3.1]	31	0.3 [0.2-0.5]

Table 20: Prevalence of Global, Moderate and Severe Acute Malnutrition (Weigh-for-Height Z-score) in

children 0 to 59 months of age by region, Tanzania Mainland, Zanzibar and National (WHO 2006)

No.	Region	N	Global Acute Malnutrition (WHZ <-2 and/or edema)						Moderate Acute Mal- nutrition (WHZ <-2 and >=3)		Severe Acute Malnu- trition (WHZ <-3 and/or ede- ma		Edema
			All		Boys		Girls		All		All		
			n	% [CI 95%]	n	% [CI 95%]	n	% [CI 95%]	n	% [CI 95%]	n	% [CI 95%]	
	Mainland	14,914	505	3.5 [3.1-3.8]	302	4.0 [3.5-4.5]	203	2.9 [2.5-3.4]	453	3.1 [2.8-3.4]	52	0.4 [0.2-0.5]	0.03
1	Dodoma	537	20	3.7 [2.5-5.5]	11	4.3 [2.5-7.2]	9	3.2 [1.6-6.2]	18	3.4 [2.2-5.1]	2	0.4 [0.1-1.5]	0.0
2	Arusha	719	31	4.3 [3.0-6.1]	21	5.5 [3.4-8.6]	10	3.0 [1.6-5.5]	28	3.9 [2.7-5.6]	3	0.4 [0.1-1.3]	0.0
3	Kilimanjaro	454	7	1.5 [0.7-3.3]	4	1.7 [0.6-4.2]	3	1.4 [0.5-4.0]	7	1.5 [0.7-3.3]	0	0.0	0.0
4	Tanga	481	13	2.7 [1.4-5.1]	8	3.1 [1.5-6.1]	5	2.3 [0.9-5.5]	10	2.1 [1.0-4.2]	3	0.6 [0.2-1.9]	0.0
5	Morogoro	563	21	3.7 [2.5-5.4]	10	3.5 [1.8-6.9]	11	3.9 [2.3-6.7]	19	3.4 [2.3-5.0]	2	0.4 [0.1-1.4]	0.2
6	Pwani	639	18	2.8 [1.6-5.0]	10	3.1 [1.5-6.0]	8	2.6 [1.2-5.2]	16	2.5 [1.3-4.7]	2	0.3 [0.1-1.3]	0.0
7	Dar es Salaam	585	25	4.3 [2.8-6.5]	13	4.3 [2.4-7.8]	12	4.2 [2.3-7.5]	23	3.9 [2.5-6.2]	2	0.3 [0.1-1.4]	0.0
8	Lindi	259	6	2.3 [1.1-4.7]	4	2.8 [1.1-7.1]	2	1.7 [0.4-6.8]	5	1.9 [0.8-4.4]	1	0.4 [0.1-2.8]	0.0
9	Mtwara	433	7	1.6 [0.8-3.3]	3	1.3 [0.4-4.0]	4	1.9 [0.7-5.1]	7	1.6 [0.8-3.3]	0	0.0	0.0
10	Ruvuma	498	15	3.0 [1.9-4.8]	8	3.1 [1.5-6.2]	7	2.9 [1.5-5.7]	11	2.2 [1.2-3.9]	4	0.8 [0.3-2.1]	0.0
11	Iringa	599	22	3.7 [2.5-5.4]	15	5.2 [3.2-8.3]	7	2.3 [1.1-4.5]	21	3.5 [2.3-5.2]	1	0.2 [0.0-1.3]	0.0

No.	Region	N	Global Acute Malnutrition (WHZ <-2 and/or edema)						Moderate Acute Mal- nutrition (WHZ <-2 and >=-3)		Severe Acute Malnu- trition (WHZ <-3 and/or ede- ma)		Edema
			All		Boys		Girls		All		All		
			n	% [CI 95%]	n	% [CI 95%]	n	% [CI 95%]	n	% [CI 95%]	n	% [CI 95%]	
12	Mbeya	527	14	2.7 [1.7-4.1]	8	3.1 [1.6-5.9]	6	2.2 [1.0-4.7]	10	1.9 [1.1-3.3]	4	0.8 [0.3-2.0]	0.2
13	Singida	675	35	5.2 [3.5-7.7]	20	5.7 [3.4-9.5]	15	4.6 [2.5-8.2]	34	5.0 [3.4-7.5]	1	0.1 [0.0-1.1]	0.0
14	Tabora	604	22	3.6 [2.3-5.7]	13	4.1 [2.4-7.0]	9	3.1 [1.7-5.5]	21	3.5 [2.2-5.6]	1	0.2 [0.0-1.2]	0.0
15	Rukwa	547	12	2.2 [1.2-4.1]	4	1.5 [0.6-3.8]	8	2.9 [1.2-7.0]	11	2.0 [1.0-4.0]	1	0.2 [0.0-1.3]	0.2
16	Kigoma	632	31	4.9 [2.9-8.1]	22	7.2 [4.7-10.9]	9	2.8 [1.1-6.5]	30	4.7 [2.8-7.8]	1	0.2 [0.0-1.2]	0.0
17	Shinyanga	704	30	4.3 [2.9-6.2]	21	5.9 [3.8-9.2]	9	2.6 [1.5-4.4]	30	4.3 [2.9-6.2]	0	0.0	0.0
18	Kagera	511	16	3.1 [1.6-5.9]	9	3.6 [1.6-8.0]	7	2.7 [1.2-5.8]	16	3.1 [1.6-5.9]	0	0.0	0.0
19	Mwanza	555	20	3.6 [2.3-5.5]	12	4.7 [2.7-7.9]	8	2.7 [1.3-5.4]	18	3.2 [2.1-5.1]	2	0.4 [0.1-1.5]	0.0
20	Mara	692	12	1.7 [1.1-2.7]	6	1.7 [1.1-2.7]	6	1.8 [0.9-3.6]	10	1.4 [0.9-2.4]	2	0.3 [0.1-1.2]	0.3
21	Manyara	656	25	3.8 [2.5-5.7]	12	3.5 [2.0-6.0]	13	4.2 [2.6-6.6]	24	3.7 [2.4-5.5]	1	0.2 [0.0-1.2]	0.0
22	Njombe	485	10	2.1 [1.1-3.8]	6	2.5 [1.0-6.0]	4	1.6 [0.6-4.2]	9	1.9 [1.0-3.6]	1	0.2 [0.0-1.6]	0.0
23	Katavi	583	23	3.9 [2.5-6.1]	14	4.5 [2.4-8.5]	9	3.3 [1.6-6.6]	17	2.9 [1.7-4.9]	6	1.0 [0.4-2.9]	0.0
24	Simiyu	653	30	4.6 [3.0-7.0]	16	4.9 [2.8-8.4]	14	4.3 [2.4-7.5]	27	4.1 [2.7-6.2]	3	0.5 [0.1-2.1]	0.0

No.	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		
			n	% [CI 95%]	n	% [CI 95%]	n	% [CI 95%]	n	% [CI 95%]	n	% [CI 95%]	
25	Geita	636	18	2.8 [1.7-4.8]	11	3.4 [1.7-6.6]	7	2.2 [1.1-4.5]	18	2.8 [1.7-4.8]	0	0.0	0.0
26	Songwe	601	14	2.3 [1.3-4.3]	12	4.0 [2.0-8.0]	2	0.7 [0.2-2.6]	12	2.0 [1.0-3.9]	2	0.3 [0.1-1.3]	0.0
	Zanzibar	2,273	139	6.1 [4.7-7.5]	73	5.7 [4.0-7.4]	66	6.6 [4.5-8.7]	116	4.8 [3.6-6.0]	23	1.3 [0.7-1.9]	0.0
27	Unguja North	391	30	7.7 [5.0-11.5]	14	6.7 [4.0-11.2]	16	8.7 [5.4-13.9]	27	6.9 [4.5-10.4]	3	0.8 [0.2-2.3]	0.0
28	Unguja South	372	16	4.3 [2.7-6.9]	9	4.5 [2.3-8.6]	7	4.1 [2.1-7.7]	13	3.5 [2.1-5.6]	3	0.8 [0.3-2.5]	0.0
29	Stone Town	333	15	4.5 [2.5-7.9]	5	2.9 [1.2-6.6]	10	6.3 [3.1-12.1]	14	4.2 [2.4-7.3]	1	0.3 [0.0-2.3]	0.0
30	Pemba North	591	38	6.4 [4.7-8.8]	23	7.0 [4.6-10.6]	15	5.7 [3.8-8.5]	33	5.6 [3.9-7.9]	5	0.8 [0.4-2.0]	0.0
31	Pemba South	563	30	5.3 [3.6-7.8]	15	5.0 [2.8-8.8]	15	5.7 [3.4-9.5]	29	5.2 [3.5-7.6]	1	0.2 [0.0-1.4]	0.0
	National	17,187	644	3.5 [3.2-3.9]	375	4.0 [3.6-4.5]	269	3.0 [2.6-3.4]	569	3.1 [2.8-3.5]	75	0.4 [0.3-0.5]	0.03

Table 21: Number of children 0-59 months suffering from moderate acute malnutrition or severe acute malnutrition by region, Tanzania Mainland, Zanzibar and National

Region	Estimated Population (Census 2012)	Estimated Population 2018 ¹¹	Population 0-59 months	Moderate Acute Malnutrition		Severe Acute Malnutrition	
				Prevalence (%)	Number of MAM children*	Prevalence (%)	Number of SAM children**
Mainland	43,625,354	52,619,314	9,139,198		423,550		87,818
Dodoma	2,083,588	2,492,989	433,576	3.4	22,112	0.4	4,509
Arusha	1,694,310	1,999,907	301,426	3.9	17,633	0.4	3,135
Kilimanjaro	1,640,087	1,864,329	260,437	1.5	5,860	0	1,205***
Tanga	2,045,205	2,337,053	315,965	2.1	9,953	0.6	4,929
Morogoro	2,218,492	2,596,287	404,280	3.4	20,618	0.4	4,205
Pwani	1,098,668	1,265,504	192,324	2.5	7,212	0.3	1,500
Dar es Salaam	4,364,541	5,147,070	792,404	3.9	46,356	0.3	6,181
Lindi	864,652	983,738	139,898	1.9	3,987	0.4	1,455
Mtwara	1,270,854	1,424,083	189,646	1.6	4,552	0	936***
Ruvuma	1,376,891	1,579,811	221,627	2.2	7,314	0.8	4,610
Iringa	941,238	1,095,172	161,393	3.5	8,473	0.2	839
Mbeya	1,708,548	2,070,412	363,709	1.9	10,366	0.8	7,565
Singida	1,370,637	1,612,854	262,996	5	19,725	0.1	684
Tabora	2,291,623	2,870,522	570,865	3.5	29,970	0.2	2,968
Rukwa	1,004,539	1,195,550	188,864	2	5,666	0.2	982
Kigoma	2,127,930	2,616,200	490,307	4.7	34,567	0.2	2,550
Shinyanga	1,534,808	1,874,709	336,306	4.3	21,692	0	4,459***
Kagera	2,458,023	3,022,037	564,408	3.1	26,245	0	5,395***
Mwanza	2,772,509	3,532,378	736,817	3.2	15,473	0.4	7,663
Mara	1,743,830	2,209,143	455,654	1.4	21,871	0.3	3,554
Manyara	1,425,131	1,750,864	316,473	3.7	17,564	0.2	1,646
Njombe	702,097	803,299	108,780	1.9	3,100	0.2	566
Katavi	564,604	738,237	162,902	2.9	7,086	1	4,235
Simiyu	1,584,157	2,094,798	488,113	4.1	30,019	0.5	6,345
Geita	1,739,530	2,239,949	477,877	2.8	20,071	0	4,126***
Songwe	998,862	1,202,419	202,151	2	6,065	0.3	1,577
Zanzibar	1,303,569	1,579,849	269,149		20,176		3,396
Unguja North	187,455	222,066	34,652	6.9	3,586	0.8	721
Unguja South	115,588	133,767	18,553	3.5	974	0.8	385
Stone Town	593,678	700,791	104,810	4.2	6,603	0.3	818
Pemba North	211,732	271,594	57,276	5.6	4,811	0.8	1,191
Pemba South	195,116	251,631	53,858	5.2	4,201	0.2	280
Total	44,928,923	54,199,163	9,408,347		443,725		91,213

* The estimations were made using 1.5 incidence factor for MAM 5

** The estimations were made using 2.6 incidence factor for SAM (burden)¹²

*** The estimations were made using a ratio SAM/MAM = 0.206 (National ratio of 75,093 (SAM) / 365,306 (MAM)). The estimations of MAM children for Kilimanjaro, Mtwara, Shinyanga, Kagera and Geita were removed for calculation.

11 Based on the Average Annual Rate 2002-2012 by region from the Census General Report

12 MAM Caseload = Population 0-59 months x Prevalence x 1.5. SAM Caseload = Population 0-59 months x Prevalence x 2.6. Sources: (1) UNICEF Global SAM Management Update. Summary of findings. September 2013. (2) How do we estimate case load for SAM and/or MAM in children 6-59 months in a given time period. Mark Myatt, June 2012

According to survey results, there are approximately 440,000 moderately acute malnourished children and 90,000 severely acute malnourished children in Tanzania in 2018.

Prevalence of Underweight

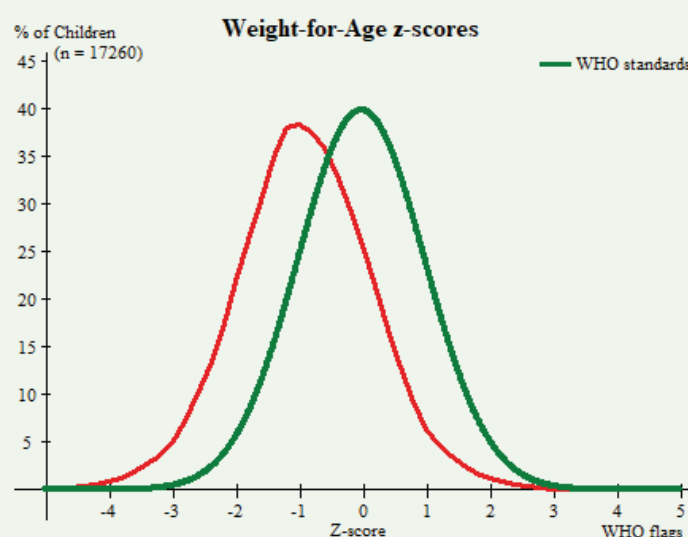


Figure 5: Weight-for-Age z-score (WHO 2006)

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 -0.92 ± 1.09 SD.

Table 22: 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)

Back-ground 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 (Months)							
0-5	1,881	182	9.4 [7.7-11.0]	128	6.8 [5.4-8.2]	54	2.5 [1.7-3.4]
6-11	1,909	263	13.6 [11.8-15.4]	206	10.8 [9.1-12.4]	57	2.8 [2.0-3.6]
12-23	3,566	618	16.8 [15.3-18.4]	465	13.0 [11.7-14.4]	153	3.8 [3.1-4.5]
24-35	3,460	579	16.6 [15.0-18.2]	473	13.5 [12.1-14.9]	106	3.1 [2.4-3.9]
36-47	3,422	469	14.0 [12.6-15.4]	402	12.0 [10.7-13.2]	67	2.1 [1.5-2.6]
48-59	3,022	451	14.4 [13.0-15.9]	388	12.5 [11.1-13.8]	63	2.0 [1.3-2.6]
Sex							
Male	8,827	1,403	15.7 [14.8-16.6]	1,106	12.5 [11.6-13.3]	297	3.2 [2.8-3.6]
Female	8,433	1,159	13.5 [12.6-14.5]	956	11.3 [10.5-12.1]	203	2.3 [1.9-2.6]

Table 23: Prevalence of Global, Moderate and Severe Underweight (Weigh-for-Age Z-score) in children 0 to 59 months of age by region, Tanzania Mainland, Zanzibar and National (WHO 2006)

No.	Region	N	Underweight (WAZ <2)						Moderate Underweight (WAZ <2 and >= -3)			Severe Underweight (WAZ <-3)		
			All		Boys		Girls	All	n	%	[CI 95%]	n	%	[CI 95%]
			n	%	n	%								
	Mainland	14,980	2,244	14.7 [13.9-15.4]	1,232	15.7 [14.8-16.7]	13.5 [12.6-14.5]	1,012	1,814	11.9 [11.3-12.5]	430	2.7 [2.4-3.0]		
1	Dodoma	535	95	17.8 [14.5-21.6]	45	17.6 [13.4-22.9]	17.9 [13.3-23.6]	50	84	15.7 [12.6-19.4]	11	2.1 [1.1-3.8]		
2	Arusha	718	100	13.9 [10.0-19.1]	69	18.0 [12.6-25.0]	9.3 [6.0-14.1]	31	76	10.6 [7.8-14.3]	24	3.3 [1.9-5.8]		
3	Kilimanjaro	456	44	9.6 [6.8-13.6]	30	12.4 [8.3-18.1]	6.5 [4.0-10.4]	14	39	8.6 [5.9-12.2]	5	1.1 [0.4-3.0]		
4	Tanga	487	76	15.6 [12.2-19.7]	41	15.6 [11.4-21.1]	15.6 [11.0-21.6]	35	67	13.8 [10.5-17.8]	9	1.8 [1.0-3.3]		
5	Morogoro	561	68	12.1 [9.1-16.0]	30	10.6 [6.7-16.4]	13.6 [9.8-18.6]	38	58	10.3 [7.7-13.7]	10	1.8 [0.9-3.3]		
6	Pwani	637	57	8.9 [6.7-11.9]	29	8.9 [5.7-13.5]	9.0 [6.2-12.9]	28	50	7.8 [5.8-10.5]	7	1.1 [0.5-2.5]		
7	Dar es Salaam	587	68	11.6 [9.1-14.6]	39	13.0 [9.5-17.4]	10.1 [6.8-14.8]	29	62	10.6 [8.3-13.4]	6	1.0 [0.4-2.5]		
8	Lindi	257	19	7.4 [4.4-12.1]	9	6.4 [2.9-13.5]	8.5 [4.1-17.0]	10	18	7.0 [4.3-11.2]	1	0.4 [0.0-3.0]		
9	Mtwara	430	50	11.6 [8.9-15.0]	22	9.8 [6.9-13.8]	13.6 [9.4-19.3]	28	46	10.7 [8.0-14.1]	4	0.9 [0.4-2.4]		
10	Ruvuma	497	82	16.5 [13.2-20.5]	51	19.8 [15.8-24.6]	12.9 [9.2-17.8]	31	68	13.7 [10.7-17.4]	14	2.8 [1.6-5.0]		
11	Iringa	604	111	18.4 [15.1-22.2]	70	23.9 [19.2-29.3]	13.2 [9.5-18.1]	41	82	13.6 [10.8-16.9]	29	4.8 [3.0-7.6]		
12	Mbeya	525	47	9.0 [6.7-11.8]	25	9.8 [6.8-14.1]	8.1 [5.3-12.2]	22	42	8.0 [6.0-10.5]	5	1.0 [0.4-2.3]		
13	Singida	675	123	18.2 [14.8-22.2]	63	18.1 [14.0-23.1]	18.3 [13.7-24.2]	60	101	15.0 [12.0-18.5]	22	3.3 [2.1-5.1]		

No.	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%]
14	Tabora	599	76	12.7 [10.6-15.1]	38	12.2 [9.2-16.0]	38	13.2 [10.4-16.6]	63	10.5 [8.6-12.8]	13	2.2 [1.3-3.7]
15	Rukwa	550	118	21.5 [17.0-26.7]	58	21.6 [15.7-28.9]	60	21.4 [15.8-28.2]	96	17.5 [14.0-21.6]	22	4.0 [2.4-6.6]
16	Kigoma	632	128	20.3 [16.0-25.3]	67	21.9 [16.8-28.0]	61	18.7 [13.7-25.0]	103	16.3 [12.4-21.1]	25	4.0 [2.5-6.2]
17	Shinyanga	706	106	15.0 [12.0-18.6]	53	15.0 [11.7-18.9]	53	15.1 [10.9-20.5]	94	13.3 [10.6-16.6]	12	1.7 [1.1-2.6]
18	Kagera	506	101	20.0 [16.0-24.6]	59	23.8 [18.4-30.2]	42	16.3 [11.7-22.2]	80	15.8 [12.6-19.7]	21	4.2 [2.4-7.]
19	Mwanza	557	65	11.7 [9.2-14.6]	32	12.4 [8.1-18.4]	33	11.1 [8.0-15.1]	55	9.9 [7.6-12.8]	10	1.8% [0.9-3.4]
20	Mara	690	62	9.0 [7.4-10.9]	37	10.5 [8.0-13.6]	25	7.4 [5.1-10.6]	54	7.8 [6.4-9.5]	8	1.2 [0.6-2.2]
21	Manyara	664	124	18.7 [15.5-22.3]	73	21.0 [16.7-26.1]	51	16.1 [12.3-20.8]	103	15.5 [12.5-19.1]	21	3.2 [2.1-4.7]
22	Njombe	486	77	15.8 [12.4-20.0]	39	16.3 [12.1-21.6]	38	15.4 [10.9-21.2]	69	14.2 [11.1-18.0]	8	1.6 [0.9-3.1]
23	Katavi	579	79	13.6 [11.0-16.8]	46	15.0 [11.5-19.4]	33	12.1 [9.1-15.9]	63	10.9 [8.8-13.]	16	2.8 [1.6-4.6]
24	Simiyu	650	89	13.7 [10.7-17.3]	43	13.2 [9.1-18.7]	46	14.2 [10.8-18.5]	70	10.8% [8.2-14.0]	19	2.9 [1.8-4.6]
25	Geita	634	106	16.7 [13.3-20.7]	63	19.3 [15.2-24.2]	43	14.0 [9.9-19.4]	90	14.2 [10.9-18.3]	16	2.5 [1.5-4.1]
26	Songwe	608	101	16.6 [13.4-20.5]	63	20.7 [16.6-25.6]	38	12.5 [8.8-17.4]	81	13.3 [10.5-16.7]	20	3.3 [2.2-5.0]
	Zanzibar	2,280	318	14.0 [12.1-15.9]	171	14.0 [11.5-16.5]	147	14.0 [11.2-16.8]	248	10.7 [9.0-12.4]	70	3.3 [2.4-4.2]

No.	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%]
27	Unguja North	392	60	15.3 [11.2-20.6]	28	13.3 [8.8-19.6]	32	17.6 [12.4-24.3]	46	11.7 [8.4-16.1]	14	3.6 [2.0-6.3]
28	Unguja South	375	38	10.1 [7.4-13.7]	18	8.9 [5.6-13.7]	20	11.6 [7.5-17.7]	30	8.0 [5.7-11.2]	8	2.1 [1.1-4.0]
29	Stone Town	339	45	13.3 [10.0-17.3]	23	13.1 [8.6-19.3]	22	13.5 [8.8-20.1]	35	10.3 [7.5-14.1]	10	2.9 [1.6-5.3]
30	Pemba North	590	82	13.9 [11.2-17.2]	48	14.7 [11.3-18.9]	34	12.9 [9.8-16.9]	69	11.7 [9.1-14.8]	13	2.2 [1.2-4.0]
31	Pemba South	565	77	13.6 [10.4-17.7]	43	14.2 [10.5-18.9]	34	13.0 [9.3-17.9]	68	12.0 [9.1-15.7]	9	1.6 [0.8-3.2]
	National	17,260	2,562	14.6 [13.9-15.3]	1,403	15.7 [14.8-16.6]	1,159	13.5 [12.6-14.5]	2,062	11.9 [11.3-12.5]	500	2.7 [2.4-3.1]

Prevalence of Overweight

Table 24: Prevalence of Global and Severe Overweight (Weigh-for-Height Z-score – no edema) in children 0 to 59 months of age by region, Tanzania Mainland, Zanzibar and National (WHO 2006)

No.	Region	N	Overweight (WHZ >2)		Severe Overweight (WHZ >3)	
			n	% [CI 95%]	N	% [CI 95%]
	Mainland	14,914	400	2.8 [2.5-3.1]	62	0.5 [0.3-0.6]
1	Dodoma	541	16	3.0 [1.5-4.4]	3	0.6 [0.0-1.2]
2	Arusha	728	20	2.7 [1.5-4.0]	3	0.4 [0.0-1.0]
3	Kilimanjaro	459	17	3.7 [2.0-5.4]	4	0.9 [0.1-1.7]
4	Tanga	486	19	3.9 [2.3-5.5]	4	0.8 [0.0-1.6]
5	Morogoro	565	23	4.1 [2.1-6.0]	3	0.5 [0.0-1.3]
6	Pwani	641	18	2.8 [1.5-4.1]	2	0.3 [0.0-0.7]
7	Dar es Salaam	594	24	4.0 [2.6-5.5]	6	1.0 [0.2-1.8]
8	Lindi	259	5	1.9 [0.3-3.5]	0	0.0
9	Mtwara	434	19	4.4 [2.9-5.9]	1	0.2 [0.0-0.7]
10	Ruvuma	500	21	4.2 [2.6-5.8]	2	0.4 [0.0-0.9]
11	Iringa	605	18	3.0 [1.8-4.2]	6	1.0 [0.1-1.9]
12	Mbeya	529	28	5.3 [3.5-7.1]	6	1.1 [0.3-2.0]
13	Singida	679	14	2.1 [0.8-3.3]	1	0.1 [0.0-0.4]
14	Tabora	604	12	2.0 [0.9-3.1]	0	0.0
15	Rukwa	547	7	1.3 [0.3-2.3]	1	0.2 [0.0-0.5]
16	Kigoma	635	12	1.9 [0.5-3.2]	0	0.0
17	Shinyanga	708	9	1.3 [0.3-2.2]	2	0.3 [0.0-0.7]
18	Kagera	516	14	2.7 [1.4-4.0]	3	0.6 [0.0-1.2]
19	Mwanza	557	10	1.8 [0.7-2.9]	1	0.2 [0.0-0.5]
20	Mara	693	16	2.3 [1.1-3.6]	2	0.3 [0.0-0.7]
21	Manyara	665	13	2.0 [1.1-2.8]	1	0.2 [0.0-0.4]
22	Njombe	486	21	4.3 [2.1-6.6]	2	0.4 [0.0-1.0]
23	Katavi	585	10	1.7 [0.8-2.6]	1	0.2 [0.0-0.5]
24	Simiyu	656	10	1.5 [0.5-2.6]	3	0.5 [0.0-1.0]
25	Geita	639	12	1.9 [0.9-2.9]	3	0.5 [0.0-1.0]
26	Songwe	603	12	2.0 [1.0-2.9]	2	0.3 [0.0-0.8]
	Zanzibar	2,273	34	2.1 [1.2-3.1]	5	0.2 [0.0-0.5]
27	Unguja North	396	7	1.8 [0.0-3.5]	1	0.3 [0.0-0.8]
28	Unguja South	376	6	1.6 [0.2-3.0]	1	0.3 [0.0-0.8]
29	Stone Town	341	11	3.2 [1.2-5.2]	1	0.3 [0.0-0.9]
30	Pemba North	595	5	0.8 [0.2-1.5]	1	0.2 [0.0-0.5]
31	Pemba South	565	5	0.9 [0.2-1.6]	1	0.2 [0.0-0.5]
	National	17,187	434	2.8 [2.5-3.1]	67	0.5 [0.3-0.6]

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 15.1% and 7.2% respectively in the first month of life. Chronic malnutrition increases quickly until it reaches peak at 27 months of age (45.2%). By this age, the majority of the damage of malnutrition in childhood is done and cannot be reversed. Prevalence of global acute malnutrition starts below 5% (3.5%) up to the first 14 months of life and steadily coming down after.

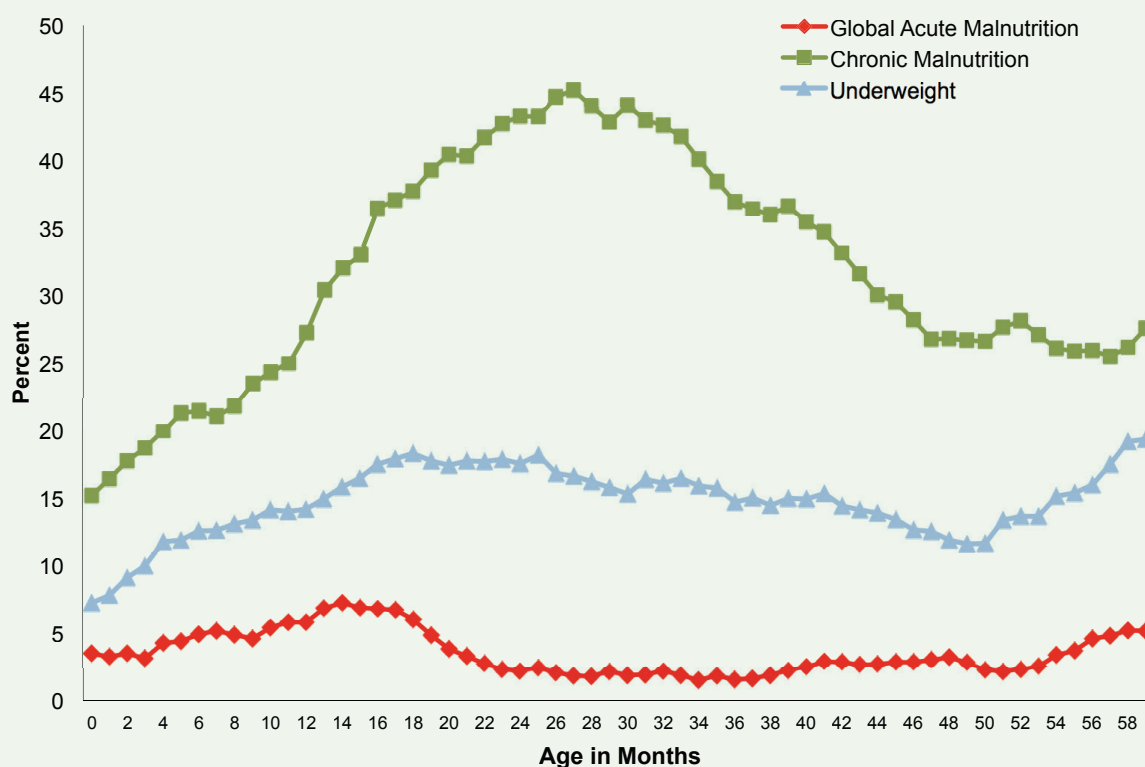


Figure 6: Trends of malnutrition by age in months

4.2 Child's weight and size at birth

Table 25: Child's size at birth by region, Tanzania Mainland, Zanzibar and National (Children 0-59 months)

No.	Region	N	Percent distribution of all live births by size of child at birth			Don't know (%)	Total (%)
			Very small (%)	Smaller than average (%)	Average or larger (%)		
	Mainland	15,187	2.4	4.1	84.3	9.2	100.0
1	Dodoma	552	1.3	2.9	85.5	10.3	100.0
2	Arusha	748	3.3	5.8	67.4	23.5	100.0
3	Kilimanjaro	470	0.9	3.8	88.7	6.6	100.0
4	Tanga	499	1.4	4.4	88.2	6.0	100.0
5	Morogoro	567	0.9	2.8	76.9	19.4	100.0
6	Pwani	642	0.6	2.0	89.6	7.8	100.0
7	Dar es Salaam	609	2.3	4.8	86.0	6.9	100.0
8	Lindi	274	3.6	0.4	83.6	12.4	100.0
9	Mtwara	461	4.8	0.0	84.8	10.4	100.0
10	Ruvuma	506	8.3	1.4	84.4	5.9	100.0
11	Iringa	621	10.3	0.3	83.1	6.3	100.0

No.	Region	N	Percent distribution of all live births by size of child at birth			Don't know (%)	Total (%)
12	Mbeya	543	0.9	6.4	85.5	7.2	100.0
13	Singida	692	13.7	0.0	61.6	24.7	100.0
14	Tabora	611	0.5	3.6	95.1	0.8	100.0
15	Rukwa	553	0.7	3.8	86.3	9.2	100.0
16	Kigoma	638	0.3	5.0	92.8	1.9	100.0
17	Shinyanga	715	0.4	6.3	93.3	0.0	100.0
18	Kagera	518	0.4	3.7	95.3	0.6	100.0
19	Mwanza	567	3.5	12.3	79.4	4.8	100.0
20	Mara	704	0.2	2.0	82.5	15.3	100.0
21	Manyara	685	2.5	4.4	66.4	26.7	100.0
22	Njombe	495	4.9	0.8	89.9	4.4	100.0
23	Katavi	590	0.8	3.9	93.1	2.2	100.0
24	Simiyu	660	0.2	1.5	77.4	20.9	100.0
25	Geita	645	3.1	5.7	88.7	2.5	100.0
26	Songwe	622	1.3	5.3	77.8	15.6	100.0
	Zanzibar	2,311	4.1	1.5	65.5	28.9	100.0
27	Unguja North	405	4.5	2.7	66.9	25.9	100.0
28	Unguja South	389	3.3	3.1	70.7	22.9	100.0
29	Stone Town	347	5.2	1.4	78.4	15.0	100.0
30	Pemba North	599	2.4	0.8	38.2	58.6	100.0
31	Pemba South	571	2.8	0.7	51.3	45.2	100.0
	National	17,498	2.5	4.0	83.7	9.8	100.0

Table 26: Child's weight at birth by region, Tanzania Mainland, Zanzibar and National (Children 0-59 months)

No.	Region	N	Births with a reported birth weight (%)	Births with a reported birth weight less than 2.5 kg		
				Health card (%)	Mother's recall (%)	Total (%) [95% CI]
	Mainland	14,208	81.1	4.5	1.8	6.3 [5.7-6.9]
1	Dodoma	510	87.6	3.5	0.7	4.2 [2.1-6.2]
2	Arusha	678	69.5	4.9	2.2	7.1 [4.6-9.7]
3	Kilimanjaro	430	96.5	4.6	1.2	5.8 [3.1-8.5]
4	Tanga	465	72.5	2.7	2.1	4.8 [2.0-7.6]
5	Morogoro	519	86.5	7.2	1.3	8.5 [5.3-11.7]
6	Pwani	624	92.6	4.7	1.0	5.7 [3.7-7.8]
7	Dar es Salaam	555	98.7	6.8	2.0	8.8 [5.7-11.9]

No.	Region	N	Births with a reported birth weight (%)	Births with a reported birth weight less than 2.5 kg		
				Health card (%)	Mother's recall (%)	Total (%) [95% CI]
8	Lindi	252	94.8	8.8	0.4	9.2 [5.2-13.3]
9	Mtwara	421	95.2	8.5	1.3	9.8 [6.3-13.2]
10	Ruvuma	487	97.5	7.8	3.2	11.0 [7.4-14.6]
11	Iringa	587	96.1	4.4	1.8	6.2 [3.8-8.6]
12	Mbeya	504	92.7	3.2	2.6	5.8 [3.5-8.2]
13	Singida	662	76.3	2.9	2.7	5.6 [3.5-7.6]
14	Tabora	584	69.5	2.0	2.2	4.2 [2.1-6.3]
15	Rukwa	518	75.3	2.6	2.1	4.7 [2.7-6.6]
16	Kigoma	621	85.7	2.5	1.7	4.2 [2.4-6.0]
17	Shinyanga	714	74.4	4.7	1.3	6.0 [3.7-8.3]
18	Kagera	511	89.0	4.0	1.1	5.1 [2.5-7.6]
19	Mwanza	515	75.9	3.9	3.1	7.0 [4.3-9.8]
20	Mara	659	57.7	3.2	0.5	3.8 [1.7-5.8]
21	Manyara	586	62.5	2.0	1.8	3.8 [1.8-5.8]
22	Njombe	473	99.6	6.0	0.9	6.8 [4.2-9.4]
23	Katavi	569	55.0	4.2	2.9	7.2 [4.4-10.0]
24	Simiyu	608	64.3	1.8	0.8	2.6 [1.3-3.9]
25	Geita	603	44.3	2.2	2.2	4.5 [1.2-7.8]
26	Songwe	553	85.5	2.6	3.0	5.6 [3.2-8.0]
	Zanzibar	2,058	75.0	5.8	2.5	8.3 [6.0-10.6]
27	Unguja North	350	77.4	5.2	3.3	8.5 [3.7-13.3]
28	Unguja South	337	85.2	6.6	1.0	7.7 [3.9-11.5]
29	Stone Town	317	88.3	6.5	2.2	8.6 [4.9-12.4]
30	Pemba North	549	44.4	3.7	3.7	7.4 [4.0-10.8]

No.	Region	N	Births with a reported birth weight (%)	Births with a reported birth weight less than 2.5 kg		
				Health card (%)	Mother's recall (%)	Total (%) [95% CI]
31	Pemba South	505	59.6	5.0	3.0	8.0 [3.9-12.1]
	National	16,266	80.9	4.5	1.8	6.3 [5.7-6.9]

4.3 Vitamin A Supplementation (6-59 months)

The last national campaign for vitamin A supplementation and deworming was conducted in June 2018.

Table 27: Vitamin A supplementation (VAS) coverage by region, Tanzania Mainland, Zanzibar and National (Children 6-59 months)

No.	Region	N	VAS			No VAS or Don't know (%)	Total (%)
			By card (%)	By recall (%)	Total VAS (%) [95% CI]		
	Mainland	13,503	17.3	46.4%	63.7 [61.9-65.4]	36.3	100.0
1	Dodoma	484	28.3	43.0%	71.3 [64.6-78.0]	28.7	100.0
2	Arusha	627	7.6	43.9%	51.5 [44.6-58.5]	48.5	100.0
3	Kilimanjaro	419	7.1	54.2%	61.3 [51.8-70.8]	38.7	100.0
4	Tanga	443	4.3	41.7%	46.0 [35.9-56.2]	54.0	100.0
5	Morogoro	512	47.2	30.3%	77.5 [73.4-81.7]	22.5	100.0
6	Pwani	562	49.6	21.0%	70.6 [61.4-79.9]	29.4	100.0
7	Dar es Salaam	564	6.2	60.8	67.0 [61.2-72.9]	33.0	100.0
8	Lindi	236	61.4	17.8	79.2 [71.7-86.8]	20.8	100.0
9	Mtwara	419	45.1	36.5	81.6 [75.8-87.4]	18.4	100.0
10	Ruvuma	434	25.8	49.1	74.9 [68.0-81.8]	25.1	100.0
11	Iringa	549	20.8	64.1	84.9 [80.1-89.7]	15.1	100.0
12	Mbeya	475	10.3	62.5	72.8 [66.0-79.7]	27.2	100.0
13	Singida	619	17.1	51.1	68.2 [60.5-75.8]	31.8	100.0

No.	Region	N	VAS			No VAS or Don't know (%)	Total (%)
14	Tabora	563	1.8	50.2	52.0 [39.2-64.9]	48.0	100.0
15	Rukwa	488	8.6	36.5	45.1 [37.6-52.6]	54.9	100.0
16	Kigoma	568	34.9	15.8	50.7 [40.8-60.6]	49.3	100.0
17	Shinyanga	652	0.2	40.0	40.2 [28.8-51.6]	59.8	100.0
18	Kagera	457	31.7	28.5	60.2 [50.3-70.1]	39.8	100.0
19	Mwanza	511	9.4	54.0	63.4 [55.4-71.4]	36.6	100.0
20	Mara	622	3.9	61.1	65.0 [56.1-73.8]	35.0	100.0
21	Manyara	613	7.0	47.3	54.3 [47.2-61.4]	45.7	100.0
22	Njombe	441	12.9	68.7	81.6 [77.2-86.1]	18.4	100.0
23	Katavi	523	4.2	25.8	30.0 [23.7-36.3]	70.0	100.0
24	Simiyu	584	5.9	64.0	69.9 [64.3-75.5]	30.1	100.0
25	Geita	580	4.1	61.9	66.0 [58.7-73.3]	34.0	100.0
26	Songwe	558	22.7	47.0	69.7 [63.0-76.4]	30.3	100.0
	Zanzibar	2,048	5.1	73.8	78.9 [76.0-81.8]	21.1	100.0
27	Unguja North	348	2.8	82.8	85.6 [81.2-90.0]	14.4	100.0
28	Unguja South	346	12.7	74.0	86.7 [82.3-91.1]	13.3	100.0
29	Stone Town	318	7.2	67.3	74.5 [69.0-80.1]	25.5	100.0
30	Pemba North	526	0.4	83.3	83.7 [79.8-87.5]	16.3	100.0
31	Pemba South	510	1.4	74.5	75.9 [70.2-81.6]	24.1	100.0
	National	15,551	16.7	47.1	63.8 [62.1-65.6]	36.2	100.0

4.4 Deworming (12-59 months)

Deworming was conducted simultaneously with vitamin A supplementation in June 2018.

Table 28: Deworming coverage by region, Tanzania Mainland, Zanzibar and National (Children 12-59 months)

No.	Region	N	Deworming			No De-worming or Don't know (%)	Total (%)
			By card (%)	By recall (%)	Total Deworming (%) [95% CI]		
	Mainland	11,765	13.4	45.1	58.5 [56.7-60.4]	41.5	100.0
1	Dodoma	433	23.5	40.0	63.5 [56.1-70.9]	36.5	100.0
2	Arusha	510	2.4	53.7	56.1 [48.2-64.0]	43.9	100.0
3	Kilimanjaro	368	4.4	61.1	65.5 [56.4-74.6]	34.5	100.0
4	Tanga	384	3.1	43.8	46.9 [37.7-56.1]	53.1	100.0
5	Morogoro	442	39.1	29.9	69.0 [62.3-75.7]	31.0	100.0
6	Pwani	491	43.4	24.4	67.8 [58.9-76.8]	32.2	100.0
7	Dar es Salaam	492	4.0	61.2	65.2 [59.0-71.5]	34.8	100.0
8	Lindi	213	46.0	24.4	70.4 [61.7-79.1]	29.6	100.0
9	Mtwara	367	36.8	39.8	76.6 [70.9-82.2]	23.4	100.0
10	Ruvuma	365	16.1	52.9	69.0 [62.4-75.6]	31.0	100.0
11	Iringa	481	7.7	71.7	79.4 [73.6-85.2]	20.6	100.0
12	Mbeya	417	5.0	61.9	66.9 [60.4-73.4]	33.1	100.0
13	Singida	545	11.2	52.3	63.5 [54.7-72.3]	36.5	100.0
14	Tabora	486	1.2	41.2	42.4 [30.4-54.3]	57.6	100.0
15	Rukwa	427	7.0	30.7	37.7 [30.3-45.1]	62.3	100.0
16	Kigoma	513	31.0	15.0	46.0 [36.8-55.2]	54.0	100.0
17	Shinyanga	557	0.3	32.7	33.0 [22.0-44.1]	67.0	100.0
18	Kagera	392	28.6	25.0	53.6 [43.6-63.5]	46.4	100.0

No.	Region	N	Deworming			No De-worming or Don't know (%)	Total (%)
19	Mwanza	439	6.2	48.0	54.2 [44.8-63.7]	45.8	100.0
20	Mara	549	3.3	55.5	58.8 [48.9-68.8]	41.2	100.0
21	Manyara	536	3.3	44.6	47.9 [40.2-55.7]	52.1	100.0
22	Njombe	395	10.9	67.1	78.0 [72.6-83.3]	22.0	100.0
23	Katavi	453	2.4	13.7	16.1 [10.9-21.4]	83.9	100.0
24	Simiyu	496	5.6	62.7	68.3 [62.3-74.4]	31.7	100.0
25	Geita	514	2.5	55.1	57.6 [47.5-67.7]	42.4	100.0
26	Songwe	500	16.6	46.2	62.8 [55.3-70.3]	37.2	100.0
	Zanzibar	1,814	1.4	79.3	80.7 [77.8-83.6]	19.3	100.0
27	Unguja North	311	2.6	80.7	83.3 [77.4-89.2]	16.7	100.0
28	Unguja South	297	5.0	76.8	81.8 [76.4-87.2]	18.2	100.0
29	Stone Town	280	1.1	78.2	79.3 [73.9-84.7]	20.7	100.0
30	Pemba North	479	0.0	85.0	85.0 [81.3-88.6]	15.0	100.0
31	Pemba South	447	0.7	76.3	77.0 [71.4-82.5]	23.0	100.0
	National	13,579	12.9	46.1	59.0 [57.2-60.8]	41.0	100.0

4.5 Diarrhoea in the past two weeks (0-59 months)

Table 29: Period prevalence of diarrhoea by region, Tanzania Mainland, Zanzibar and National (Children 0-59 months)

No.	Region	N	Proportion of children with diarrhoea in the past 2 weeks	
			n	% [95% CI]
	Mainland	14,847	2,170	14.1 [13.2-15.0]
1	Dodoma	530	101	19.1 [14.1-24.0]
2	Arusha	729	184	25.2 [20.7-29.8]
3	Kilimanjaro	459	71	15.5 [11.9-19.0]
4	Tanga	496	87	17.5 [11.7-23.4]
5	Morogoro	558	69	12.4 [5.8-18.9]
6	Pwani	637	40	6.3 [4.5-8.0]
7	Dar es Salaam	583	41	7.0 [4.6-9.5]
8	Lindi	269	18	6.7 [3.8-9.6]
9	Mtwara	447	50	11.2 [8.3-14.0]
10	Ruvuma	494	95	19.2 [15.4-23.1]
11	Iringa	604	55	9.1 [6.8-11.4]
12	Mbeya	516	59	11.4 [8.0-14.9]
13	Singida	681	62	9.1 [5.8-12.4]
14	Tabora	603	81	13.4 [10.0-16.8]
15	Rukwa	547	81	14.8 [9.2-20.4]
16	Kigoma	628	131	20.9 [16.0-25.7]
17	Shinyanga	713	37	5.2 [3.3-7.1]
18	Kagera	517	72	13.9 [10.3-17.6]
19	Mara	548	66	12.0 [8.5-15.6]
20	Mwanza	689	90	13.1 [9.5-16.6]
21	Manyara	651	181	27.8 [24.6-31.0]
22	Njombe	493	93	18.9 [14.3-23.4]
23	Katavi	579	90	15.5 [9.9-21.2]
24	Simiyu	651	90	13.8 [8.1-19.5]
25	Geita	625	83	13.3 [9.8-16.8]
26	Songwe	600	143	23.8 [17.9-29.8]
	Zanzibar	2,290	248	10.6 [8.8-12.5]
27	Unguja North	402	53	13.2 [9.2-17.2]
28	Unguja South	386	40	10.4 [7.0-13.7]
29	Stone Town	347	35	10.1 [6.7-13.5]
30	Pemba North	594	38	6.4 [4.6-8.2]
31	Pemba South	561	82	14.6 [10.9-18.3]
	National	17,137	2,418	14.0 [13.1-14.8]

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

Children ever breastfed

Table 30: Ever breastfed by region, Tanzania Mainland, Zanzibar and National (Children 0-23 months)

No.	Region	N	Proportion of children born in the past 24 months who were ever breastfed	
			n	% [95% CI]
	Mainland	6,470	6,227	96.6 [96.0-97.1]
1	Dodoma	223	218	97.8 [95.8-99.7]
2	Arusha	330	309	93.6 [90.0-97.2]
3	Kilimanjaro	192	189	98.4 [96.7-100.0]
4	Tanga	201	199	99.0 [97.7-100.0]
5	Morogoro	227	224	98.7 [96.9-100.0]
6	Pwani	294	293	99.7 [99.0-100.0]
7	Dar es Salaam	246	242	98.4 [96.5-100.0]
8	Lindi	98	97	99.0 [97.0-100.0]
9	Mtwara	190	184	96.8 [94.5-99.2]
10	Ruvuma	239	227	95.0 [91.2-98.7]
11	Iringa	259	247	95.4 [92.3-98.4]
12	Mbeya	244	239	98.0 [95.9-100.0]
13	Singida	287	268	93.4 [90.3-96.5]
14	Tabora	251	242	96.4 [92.9-99.9]
15	Rukwa	237	234	98.7 [97.4-100.0]
16	Kigoma	265	261	98.5 [96.8-100.0]
17	Shinyanga	307	304	99.0 [98.0-100.0]
18	Kagera	227	225	99.1 [97.9-100.0]
19	Mara	234	217	92.7 [88.6-96.8]
20	Mwanza	299	292	97.7 [95.6-99.7]
21	Manyara	306	275	89.9 [84.6-95.1]
22	Njombe	209	209	100.0
23	Katavi	266	262	98.5 [97.1-99.9]
24	Simiyu	307	283	92.2 [87.7-96.7]
25	Geita	268	246	91.8 [88.4-95.2]
26	Songwe	264	241	91.3 [86.7-95.9]
	Zanzibar	950	927	98.0 [96.9-99.1]
27	Unguja North	164	163	99.4 [98.2-100.0]
28	Unguja South	164	161	98.2 [96.2-100.0]
29	Stone Town	140	138	98.6 [96.5-100.0]
30	Pemba North	243	236	97.1 [94.7-99.6]
31	Pemba South	239	229	95.8 [93.1-98.6]
	National	7,420	7,154	96.6 [96.0-97.2]

Timely Initiation of Breastfeeding

Table 31: Timely Initiation of Breatfeeding by region, Tanzania Mainland, Zanzibar and National (Children 0-23 months)

No.	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	5,968	3,136	53.5 [51.6-55.4]
1	Dodoma	210	120	57.1 [49.2-65.1]
2	Arusha	277	155	56.0 [50.4-61.5]
3	Kilimanjaro	179	107	59.8 [51.4-68.1]
4	Tanga	192	116	60.4 [53.5-67.3]
5	Morogoro	220	145	65.9 [55.3-76.5]
6	Pwani	290	202	69.7 [62.3-77.0]
7	Dar es Salaam	233	118	50.6 [42.0-59.3]
8	Lindi	93	62	66.7 [57.2-76.2]
9	Mtwara	177	126	71.2 [62.4-79.9]
10	Ruvuma	220	87	39.5 [33.1-45.9]
11	Iringa	231	127	55.0 [47.2-62.7]
12	Mbeya	235	119	50.6 [39.9-61.4]
13	Singida	241	159	66.0 [59.0-72.9]
14	Tabora	234	35	15.0 [8.5-21.4]
15	Rukwa	227	95	41.9 [33.3-50.4]
16	Kigoma	255	196	76.9 [71.7-82.0]
17	Shinyanga	304	12	3.9 [0.4-7.5]
18	Kagera	219	167	76.3 [69.1-83.4]
19	Mara	210	96	45.7 [35.5-55.9]
20	Mwanza	276	148	53.6 [43.9-63.3]
21	Manyara	250	145	58.0 [49.4-66.6]
22	Njombe	203	106	52.2 [43.4-61.0]
23	Katavi	253	92	36.4 [29.3-43.4]
24	Simiyu	276	171	62.0 [50.2-73.7]
25	Geita	246	115	46.7 [36.4-57.1]
26	Songwe	217	115	53.0 [42.3-63.7]
	Zanzibar	898	446	52.7 [47.7-57.7]
27	Unguja North	162	90	55.6 [47.5-63.7]
28	Unguja South	154	88	57.1 [45.4-68.8]
29	Stone Town	130	75	57.7 [48.3-67.1]
30	Pemba North	233	109	46.8 [37.8-55.8]
31	Pemba South	219	84	38.4 [29.9-46.9]
	National	6,866	3,582	53.5 [51.6-55.3]

Exclusive breastfeeding under 6 months

Table 32: Exclusive breastfeeding by region, Tanzania Mainland, Zanzibar and National (Infants 0-5 months)

No.	Region	N	Proportion of infants 0-5 months of age who are fed exclusively with breast milk	
			n	% [95% CI]
	Mainland	1,533	891	58.6 [55.8-61.5]
1	Dodoma	65	31	47.7 [34.0-61.4]
2	Arusha	74	22	29.7 [18.8-40.7]
3	Kilimanjaro	47	23	48.9 [34.6-63.2]
4	Tanga	53	23	45.3 [33.0-57.5]
5	Morogoro	49	25	51.0 [34.7-67.3]
6	Pwani	72	38	52.8 [39.3-66.3]
7	Dar es Salaam	42	24	57.1 [43.2-71.1]
8	Lindi	35	16	45.7 [32.4-59.1]
9	Mtwara	41	21	51.2 [38.1-64.3]
10	Ruvuma	63	37	58.7 [44.0-73.4]
11	Iringa	68	45	66.2 [52.0-80.4]
12	Mbeya	64	46	71.9 [59.3-84.4]
13	Singida	71	41	57.7 [44.6-70.9]
14	Tabora	47	28	59.6 [43.6-75.5]
15	Rukwa	63	27	42.9 [28.5-57.2]
16	Kigoma	65	59	90.8 [84.5-97.0]
17	Shinyanga	60	50	83.3 [71.8-94.8]
18	Kagera	58	50	86.2 [75.9-96.5]
19	Mara	52	29	55.8 [41.0-70.5]
20	Mwanza	75	37	49.3 [37.8-60.9]
21	Manyara	64	26	40.6 [29.6-51.6]
22	Njombe	50	35	70.0 [57.8-82.2]
23	Katavi	63	37	58.7 [44.3-73.2]
24	Simiyu	70	39	55.7 [45.4-66.0]
25	Geita	61	44	72.1 [59.5-84.7]
26	Songwe	61	37	60.7 [48.8-72.5]
	Zanzibar	251	80	30.0 [22.8-37.2]
27	Unguja North	57	24	42.1 [31.1-53.1]
28	Unguja South	37	19	51.4 [34.5-68.2]
29	Stone Town	28	7	25.0 [8.7-41.3]
30	Pemba North	71	14	19.7 [9.4-30.0]
31	Pemba South	58	16	27.6 [16.7-38.5]
	National	1,784	971	57.8 [55.0-60.5]

Continued breastfeeding at 1 year

Table 33: Continued breastfeeding at 1 year by region, Tanzania Mainland, Zanzibar and National (Children 12-15 months)

No.	Region	N	Proportion of children 12-15 months of age who are fed breast milk during the previous day	
			n	% [95% CI]
	Mainland	1,064	988	92.4 [90.6-94.3]
1	Dodoma	31	29	93.5 [85.1-100.0]
2	Arusha	53	49	92.5 [83.6-100.0]
3	Kilimanjaro	26	24	92.3 [82.5-100.0]
4	Tanga	25	24	96.0 [88.6-100.0]
5	Morogoro	33	30	90.9 [81.7-100.0]
6	Pwani	52	50	96.2 [91.1-100.0]
7	Dar es Salaam	52	47	90.4 [82.0-98.8]
8	Lindi	14	14	100.0
9	Mtwara	37	35	94.6 [87.4-100.0]
10	Ruvuma	33	31	93.9 [85.4-100.0]
11	Iringa	57	54	94.7 [89.0-100.0]
12	Mbeya	40	35	87.5 [77.2-97.8]
13	Singida	48	47	97.9 [93.8-100.0]
14	Tabora	48	44	91.7 [83.5-99.8]
15	Rukwa	41	40	97.6 [92.9-100.0]
16	Kigoma	45	43	95.6 [89.8-100.0]
17	Shinyanga	51	40	78.4 [67.3-89.5]
18	Kagera	33	29	87.9 [76.9-98.8]
19	Mara	33	29	87.9 [76.4-99.4]
20	Mwanza	46	43	93.5 [87.0-100.0]
21	Manyara	40	38	95.0 [87.9-100.0]
22	Njombe	38	38	100.0
23	Katavi	53	45	84.9 [76.2-93.7]
24	Simiyu	43	40	93.0 [85.4-100.0]
25	Geita	50	49	98.0 [94.2-100.0]
26	Songwe	42	41	97.6 [92.9-100.0]
	Zanzibar	162	138	83.9 [75.8-92.0]
27	Unguja North	30	27	90.0 [79.0-100.0]
28	Unguja South	27	23	85.2 [72.4-97.9]
29	Stone Town	27	22	81.5 [66.2-96.7]
30	Pemba North	36	31	86.1 [73.5-98.7]
31	Pemba South	42	35	83.3 [72.4-94.3]
	National	1,226	1,126	92.2 [90.3-94.0]

Continued breastfeeding at 2 years

Table 34: Continued breastfeeding at 2 year by region, Tanzania Mainland, Zanzibar and National (Children 20-23 months)

No.	Region	N	Proportion of children 20-23 months of age who are fed breast milk during the previous day	
			n	% [95% CI]
	Mainland	872	372	43.3 [39.5-47.1]
1	Dodoma	33	21	63.6 [47.5-79.7]
2	Arusha	46	27	58.7 [43.5-73.9]
3	Kilimanjaro	29	14	48.3 [25.0-71.5]
4	Tanga	31	19	61.3 [40.3-82.2]
5	Morogoro	38	21	55.3 [41.1-69.5]
6	Pwani	33	18	54.5[36.9-72.2]
7	Dar es Salaam	36	13	36.1 [21.7-50.6]
8	Lindi	8	4	50.0 [0-100.0]
9	Mtwara	26	16	61.5 [40.1-82.9]
10	Ruvuma	28	9	32.1 [16.0-48.3]
11	Iringa	22	10	45.5 [27.4-63.6]
12	Mbeya	31	11	35.5 [14.8-56.2]
13	Singida	36	17	47.2 [27.3-67.1]
14	Tabora	29	6	20.7 [4.7-36.7]
15	Rukwa	38	10	26.3 [12.8-39.9]
16	Kigoma	44	22	50.0 [32.7-67.3]
17	Shinyanga	61	17	27.9 [16.9-38.8]
18	Kagera	36	16	44.4 [28.9-60.0]
19	Mara	22	4	18.2 [1.1-35.3]
20	Mwanza	45	18	40.0 [20.3-59.7]
21	Manyara	37	23	62.2 [47.2-77.1]
22	Njombe	35	14	40.0 [16.0-64.0]
23	Katavi	40	9	22.5 [10.5-34.5]
24	Simiyu	37	16	43.2 [30.7-55.8]
25	Geita	27	11	40.7 [19.3-62.2]
26	Songwe	24	6	25.0 [8.2-41.8]
	Zanzibar	112	50	43.7 [29.7-57.7]
27	Unguja North	15	1	6.7 [0.0-19.9]
28	Unguja South	19	7	36.8 [16.6-57.1]
29	Stone Town	18	8	44.4 [17.9-71.0]
30	Pemba North	37	22	59.5 [41.5-77.4]
31	Pemba South	23	12	52.2 [34.0-70.3]
	National	984	422	43.3 [39.6-47.0]

Introduction of complementary food

Table 35: Introduction of complementary food by region, Tanzania Mainland, Zanzibar and National (Infants 6-8 months)

No.	Region	N	Proportion of infants 6-8 months of age who received solid, semi-solid or soft foods	
			n	% [95% CI]
	Mainland	809	704	87.1 [84.3-89.9]
1	Dodoma	28	24	85.7 [71.7-99.7]
2	Arusha	43	34	79.1 [61.6-96.5]
3	Kilimanjaro	22	22	100.0
4	Tanga	31	31	100.0
5	Morogoro	29	28	96.6 [89.9-100.0]
6	Pwani	35	34	97.1 [91.6-100.0]
7	Dar es Salaam	41	33	80.5 [68.3-92.7]
8	Lindi	10	8	80.0 [59.4-100.0]
9	Mtwara	25	18	72.0 [53.8-90.2]
10	Ruvuma	35	35	100.0
11	Iringa	25	21	84.0 [68.3-99.7]
12	Mbeya	24	17	70.8 [49.5-92.2]
13	Singida	34	27	79.4 [65.4-93.5]
14	Tabora	29	28	96.6 [90.1-100.0]
15	Rukwa	40	37	92.5 [84.2-100.0]
16	Kigoma	23	23	100.0
17	Shinyanga	29	25	86.2 [71.7-100.0]
18	Kagera	33	26	78.8 [60.8-96.8]
19	Mara	34	33	97.1 [91.2-100.0]
20	Mwanza	35	26	74.3 [59.3-89.2]
21	Manyara	41	37	90.2 [80.9-99.6]
22	Njombe	21	20	95.2 [85.7-100.0]
23	Katavi	36	33	91.7 [83.0-100.0]
24	Simiyu	45	33	73.3 [58.2-88.5]
25	Geita	35	29	82.9 [69.4-96.3]
26	Songwe	26	22	84.6 [70.6-98.6]
	Zanzibar	123	104	79.1 [65.8-92.5]
27	Unguja North	17	17	100.0
28	Unguja South	25	20	80.0 [63.1-96.9]
29	Stone Town	29	21	72.4 [51.1-93.7]
30	Pemba North	26	23	88.5 [77.5-99.4]
31	Pemba South	26	23	88.5 [76.3-100.0]
	National	932	808	86.8 [84.1-89.6]

Average number of food groups consumed

Table 36: 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 (Months)			
6-8	937	2.1	[1.9-2.2]
9-11	997	2.8	[2.7-3.0]
12-17	1,857	3.2	[3.1-3.3]
18-23	1,754	3.5	[3.4-3.6]
Sex			
Male	2,693	3.0	[2.9-3.1]
Female	2,852	3.1	[3.0-3.2]

Table 37: Average number of food groups consumed by region, Tanzania Mainland, Zanzibar and National (Children 6-23 months)

No.	Region	N	Average number of food group consumed	
			Mean	[95% CI]
	Mainland	4,857	3.0	[3.0-3.1]
1	Dodoma	156	2.9	[2.6-3.3]
2	Arusha	252	3.1	[2.8-3.4]
3	Kilimanjaro	141	4.0	[3.7-4.2]
4	Tanga	145	3.3	[3.0-3.5]
5	Morogoro	172	2.9	[2.7-3.2]
6	Pwani	215	3.4	[3.0-3.8]
7	Dar es Salaam	201	2.6	[2.4-2.9]
8	Lindi	65	2.2	[2.0-2.3]
9	Mtwara	153	2.3	[2.1-2.5]
10	Ruvuma	168	2.7	[2.5-2.9]
11	Iringa	189	2.8	[2.5-3.0]
12	Mbeya	177	2.8	[2.5-3.1]
13	Singida	214	2.3	[2.2-2.4]
14	Tabora	203	3.1	[2.9-3.4]
15	Rukwa	172	3.2	[2.7-3.6]
16	Kigoma	195	3.1	[2.7-3.5]
17	Shinyanga	244	2.8	[2.6-3.0]
18	Kagera	166	2.5	[2.2-2.7]
19	Mara	179	3.8	[3.3-4.3]
20	Mwanza	222	3.7	[3.2-4.3]
21	Manyara	237	2.8	[2.6-3.0]
22	Njombe	155	2.9	[2.7-3.0]
23	Katavi	199	3.3	[3.0-3.5]
24	Simiyu	231	3.7	[3.3-4.2]
25	Geita	205	3.8	[3.4-4.3]
26	Songwe	201	3.0	[2.6-3.3]
	Zanzibar	688	2.4	[2.3-2.6]

27	Unguja North	108	2.8	[2.4-3.1]
28	Unguja South	121	2.4	[2.0-2.7]
29	Stone Town	111	2.3	[2.0-2.5]
30	Pemba North	170	2.7	[2.5-2.8]
31	Pemba South	178	2.4	[2.2-2.6]
	National	5,545	3.0	[3.0-3.1]

Minimum Dietary Diversity

Table 38: 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 (Months)			
6-8	937	154	17.1 [14.2-20.0]
9-11	997	295	31.2 [27.6-34.8]
12-17	1,857	662	37.6 [34.4-40.7]
18-23	1,754	751	44.8 [41.5-48.0]
Sex			
Male	2,852	937	34.3 [31.7-36.8]
Female	2,693	925	36.0 [33.3-38.8]

Table 39: Minimum Dietary Diversity by region, Tanzania Mainland, Zanzibar and National (Children 6-23 months)

No.	Region	N	Proportion of children 6-23 months of age who received foods from ≥ 4 food groups during the previous day	
			n	% [95% CI]
	Mainland	4,857	1,727	35.6 [33.4-37.9]
1	Dodoma	156	56	35.9 [26.3-45.5]
2	Arusha	252	96	38.1 [28.7-47.5]
3	Kilimanjaro	141	90	63.8 [56.0-71.7]
4	Tanga	145	57	39.3 [28.6-50.1]
5	Morogoro	172	57	33.1 [22.2-44.1]
6	Pwani	215	97	45.1 [35.0-55.3]
7	Dar es Salaam	201	58	28.9 [21.2-36.5]
8	Lindi	65	1	1.5 [0.0-4.5]
9	Mtwara	153	31	20.3 [11.2-29.3]
10	Ruvuma	168	38	22.6 [12.8-32.5]
11	Iringa	189	48	25.4 [17.2-33.6]
12	Mbeya	177	54	30.5 [22.6-38.4]
13	Singida	214	22	10.3 [4.7-15.9]
14	Tabora	203	85	41.9 [30.7-53.1]
15	Rukwa	172	72	41.9 [29.8-53.9]
16	Kigoma	195	69	35.4 [24.5-46.3]
17	Shinyanga	244	74	30.3 [21.7-39.0]
18	Kagera	166	32	19.3 [10.8-27.8]

19	Mara	179	95	53.1 [38.8-67.4]
20	Mwanza	222	105	47.3 [33.1-61.5]
21	Manyara	237	58	24.5 [15.9-33.0]
22	Njombe	155	37	23.9 [15.2-32.6]
23	Katavi	199	93	46.7 [37.6-55.9]
24	Simiyu	231	123	53.2 [40.2-66.3]
25	Geita	205	116	56.6 [44.9-68.3]
26	Songwe	201	63	31.3 [21.6-41.1]
	Zanzibar	688	135	18.8 [14.7-23.0]
27	Unguja North	108	27	25.0 [13.4-36.6]
28	Unguja South	121	26	21.5 [11.7-31.3]
29	Stone Town	111	19	17.1 [9.8-24.4]
30	Pemba North	170	39	22.9 [16.0-29.9]
31	Pemba South	178	24	13.5 [8.3-18.7]
	National	5,545	1,862	35.1 [33.0-37.3]

Minimum Meal Frequency

Table 40: 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 (Months)			
6-8	937	673	77.2 [74.0-80.4]
9-11	997	461	52.0 [48.1-55.9]
12-17	1,857	920	58.3 [55.2-61.3]
18-23	1,754	693	48.0 [44.8-51.3]
Sex			
Male	2,852	1,442	58.9 [56.4-61.4]
Female	2,693	1,305	55.9 [53.2-58.6]

Table 41: Minimum meal frequency by age group and for breastfed/non-breastfed children, by region, Tanzania Mainland, Zanzibar and National

No.	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	4,857	2,240	63.6 [61.4-65.8]	255	32.9 [28.9-36.8]	2,495	58.0 [56.0-60.1]
1	Dodoma	156	62	47.0 [36.3-57.7]	4	23.5 [2.2-44.8]	66	44.3 [34.0-54.6]
2	Arusha	252	91	47.6 [37.3-58.0]	24	66.7 [50.1-83.3]	115	50.7 [40.3-61.1]
3	Kilimanjaro	141	77	71.3 [60.8-81.8]	21	65.6 [45.3-85.9]	98	70.0 [61.0-79.0]
4	Tanga	145	94	75.8 [66.0-85.7]	5	25.0 [3.6-46.4]	99	68.8 [58.3-79.2]
5	Morogoro	172	76	54.3 [39.4-69.2]	5	17.2 [0.0-35.3]	81	47.9 [34.5-61.3]

No.	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%]
6	Pwani	215	119	64.0 [50.2-77.7]	7	25.9 [10.7-41.1]	126	59.2 [46.1-72.2]
7	Dar es Salaam	201	143	89.4 [85.0-93.7]	15	41.7 [25.0-58.4]	158	80.6 [75.2-86.1]
8	Lindi	65	50	92.6 [85.5-99.6]	4	66.7 [1.2-100.0]	54	90.0 [81.2-98.8]
9	Mtwara	153	75	64.1 [53.4-74.8]	7	29.2 [7.2-51.1]	82	58.2 [48.0-68.3]
10	Ruvuma	168	76	59.4 [46.0-72.8]	6	20.0 [5.4-34.6]	82	51.9 [38.2-65.6]
11	Iringa	189	40	25.8 [15.6-36.0]	0	0.0	40	22.9 [13.3-32.4]
12	Mbeya	177	112	81.8 [74.0-89.5]	16	44.4 [25.0-63.9]	128	74.0 [65.8-82.1]
13	Singida	214	39	22.8 [16.5-29.1]	1	3.8 [0.0-11.4]	40	20.3 [14.5-26.1]
14	Tabora	203	138	90.2 [85.7-94.7]	13	31.7 [17.9-45.5]	151	77.8 [72.3-83.4]
15	Rukwa	172	70	53.8 [43.8-63.9]	5	12.5 [1.6-23.4]	75	44.1 [35.9-52.3]
16	Kigoma	195	116	72.0 [64.1-80.0]	15	45.5 [23.6-67.3]	131	67.5 [59.6-75.5]
17	Shinyanga	244	141	84.4 [77.8-91.0]	14	18.9 [9.0-28.8]	155	64.3 [56.9-71.7]
18	Kagera	166	105	77.8 [68.2-87.4]	1	3.3 [0.0-9.8]	106	64.2 [55.1-73.4]
19	Mara	179	64	50.4 [36.3-64.5]	21	63.6 [48.7-78.6]	85	53.1 [40.8-65.4]
20	Mwanza	222	42	25.9 [16.0-35.8]	10	20.4 [7.4-33.4]	52	24.6 [15.4-33.9]
21	Manyara	237	85	47.2 [36.3-58.2]	8	38.1 [12.4-63.8]	93	46.3 [35.0-57.5]
22	Njombe	155	109	89.3 [82.1-96.6]	21	63.6 [40.9-86.4]	130	83.9 [75.9-91.9]
23	Katavi	199	88	60.7 [51.9-69.5]	7	14.0 [4.2-23.8]	95	48.7 [39.8-57.6]
24	Simiyu	231	66	39.1 [24.2-53.9]	9	22.5 [6.5-38.5]	75	35.9 [21.3-50.4]
25	Geita	205	62	41.1 [31.3-50.9]	8	26.7 [6.0-47.3]	70	38.7 [29.4-47.9]
26	Songwe	201	100	65.8 [55.8-75.7]	8	32.0 [12.1-51.9]	108	61.0 [51.7-70.4]
	Zanzibar	688	233	41.2 [34.8-47.5]	19	16.4 [6.9-25.8]	252	36.4 [30.7-42.2]
27	Unguja North	108	30	35.7 [21.6-49.9]	2	9.1 [0.0-26.5]	32	30.2 [17.9-42.4]
28	Unguja South	121	56	58.9 [46.6-71.3]	5	20.0 [6.2-33.8]	61	50.8 [40.0-61.7]

No.	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	Stone Town	111	34	39.1 [27.7-50.4]	4	19.0 [1.5-36.6]	38	35.2 [24.8-45.6]
30	Pemba North	170	53	39.8 [30.8-48.9]	5	16.7 [2.4-31.0]	58	35.6 [27.0-44.2]
31	Pemba South	178	60	43.5 [33.3-53.6]	3	10.7 [0.0-22.0]	63	38.0 [29.5-46.4]
	National	5,545	2,473	63.0 [60.8-65.1]	274	32.4 [28.5-36.2]	2,747	57.4 [55.4-59.4]

Minimum Acceptable Diet

Table 42: 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 (Months)			
6-8	937	118	17.5 [14.3-20.8]
9-11	997	166	29.3 [24.8-33.8]
12-17	1,857	372	33.3 [29.8-36.8]
18-23	1,754	351	36.5 [32.8-40.3]
Sex			
Male	2,852	519	30.3 [27.5-33.1]
Female	2,693	488	30.4 [27.4-33.4]

Table 43: Minimum Acceptable Diet (MAD) by age group and for breastfed/non-breastfed children, by region, Tanzania Mainland, Zanzibar and National

No.	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	4,857	819	30.8 [28.4-33.2]	140	30.0 [25.3-34.7]	959	30.7 [28.4-32.9]
1	Dodoma	156	18	21.2 [11.4-30.9]	2	16.7 [0.0-46.7]	20	20.6 [10.2-31.0]
2	Arusha	252	45	44.1 [32.3-56.0]	15	55.6 [35.9-75.2]	60	46.5 [35.4-57.6]
3	Kilimanjaro	141	44	45.4 [32.8-58.0]	17	60.7 [43.8-77.7]	61	48.8 [38.7-58.9]
4	Tanga	145	40	39.2 [28.1-50.3]	3	33.3 [4.2-62.5]	43	38.7 [28.2-49.3]
5	Morogoro	172	32	37.2 [22.7-51.7]	3	20.0 [0.0-45.0]	35	34.7 [21.6-47.7]
6	Pwani	215	68	51.9 [39.3-64.6]	6	35.3 [14.8-55.8]	74	50.0 [38.2-61.8]
7	Dar es Salaam	201	40	27.6 [19.3-35.9]	6	22.2 [5.3-39.1]	46	26.7 [19.2-34.3]
8	Lindi	65	1	2.0 [0.0-5.7]	0	0.0	1	1.9 [0.0-5.3]

No.	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%]
9	Mtwara	153	17	21.5 [8.8-34.2]	2	16.7 [0.0-34.1]	19	20.9 [9.8-32.0]
10	Ruvuma	168	17	20.0 [8.3-31.7]	3	25.0 [0.0-58.1]	20	20.6 [9.1-32.1]
11	Iringa	189	9	12.7 [0.0-27.7]	0	0.0	9	11.8 [0.0-26.0]
12	Mbeya	177	30	25.6 [16.4-34.9]	10	40.0 [17.7-62.3]	40	28.2 [19.2-37.2]
13	Singida	214	2	3.7 [0.0-8.5]	0	0.0	2	3.4 [0.0-7.9]
14	Tabora	203	59	41.8 [30.9-52.8]	3	10.7 [0.0-22.0]	62	36.7 [27.5-45.9]
15	Rukwa	172	28	32.2 [20.7-43.7]	3	11.5 [0.0-25.4]	31	27.4 [18.9-36.0]
16	Kigoma	195	45	35.2 [23.8-46.6]	3	13.0 [0.0-26.1]	48	31.8 [21.5-42.0]
17	Shinyanga	244	43	30.1 [20.4-39.7]	6	16.7 [3.4-29.9]	49	27.4 [18.5-36.2]
18	Kagera	166	21	19.3 [10.5-28.0]	0	0.0	21	18.1 [9.9-26.3]
19	Mara	179	32	35.2 [24.0-46.3]	20	69.0 [52.1-85.8]	52	43.3 [32.3-54.3]
20	Mwanza	222	25	30.1 [19.0-41.2]	9	31.0 [16.1-45.9]	34	30.4 [21.8-38.9]
21	Manyara	237	21	19.6 [12.2-27.1]	0	0.0	21	18.1 [11.0-25.2]
22	Njombe	155	26	23.6 [14.5-32.8]	4	17.4 [1.2-33.5]	30	22.6 [13.6-31.5]
23	Katavi	199	39	36.4 [24.5-48.4]	5	16.1 [3.6-28.6]	44	31.9 [22.3-41.5]
24	Simiyu	231	47	45.2 [31.9-58.4]	8	50.0 [27.8-72.2]	55	45.8 [32.8-58.9]
25	Geita	205	30	27.5 [17.4-37.6]	8	28.6 [6.5-50.7]	38	27.7 [18.5-37.0]
26	Songwe	201	40	36.7 [26.0-47.4]	4	28.6 [7.6-49.5]	44	35.8 [26.4-45.2]
	Zanzibar	688	46	14.8 [9.6-20.0]	2	8.8 [0.0-22.6]	48	14.0 [8.9-19.1]
27	Unguja North	108	9	20.9 [8.2-33.7]	0	0.0	9	18.0 [7.3-28.7]
28	Unguja South	121	12	19.0 [6.3-31.8]	0	0.0	12	16.4 [5.2-27.7]
29	Stone Town	111	5	11.9 [2.6-21.2]	1	16.7 [0.0-44.0]	6	12.5 [2.9-22.1]
30	Pemba North	170	12	18.2 [8.6-27.8]	1	7.1 [0.0-20.3]	13	16.3 [7.4-25.1]
31	Pemba South	178	8	11.8 [6.1-17.4]	0	0.0	8	10.7 [5.6-15.8]
	National	5,545	865	30.5 [28.1-32.8]	142	29.6 [25.0-34.3]	1,007	30.3 [28.2-32.5]

4.7 Women Nutritional Status (15-49 years)

Description of Sample and Review of Data Quality

Table 44: Description of the data (age, weight and height) collected from women aged 15 to 49 years by region, Tanzania Mainland, Zanzibar and National

No.	Region	N	Age			Weight		Height	
			Missing Data		Median Age	Missing Data		Missing Data	
			n	%	Years	n	%	n	%
	Mainland	8,038	4	0.06	28.5	9	0.1	13	0.2
1	Dodoma	321	3	0.1	29.2	1	0.3	0	0.0
2	Arusha	345	0	0.0	28.8	0	0.0	0	0.0
3	Kilimanjaro	264	0	0.0	29.9	0	0.0	0	0.0
4	Tanga	264	0	0.0	29.7	0	0.0	0	0.0
5	Morogoro	337	0	0.0	28.6	0	0.0	0	0.0
6	Pwani	369	0	0.0	28.5	2	0.6	1	0.3
7	Dar es Sa-laam	530	0	0.0	28.6	2	0.4	3	0.6
8	Lindi	186	0	0.0	29.5	0	0.0	0	0.0
9	Mtwara	318	0	0.0	30.7	0	0.0	0	0.0
10	Ruvuma	268	0	0.0	29.2	0	0.0	0	0.0
11	Iringa	323	0	0.0	29.4	0	0.0	0	0.0
12	Mbeya	405	0	0.0	28.4	2	0.5	2	0.5
13	Singida	310	0	0.0	28.8	0	0.0	1	0.4
14	Tabora	306	0	0.0	26.9	0	0.0	0	0.0
15	Rukwa	280	0	0.0	27.7	0	0.0	0	0.0
16	Kigoma	279	0	0.0	28.2	1	0.4	1	0.4
17	Shinyanga	339	0	0.0	26.8	0	0.0	0	0.0
18	Kagera	225	0	0.0	29.3	0	0.0	0	0.0
19	Mwanza	291	0	0.0	27.4	1	0.4	3	1.2
20	Mara	329	1	0.03	28.4	0	0.0	1	0.3
21	Manyara	317	0	0.0	28.8	0	0.0	0	0.0
22	Njombe	237	0	0.0	28.5	0	0.0	0	0.0
23	Katavi	301	0	0.0	27.1	0	0.0	0	0.0
24	Simiyu	259	0	0.0	27.4	0	0.0	0	0.0
25	Geita	265	0	0.0	27.7	0	0.0	1	0.4
26	Songwe	370	0	0.0	28.0	0	0.0	0	0.0
	Zanzibar	1,388	0	0.0	28.3	1	0.2	3	0.5
27	Unguja North	247	0	0.0	28.2	0	0.0	0	0.0
28	Unguja South	261	0	0.0	29.8	0	0.0	0	0.0
29	Stone Town	293	0	0.0	28.6	1	0.4	3	1.1
30	Pemba North	283	0	0.0	27.1	0	0.0	0	0.0
31	Pemba South	304	0	0.0	28.1	0	0.0	0	0.0
	National	9,426	4	0.06	28.5	10	0.1	16	0.2

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 28.5 years. This age distribution shows peaks at certain age heaping level namely: 18, 20, 30, 40 and 45 years who are numbers easily evoked by women to estimate their age.

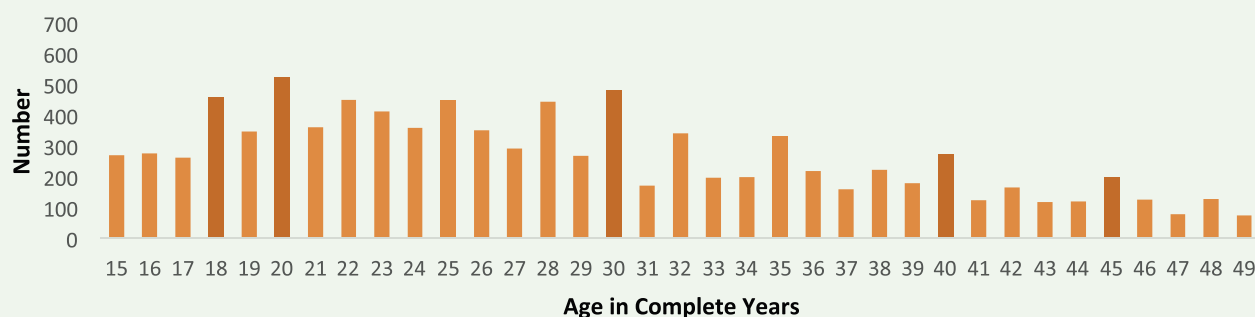


Figure 7: Distribution of women age in years

The table below shows the distribution of the sample of women aged 15 to 49 years according to their physiological status (non-pregnant, non-lactating, pregnant and/or lactating). Among all surveyed women, 908 were pregnant (9.3%). The proportion of pregnant women by region was ranging from 5.1% in Dar es Salaam to 14.0% in Kigoma. Lactating women were 2,928 i.e. 31.7% of the sample. Pregnant and lactating women were 18 or 0.3% of the sample.

Table 45: Distribution of the sample of women aged 15 to 49 years by region, Tanzania Mainland, Zanzibar and National

No.	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	%
	Main-land	8,038	4,647	58.1	758	9.3	2,593	32.0	16	0.3	24	0.3
1	Dodoma	321	180	56.1	33	10.3	105	32.7	1	0.3	2	0.6
2	Arusha	345	191	55.4	35	10.1	118	34.2	0	0.0	1	0.3
3	Kiliman-jaro	264	169	64.0	17	6.4	78	29.6	0	0.0	0	0.0
4	Tanga	264	160	60.6	22	8.3	81	30.7	1	0.4	0	0.0
5	Morogoro	337	216	64.1	37	11.0	83	24.6	1	0.3	0	0.0
6	Pwani	369	220	59.6	33	9.0	114	30.9	0	0.0	2	0.5
7	Dar es Salaam	530	402	75.8	27	5.1	99	18.7	0	0.0	2	0.4
8	Lindi	186	114	61.3	24	12.9	47	25.3	0	0.0	1	0.5
9	Mtwara	318	226	71.0	19	6.0	73	23.0	0	0.0	0	0.0
10	Ruvuma	268	145	54.1	19	7.1	100	37.3	0	0.0	4	1.5
11	Iringa	323	185	57.3	27	8.3	111	34.4	0	0.0	0	0.0
12	Mbeya	405	278	68.6	24	5.9	102	25.2	0	0.0	1	0.3
13	Singida	310	160	51.6	31	10.0	119	38.4	0	0.0	0	0.0
14	Tabora	306	170	55.6	38	12.4	96	31.4	1	0.3	1	0.3
15	Rukwa	280	141	50.3	35	12.5	101	36.1	0	0.0	3	1.1
16	Kigoma	279	126	45.1	39	14.0	114	40.9	0	0.0	0	0.0
17	Shinyan-ga	339	187	55.1	44	13.0	107	31.6	1	0.3	0	0.0

18	Kagera	225	122	54.2	17	7.6	84	37.3	1	0.5	1	0.4
19	Mwanza	291	169	58.1	29	10.0	86	29.5	6	2.1	1	0.3
20	Mara	329	186	56.5	23	7.0	120	36.5	0	0.0	0	0.0
21	Manyara	317	144	45.4	37	11.7	134	42.3	0	0.0	2	0.6
22	Njombe	237	134	56.6	20	8.4	83	35.0	0	0.0	0	0.0
23	Katavi	301	163	54.2	41	13.6	96	31.9	1	0.3	0	0.0
24	Simiyu	259	119	45.9	28	10.8	111	42.9	1	0.4	0	0.0
25	Geita	265	123	46.4	25	9.4	112	42.3	2	0.8	3	1.1
26	Songwe	370	217	58.6	34	9.2	119	32.2	0	0.0	0	0.0
	Zanzibar	1,388	895	67.0	150	10.5	335	21.9	2	0.1	6	0.5
27	Unguja North	247	170	68.8	24	9.7	52	21.1	1	0.4	0	0.0
28	Unguja South	261	183	70.1	25	9.6	52	19.9	0	0.0	1	0.4
29	Stone Town	293	216	73.7	28	9.6	47	16.0	0	0.0	2	0.7
30	Pemba North	283	154	54.4	33	11.7	93	32.9	1	0.3	2	0.7
31	Pemba South	304	172	56.6	40	13.2	91	29.9	0	0.0	1	0.3
	National	9,426	5,542	58.4	908	9.3	2,928	31.7	18	0.3	30	0.3

The figure below shows the distribution of pregnant women according to age groups. The highest proportion of pregnant women (13.9%) was in the 25-29 years age group, while the lowest proportion of pregnant women (1.2%) was in the 45-49 years age group.

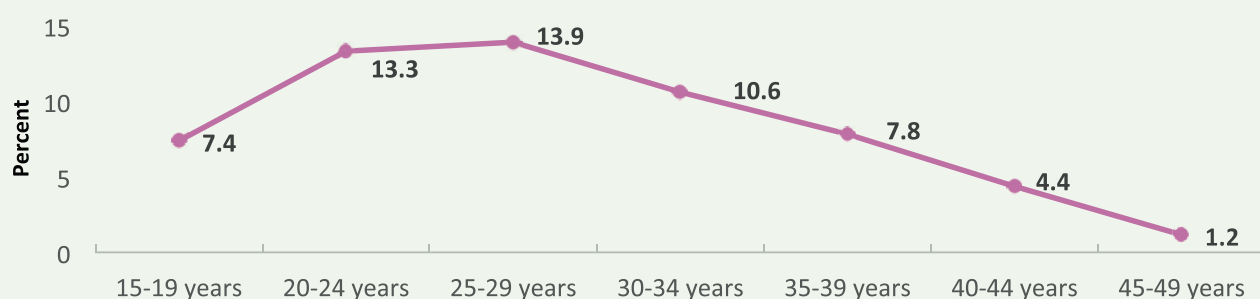


Figure 8: Percent of pregnant women by age groups

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 were excluded from the analysis.

Table 46: Nutritional status of non-pregnant women 15 to 49 years according to BMI classification by region, Tanzania Mainland, Zanzibar and National

No.	Region	N	Body Mass Index (BMI)															Mean BMI
			<16.0 Severely thin		16.0-18.4 Moderately and Mildly thin		<18.5 Total thin		18.5-24.9 Normal range		≥25.0 Total over-weight or obese		25.0-29.9 Overweight		≥ 30.0 Obese			
			n	%	N	%	n	%	n	%	n	%	n	%	n	%		
	Mainland	7,249	31	0.5	449	6.6	480	7.1	4,466	61.4	2,303	31.5	1,509	20.3	794	11.2	23.9	
1	Dodoma	286	1	0.4	24	8.4	25	8.7	177	61.9	84	29.4	53	18.5	31	10.8	23.5	
2	Arusha	310	4	1.3	26	8.4	30	9.7	159	51.3	121	39.0	74	23.9	47	15.1	24.4	
3	Kiliman-jaro	247	2	0.8	6	2.4	8	3.2	118	47.8	121	49.0	70	28.4	51	20.6	25.8	
4	Tanga	241	2	0.8	21	8.7	23	9.5	126	52.3	92	38.2	61	25.3	31	12.9	24.3	
5	Morogoro	299	1	0.3	17	5.7	18	6.0	169	56.5	112	37.5	72	24.1	40	13.4	24.7	
6	Pwani	334	2	0.6	22	6.6	24	7.2	166	49.7	144	43.1	87	26.0	57	17.1	24.8	
7	Dar es Salaam	500	3	0.6	29	5.8	32	6.4	225	45.0	243	48.6	123	24.6	120	24.0	26.0	
8	Lindi	162	0	0.0	7	4.3	7	4.3	95	58.6	60	37.1	38	23.5	22	13.6	24.5	
9	Mtwara	299	1	0.3	12	4.0	13	4.3	168	56.2	118	39.5	75	25.1	43	14.4	24.7	
10	Ruvuma	249	0	0.0	7	2.8	7	2.8	170	68.3	72	28.9	46	18.5	26	10.4	23.9	
11	Iringa	296	0	0.0	9	3.0	9	3.0	188	63.5	99	33.5	72	24.4	27	9.1	24.0	
12	Mbeya	379	0	0.0	13	3.4	13	3.4	203	53.6	163	43.0	101	26.6	62	16.4	25.2	
13	Singida	278	2	0.7	28	10.1	30	10.8	189	68.0	59	21.2	42	15.1	17	6.1	22.8	
14	Tabora	267	1	0.4	23	8.6	24	9.0	185	69.3	58	21.7	27	10.1	31	11.6	23.2	
15	Rukwa	245	0	0.0	12	4.9	12	4.9	175	71.4	58	23.7	45	18.4	13	5.3	23.0	

No.	Region	N	Body Mass Index (BMI)															Mean BMI
			<16.0 Severely thin		16.0-18.4 Moderately and Mildly thin		<18.5 Total thin		18.5-24.9 Normal range		≥25.0 Total over-weight or obese		25.0-29.9 Overweight		≥ 30.0 Obese			
			n	%	N	%	n	%	n	%	n	%	n	%	n	%		
16	Kigoma	239	0	0.0	16	6.7	16	6.7	175	73.2	48	20.1	38	15.9	10	4.2	22.7	
17	Shinyanga	294	1	0.3	18	6.1	19	6.4	199	67.7	76	25.9	60	20.4	16	5.5	23.1	
18	Kagera	207	2	1.0	21	10.1	23	11.2	139	67.1	45	21.7	33	16.0	12	5.8	22.8	
19	Mara	253	1	0.4	20	7.9	21	8.3	169	66.8	63	24.9	47	18.6	16	6.3	23.0	
20	Mwanza	305	0	0.0	19	6.2	19	6.2	232	76.1	54	17.7	41	13.4	13	4.3	22.7	
21	Manyara	280	2	0.7	34	12.1	36	12.9	168	60.0	76	27.1	45	16.1	31	11.1	23.3	
22	Njombe	217	0	0.0	7	3.2	7	3.2	149	68.7	61	28.1	49	22.6	12	5.5	23.7	
23	Katavi	259	3	1.2	13	5.0	16	6.2	178	68.7	65	25.1	45	17.4	20	7.7	23.3	
24	Simiyu	230	2	0.9	20	8.7	22	9.6	168	73.0	40	17.4	34	14.8	6	2.6	22.2	
25	Geita	237	1	0.4	18	7.6	19	8.0	171	72.1	47	19.9	40	16.9	7	3.0	22.3	
26	Songwe	336	0	0.0	7	2.1	7	2.1	205	61.0	124	36.9	91	27.1	33	9.8	24.6	
	Zanzibar	1,233	9	0.7	114	8.9	123	9.6	615	48.6	495	41.8	270	21.6	225	20.2	25.2	
27	Unguja North	222	1	0.5	32	14.4	33	14.9	110	49.5	79	35.6	45	20.3	34	15.3	23.9	
28	Unguja South	236	3	1.3	15	6.3	18	7.6	107	45.3	111	47.1	53	22.5	58	24.6	26.0	
29	Stone Town	262	2	0.8	19	7.2	21	8.0	117	44.6	124	47.4	56	21.4	68	26.0	26.3	
30	Pemba North	249	3	1.2	27	10.9	30	12.1	142	57.0	77	30.9	50	20.1	27	10.8	23.5	
31	Pemba South	264	0	0.0	21	8.0	21	8.0	139	52.6	104	39.4	66	25.0	38	14.4	24.5	
	National	8,482	40	0.5	563	6.8	603	7.3	5,081	61.0	2,798	31.7	1,779	20.2	1,019	11.5	23.9	

Table 47: Nutritional status of non-pregnant women 15 to 49 years according to BMI classification by age group

Region	N	Body Mass Index (BMI)														Mean BMI
		<16.0 Severely thin		16.0-18.4 Moderately and Mildly thin		<18.5 Total thin		18.5-24.9 Normal range		≥25.0 Total over-weight or obese		25.0-29.9 Overweight		≥ 30.0 Obese		
Age group (Years)		n	%	n	%	n	%	n	%	n	%	n	%	n	%	
15-19	1,492	19	1.3	195	13.6	214	14.8	1,070	72.6	208	12.5	171	10.6	37	1.9	21.5
20-24	1,819	9	0.6	129	7.0	138	7.6	1,267	70.6	414	21.8	287	15.6	127	6.2	22.9
25-29	1,549	6	0.2	86	5.3	92	5.6	954	63.9	503	30.6	343	21.2	160	9.4	23.8
30-34	1,236	3	0.3	54	4.1	57	4.4	642	53.4	537	42.2	318	24.6	219	17.6	25.1
35-39	1,023	1	0.1	36	4.3	37	4.4	502	50.3	484	45.3	293	27.1	191	18.2	25.5
40-44	763	2	0.3	32	4.6	34	5.0	368	47.6	361	47.4	204	27.1	157	20.4	25.6
45-49	596	0	0.0	30	6.3	30	6.3	275	47.3	291	46.5	163	25.4	128	21.0	25.6

Nutritional status of pregnant women 15 to 49 years (MUAC<220 mm)

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

Table 48: Prevalence of low MUAC (MUAC<220 mm) in pregnant women 15 to 49 years by region, Tanzania Mainland, Zanzibar and National

No.	Region	N	Prevalence of low MUAC (MUAC<220 mm) in pregnant women aged 15-49 years	
			n	% [95% CI]
	Mainland	772	14	1.5 [0.7-2.4]
1	Dodoma	34	0	0.0
2	Arusha	35	4	11.4 [0.0-23.3]
3	Kilimanjaro	17	0	0.0
4	Tanga	23	1	4.3 [0.0-12.6]
5	Morogoro	38	0	0.0
6	Pwani	33	1	3.0 [0.0-8.9]
7	Dar es Salaam	27	0	0.0
8	Lindi	24	1	4.2 [0.0-11.8]
9	Mtwara	19	0	0.0
10	Ruvuma	19	0	0.0
11	Iringa	27	1	3.7 [0.0-10.8]
12	Mbeya	23	2	8.7 [0.0-19.8]
13	Singida	30	2	6.7 [0.0-15.5]
14	Tabora	39	0	0.0
15	Rukwa	35	0	0.0
16	Kigoma	39	0	0.0
17	Shinyanga	45	1	2.2 [0.0-6.6]
18	Kagera	18	0	0.0
19	Mara	35	0	0.0
20	Mwanza	23	0	0.0
21	Manyara	37	1	2.7 [0.0-7.8]
22	Njombe	20	0	0.0
23	Katavi	42	0	0.0
24	Simiyu	29	0	0.0
25	Geita	27	0	0.0
26	Songwe	34	0	0.0
	Zanzibar	152	2	1.8 [0.0-4.8]
27	Unguja North	25	0	0.0
28	Unguja South	25	1	4.0 [0.0-11.9]
29	Stone Town	28	1	3.6 [0.0-10.5]
30	Pemba North	34	0	0.0
31	Pemba South	40	0	0.0
	National	924	16	1.6 [0.7-2.4]

Table 49: Prevalence of low MUAC (MUAC<220 mm) in pregnant women 15 to 49 years by age group

Region	N	Prevalence of low MUAC (MUAC<220 mm) in pregnant women aged 15-49 years	
		n	% [95% CI]
Age group (Years)			
15-19	119	4	3.4 [0.1-6.7]
20-24	280	5	1.2 [0.0-2.3]
25-29	250	5	1.9 [0.2-3.5]
30-34	147	1	1.2 [0.0-3.4]
35-39	86	1	1.1 [0.0-3.2]
40-44	35	0	0.0
45-49	7	0	0.0

Iron-Folic Acid Supplementation

Table 50: 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, disaggregated by number of days, by region, Tanzania Mainland, Zanzibar and National

No.	Region	N	Number of days iron syrup/iron or iron/folate tablets taken during pregnancy for past birth									
			None		<60		60 – 89		90+		Don't know	
			n	%	n	%	n	%	n	%	n	%
	Mainland	4,847	984	20.1	1,498	30.1	648	12.8	1,328	28.7	389	8.3
1	Dodoma	195	19	9.8	56	28.7	19	9.7	56	28.7	45	23.1
2	Arusha	236	64	27.1	89	37.7	34	14.4	34	14.4	15	6.4
3	Kilimanjaro	144	17	11.8	34	23.6	17	11.8	41	28.5	35	24.3
4	Tanga	163	22	13.5	70	43.0	29	17.8	40	24.5	2	1.2
5	Morogoro	176	19	10.8	65	36.9	25	14.2	51	29.0	16	9.1
6	Pwani	213	19	8.9	80	37.5	21	9.9	82	38.5	11	5.2
7	Dar es Salaam	209	29	13.9	71	34.0	26	12.4	70	33.5	13	6.2
8	Lindi	98	12	12.3	12	12.2	24	24.5	49	50.0	1	1.0
9	Mtwara	161	16	9.9	31	19.3	58	36.0	55	34.2	1	0.6
10	Ruvuma	200	28	14.0	57	28.5	25	12.5	80	40.0	10	5.0
11	Iringa	212	44	20.7	63	29.7	26	12.3	61	28.8	18	8.5
12	Mbeya	209	16	7.6	79	37.8	34	16.3	74	35.4	6	2.9
13	Singida	199	60	30.2	48	24.1	22	11.1	51	25.6	18	9.0
14	Tabora	181	59	32.6	52	28.7	26	14.4	21	11.6	23	12.7
15	Rukwa	182	41	22.5	75	41.2	20	11.0	32	17.6	14	7.7
16	Kigoma	191	41	21.5	27	14.1	15	7.9	78	40.8	30	15.7
17	Shinyanga	222	62	27.9	80	36.0	37	16.7	43	19.4	0	0.0
18	Kagera	148	20	13.5	9	6.1	5	3.4	109	73.6	5	3.4
19	Mara	167	54	32.3	67	40.1	17	10.2	17	10.2	12	7.2
20	Mwanza	199	57	28.6	50	25.1	20	10.1	54	27.1	18	9.1
21	Manyara	217	55	25.3	62	28.6	16	7.4	46	21.2	38	17.5
22	Njombe	187	24	12.8	52	27.8	44	23.5	66	35.3	1	0.6

23	Katavi	179	75	41.9	70	39.1	12	6.7	9	5.0	13	7.3
24	Simiyu	175	36	20.5	54	30.9	34	19.4	46	26.3	5	2.9
25	Geita	164	52	31.7	74	45.1	15	9.1	15	9.2	8	4.9
26	Songwe	220	43	19.5	71	32.3	27	12.3	48	21.8	31	14.1
	Zanzibar	626	200	36.4	237	34.9	60	9.2	87	12.8	42	6.7
27	Unguja North	108	33	30.6	28	25.9	8	7.4	35	32.4	4	3.7
28	Unguja South	105	26	24.8	27	25.7	24	22.8	26	24.8	2	1.9
29	Stone Town	112	53	47.3	29	25.9	12	10.7	12	10.7	6	5.4
30	Pemba North	149	49	32.9	65	43.6	7	4.7	5	3.4	23	15.4
31	Pemba South	152	39	25.7	88	57.9	9	5.9	9	5.9	7	4.6
	National	5,473	1,184	20.5	1,735	30.2	708	12.7	1,415	28.5	431	8.1

Anaemia

Table 51: Prevalence of anaemia and haemoglobin concentration in non-pregnant women of reproductive age (15-49 years) by region, Tanzania Mainland, Zanzibar and national

No.	Region	N	Total Anaemia (Hb <12.0 g/dL)		Mild Anaemia (Hb 11.0-11.9 g/dL)		Moderate Anaemia (Hb 8.0-10.9 g/dL)		Severe Anaemia (Hb <8.0 g/dL)		Mean Hb (g/dL)
			n	% [95% CI]	n	% [95% CI]	n	% [95% CI]	n	% [95% CI]	Mean
	Mainland	7,148	1,952	28.2 [26.8-29.5]	1,098	15.7 [14.7-16.7]	788	11.5 [10.6-12.4]	66	1.0 [0.7-1.3]	12.6
1	Dodoma	284	69	24.3 [18.5-30.1]	41	14.4 [10.5-18.3]	27	9.5 [6.0-13.1]	1	0.4 [0.0-1.1]	12.8
2	Arusha	305	66	21.6 [15.8-27.5]	26	8.5 [5.2-11.9]	35	11.5 [6.8-16.2]	5	1.6 [0.2-3.1]	13.0
3	Kilimanjaro	221	30	13.5 [9.3-17.9]	16	7.2 [4.4-10.1]	12	5.4 [2.1-8.7]	2	0.9 [0.0-2.2]	13.3
4	Tanga	234	68	29.1 [20.9-37.2]	33	14.1 [8.6-19.6]	34	14.5 [9.0-20.0]	1	0.4 [0.0-1.3]	12.5
5	Morogoro	299	89	29.8 [22.2-37.3]	54	18.1 [13.7-22.4]	29	9.7 [4.9-14.5]	6	2.0 [0.2-3.8]	12.6
6	Pwani	335	91	27.2 [21.6-32.8]	42	12.5 [8.6-16.4]	45	13.4 [9.4-17.4]	4	1.2 [0.1-2.3]	12.6
7	Dar es Salaam	494	142	28.7 [23.5-34.0]	80	16.2 [12.0-20.4]	56	11.3 [7.9-14.7]	6	1.2 [0.0-2.6]	12.5
8	Lindi	157	51	32.5 [25.7-39.3]	34	21.7 [15.2-28.1]	17	10.8 [6.4-15.3]	0	0.0	12.6
9	Mtwara	296	90	30.4 [23.3-37.5]	58	19.6 [14.7-24.5]	31	10.5 [6.4-14.5]	1	0.3 [0.0-1.0]	12.6
10	Ruvuma	245	66	26.9 [20.0-33.9]	39	15.9 [10.2-21.7]	26	10.6 [6.2-15.0]	1	0.4 [0.0-1.2]	12.7
11	Iringa	292	49	16.8 [11.8-21.8]	32	11.0 [7.0-14.9]	16	5.5 [2.6-8.3]	1	0.3 [0.0-1.0]	13.1
12	Mbeya	369	78	21.1 [16.9-25.4]	51	13.8 [10.8-16.8]	22	6.0 [3.2-8.7]	5	1.3 [0.2-2.5]	12.9
13	Singida	276	47	17.0 [12.2-21.8]	24	8.7 [5.1-12.3]	22	8.0 [4.9-11.0]	1	0.3 [0.0-1.1]	12.9
14	Tabora	264	91	34.5 [28.5-40.4]	54	20.4 [15.4-25.5]	35	13.3 [8.7-17.8]	2	0.8 [0.0-1.8]	12.5

No.	Region	N	Total Anaemia (Hb <12.0 g/dL)		Mild Anaemia (Hb 11.0-11.9 g/dL)		Moderate Anaemia (Hb 8.0-10.9 g/dL)		Severe Anaemia (Hb <8.0 g/dL)		Mean Hb (g/dL)
			n	% [95% CI]	n	% [95% CI]	n	% [95% CI]	n	% [95% CI]	Mean
15	Rukwa	244	50	20.5 [14.3-26.7]	38	15.6 [10.1-21.0]	11	4.5 [2.2-6.9]	1	0.4 [0.0-1.2]	12.9
16	Kigoma	240	82	34.2 [27.0-41.3]	44	18.3 [13.4-23.2]	36	15.0 [10.3-19.7]	2	0.8 [0.0-2.0]	12.4
17	Shinyanga	293	89	30.4 [25.4-35.4]	53	18.1 [13.7-22.5]	34	11.6 [8.0-15.2]	2	0.7 [0.0-1.6]	12.6
18	Kagera	205	43	21.0 [13.7-28.3]	29	14.1 [9.1-19.2]	14	6.8 [2.7-11.0]	0	0.0	13.0
19	Mwanza	250	96	38.4 [31.6-45.2]	46	18.4 [11.8-25.0]	47	18.8 [14.4-23.2]	3	1.2 [0.0-2.6]	12.2
20	Mara	305	109	35.7 [27.9-43.6]	58	19.0 [13.8-24.2]	44	14.4 [10.6-18.2]	7	2.3 [0.4-4.2]	12.4
21	Manyara	279	90	32.3 [26.0-38.6]	42	15.1 [10.5-19.6]	46	16.5 [10.9-22.0]	2	0.7 [0.0-1.7]	12.6
22	Njombe	210	48	22.9 [16.4-29.3]	31	14.8 [9.8-19.8]	16	7.6 [3.2-12.0]	1	0.5 [0.0-1.5]	13.0
23	Katavi	257	84	32.7 [26.1-39.2]	50	19.5 [13.9-25.0]	34	13.2 [9.0-17.4]	0	0.0	12.5
24	Simiyu	227	85	37.4 [29.6-45.3]	41	18.1 [12.4-23.7]	41	18.1 [11.1-25.1]	3	1.3 [0.0-2.8]	12.3
25	Geita	237	86	36.3 [30.9-41.7]	47	19.8 [15.4-24.2]	31	13.1 [9.1-17.0]	8	3.4 [1.3-5.5]	12.2
26	Songwe	330	63	19.1 [13.2-25.0]	35	10.6 [6.1-15.1]	27	8.2 [5.1-11.3]	1	0.3 [0.0-0.9]	13.1
	Zanzibar	1,177	535	43.2 [39.9-46.5]	280	23.5 [21.0-26.0]	234	18.1 [15.7-20.5]	21	1.6 [0.8-2.4]	12.0
27	Unguja North	203	86	42.4 [34.4-50.3]	48	23.6 [18.1-29.2]	35	17.2 [12.6-21.8]	3	1.5 [0.0-3.1]	12.1
28	Unguja South	230	99	43.0 [36.8-49.3]	47	20.4 [14.4-26.5]	48	20.9 [14.1-27.7]	4	1.7 [0.1-3.4]	12.0
29	Stone Town	253	95	37.5 [32.0-43.1]	56	22.1 [18.1-26.1]	36	14.2 [10.2-18.2]	3	1.2 [0.0-2.5]	12.1
30	Pemba North	239	131	54.8 [47.4-62.3]	67	28.0 [22.0-34.1]	58	24.3 [18.7-29.8]	6	2.5 [0.6-4.4]	11.6
31	Pemba South	252	124	49.2 [41.9-56.5]	62	24.6 [17.9-31.3]	57	22.6 [16.8-28.4]	5	2.0 [0.1-3.8]	11.7
	National	8,325	2,487	28.8 [27.5-30.1]	1,378	16.1 [15.1-17.0]	1,022	11.7 [10.9-12.6]	87	1.0 [0.8-1.3]	12.6

4.8 Salt adequately iodized

Table 52: Coverage of laboratory salt collection for laboratory testing by region, Tanzania Mainland, Zanzibar and National

No.	Region	N	Salt Provided		No salt	
			n	%	n	%
	Mainland	7,501	6,869	91.6	632	8.4
1	Dodoma	279	255	91.4	24	8.6
2	Arusha	338	310	91.7	28	8.3
3	Kilimanjaro	290	276	95.2	14	4.8
4	Tanga	281	245	87.2	36	12.8
5	Morogoro	316	283	89.6	33	10.4
6	Pwani	364	329	90.4	35	9.6
7	Dar es Salaam	382	360	94.2	22	5.8
8	Lindi	225	205	91.1	20	8.9
9	Mtwara	326	301	92.3	25	7.7
10	Ruvuma	231	195	84.4	36	15.6
11	Iringa	336	319	94.9	17	5.1
12	Mbeya	424	407	96.0	17	4.0
13	Singida	341	322	94.4	19	5.6
14	Tabora	234	220	94.0	14	6.0
15	Rukwa	257	227	88.3	30	11.7
16	Kigoma	260	239	91.9	21	8.1
17	Shinyanga	239	221	92.5	18	7.5
18	Kagera	217	202	93.1	15	6.9
19	Mwanza	248	211	85.1	37	14.9
20	Mara	290	269	92.8	21	7.2
21	Manyara	291	248	85.2	43	14.8
22	Njombe	235	215	91.5	20	8.5
23	Katavi	250	226	90.4	24	9.6
24	Simiyu	208	190	91.3	18	8.7
25	Geita	232	204	87.9	28	12.1
26	Songwe	407	390	95.8	17	4.2
	Zanzibar	1,363	1,150	84.4	213	15.6
27	Unguja North	284	227	79.9	57	20.1
28	Unguja South	290	245	84.5	45	15.5
29	Stone Town	238	205	86.1	33	13.9
30	Pemba North	280	239	85.4	41	14.6
31	Pemba South	271	234	86.3	37	13.7
	National	8,864	8,019	90.5	845	9.5

Table 53: Household iodine levels (laboratory testing) by region, Tanzania Mainland, Zanzibar and national

No.	Region	N	None (0 ppm)		Inadequate (<10 ppm)		Inadequate (10 to <15 ppm)		Adequate (>= 15 ppm)		Iodine Concentration
			n	% [95% CI]	n	% [95% CI]	n	% [95% CI]	n	% [95% CI]	Median
	Mainland	6869	353	4.9 [4.1-5.7]	1478	23.7 [22.1-25.3]	637	9.6 [8.7-10.4]	4401	61.8 [59.9-63.8]	23.4
1	Dodoma	255	28	11.0 [5.4-16.6]	88	34.5 [26.6-42.4]	24	9.4 [5.3-13.5]	115	45.1 [36.6-53.6]	17.8
2	Arusha	310	1	0.3 [0.0-1.0]	3	1.0 [0.0-2.1]	6	1.9 [0.4-3.4]	300	96.8 [94.7-98.8]	33.5
3	Kiliman-jaro	276	6	2.2 [0.2-4.1]	19	6.9 [2.5-11.3]	23	8.3 [4.4-12.3]	228	82.6 [74.9-90.3]	27.8
4	Tanga	245	1	0.4 [0.0-1.2]	60	24.5 [17.1-31.9]	23	9.4 [5.1-13.6]	161	65.7 [56.3-75.1]	23.7
5	Morogoro	283	6	2.1 [0.2-4.0]	79	27.9 [18.4-37.5]	17	6.0 [2.6-9.4]	181	64.0 [53.0-75.0]	23.7
6	Pwani	329	6	1.8 [0.2-3.4]	44	13.4 [6.8-20.0]	8	2.4 [0.7-4.2]	271	82.4 [75.0-89.8]	26.1
7	Dar es Salaam	360	1	0.3 [0.0-0.8]	8	2.2 [0.4-4.1]	10	2.8 [1.0-4.6]	341	94.7 [92.2-97.3]	29.1
8	Lindi	205	5	2.4 [0.3-4.5]	80	39.0 [30.3-47.8]	43	21.0 [14.1-27.9]	77	37.6 [29.8-45.3]	16.7
9	Mtwara	301	9	3.0 [1.0-5.0]	116	38.5 [32.2-44.9]	63	20.9 [17.1-24.7]	113	37.6 [30.8-44.3]	16.0
10	Ruvuma	195	2	1.0 [0.0-2.5]	70	35.9 [25.6-46.2]	47	24.1 [16.3-31.9]	76	39.0 [27.4-50.5]	17.7
11	Iringa	319	4	1.2 [0.0-2.8]	43	13.5 [7.1-19.9]	14	4.4 [2.5-6.2]	258	80.9 [73.2-88.5]	32.0
12	Mbeya	407	1	0.2 [0.0-0.7]	13	3.2 [0.0-6.4]	11	2.7 [1.0-4.4]	382	93.9 [90.2-97.5]	36.6
13	Singida	322	110	34.2 [21.5-46.8]	98	30.4 [21.1-39.8]	31	9.6 [4.9-14.4]	83	25.8 [15.9-35.6]	11.4
14	Tabora	220	8	3.6 [1.0-6.3]	113	51.4 [40.9-61.8]	30	13.6 [8.4-18.9]	69	31.4 [20.3-42.4]	15.5
15	Rukwa	227	6	2.6 [0.6-4.6]	71	31.3 [20.7-41.8]	34	15.0 [8.3-21.7]	116	51.1 [38.3-63.9]	20.6
16	Kigoma	239	5	2.1 [0.3-3.9]	29	12.1 [6.6-17.6]	38	15.9 [10.1-21.7]	167	69.9 [60.9-78.9]	30.9
17	Shinyanga	221	15	6.8 [2.2-11.4]	103	46.6 [36.2-57.0]	33	14.9 [9.0-20.9]	70	31.7 [20.6-42.8]	14.7
18	Kagera	202	4	2.0 [0.1-3.9]	40	19.8 [9.8-29.8]	12	5.9 [2.5-9.4]	146	72.3 [59.9-84.7]	26.3
19	Mwanza	211	1	0.5 [0.0-1.5]	67	31.7 [20.1-43.4]	28	13.3 [8.0-18.5]	115	54.5 [39.4-69.6]	20.4

No.	Region	N	None (0 ppm)		Inadequate (<10 ppm)		Inadequate (10 to <15 ppm)		Adequate (≥ 15 ppm)		Iodine Concentr- ation
			n	% [95% CI]	n	% [95% CI]	n	% [95% CI]	n	% [95% CI]	Median
20	Mara	269	3	1.1 [0.0-2.4]	22	8.2 [3.5-12.9]	26	9.7 [4.9-14.4]	218	81.0 [72.4-89.7]	31.2
21	Manyara	248	71	28.6 [15.9-41.4]	28	11.3 [5.4-17.1]	11	4.4 [1.1-7.8]	138	55.7 [43.3-68.0]	18.4
22	Njombe	215	1	0.5 [0.0-1.4]	28	13.0 [7.9-18.1]	14	6.5 [2.9-10.1]	172	80.0 [72.3-87.7]	31.4
23	Katavi	226	9	4.0 [0.5-7.5]	31	13.7 [7.0-20.4]	35	15.5 [8.9-22.0]	151	66.8 [55.5-78.1]	26.3
24	Simiyu	190	36	18.9 [8.3-29.6]	84	44.2 [33.1-55.3]	25	13.2 [8.2-18.1]	45	23.7 [12.6-34.8]	12.1
25	Geita	204	13	6.4 [1.4-11.4]	131	64.2 [54.5-73.9]	18	8.8 [5.3-12.3]	42	20.6 [12.6-28.6]	11.3
26	Songwe	390	1	0.3 [0.0-0.8]	10	2.6 [0.2-4.9]	13	3.3 [1.4-5.2]	366	93.8 [90.2-97.5]	32.5
	Zanzibar	1150	22	1.9 [0.9-2.9]	598	47.1 [42.7-51.5]	143	12.0 [9.5-14.5]	387	39.0 [34.7-43.4]	17.5
27	Unguja North	227	5	2.2 [0.3-4.1]	150	66.1 [58.8-73.4]	33	14.5 [10.2-18.8]	39	17.2 [11.5-22.9]	9.2
28	Unguja South	245	5	2.0 [0.3-3.8]	164	66.9 [59.7-74.2]	30	12.3 [7.9-16.6]	46	18.8 [12.2-25.3]	11.4
29	Stone Town	205	4	1.9 [0.1-3.9]	84	41.0 [32.9-49.1]	23	11.2 [6.3-16.1]	94	45.9 [38.2-53.5]	19.9
30	Pemba North	239	4	1.7 [0.0-3.7]	119	49.8 [39.3-60.3]	18	7.5 [4.3-10.8]	98	41.0 [30.5-51.5]	17.6
31	Pemba South	234	4	1.7 [0.0-3.4]	81	34.6 [26.0-43.3]	39	16.7 [10.7-22.6]	110	47.0 [35.9-58.2]	21.2
	National	8019	375	4.8 [4.0-5.6]	2076	24.3 [22.8-25.9]	780	9.7 [8.8-10.5]	4788	61.2 [59.3-63.1]	23.2

4.9 Handwashing Practices

Table 54: Proportion of households with soap by region, Tanzania Mainland, Zanzibar and National

No.	Region	N	Proportion of households with soap	
			n	%
	Mainland	15,436	11,031	69.8 [68.6-71.0]
1	Dodoma	618	326	52.8 [46.4-59.1]
2	Arusha	690	527	76.4 [70.9-81.8]
3	Kilimanjaro	574	451	78.6 [73.1-84.0]
4	Tanga	570	371	65.1 [58.5-71.7]
5	Morogoro	635	454	71.5 [66.2-76.8]
6	Pwani	739	534	72.3 [66.6-77.9]
7	Dar es Salaam	1,015	769	75.8 [70.9-80.7]
8	Lindi	454	251	55.3 [48.2-62.4]
9	Mtwara	688	490	71.2 [66.1-76.3]
10	Ruvuma	471	374	79.4 [74.2-84.6]
11	Iringa	664	570	85.8 [82.1-89.6]
12	Mbeya	854	730	85.5 [81.3-89.7]
13	Singida	683	518	75.8 [70.1-81.6]
14	Tabora	473	375	79.3 [76.3-82.3]
15	Rukwa	517	326	63.1 [56.3-69.8]
16	Kigoma	513	314	61.2 [55.1-67.3]
17	Shinyanga	476	371	77.9 [73.3-82.5]
18	Kagera	436	250	57.3 [51.9-62.8]
19	Mara	501	326	65.1 [57.4-72.7]
20	Mwanza	589	443	75.2 [70.2-80.2]
21	Manyara	573	341	59.5 [52.2-66.9]
22	Njombe	466	405	86.9 [83.7-90.1]
23	Katavi	500	378	75.6 [70.7-80.5]
24	Simiyu	433	285	65.8 [60.0-71.6]
25	Geita	486	224	46.1 [37.9-54.3]
26	Songwe	818	628	76.8 [70.9-82.6]
	Zanzibar	2,790	1,532	54.8 [49.8-59.8]
27	Unguja North	590	239	40.5 [33.3-47.7]
28	Unguja South	597	342	57.3 [48.3-66.3]
29	Stone Town	488	264	54.1 [44.1-64.1]
30	Pemba North	568	361	63.6 [56.8-70.3]
31	Pemba South	547	326	59.6 [53.6-65.6]
	National	18,226	12,563	69.4 [68.2-70.6]

Table 55: Proportion of households who report having used soap for handwashing at least at two critical times during past 24 hours (including “after defecating”), by region, Tanzania Mainland, Zanzibar and National

No.	Region	N	Proportion of households who report having used soap for handwashing at least at two critical times during past 24 hours	
			n	%
	Mainland	11,540	334	2.8 [2.3-3.3]
1	Dodoma	347	12	3.5 [1.2-5.7]
2	Arusha	514	72	14.0 [7.7-20.3]
3	Kilimanjaro	471	6	1.3 [0.0-2.7]
4	Tanga	394	21	5.3 [1.5-9.1]
5	Morogoro	489	18	3.7 [1.1-6.3]
6	Pwani	555	18	3.2 [1.4-5.1]
7	Dar es Salaam	811	4	0.5 [0.0-1.0]
8	Lindi	255	1	0.4 [0.0-1.2]
9	Mtwara	485	9	1.9 [0.8-2.9]
10	Ruvuma	386	30	7.8 [3.6-11.9]
11	Iringa	553	1	0.2 [0.0-0.5]
12	Mbeya	744	2	0.3 [0.0-0.6]
13	Singida	462	1	0.2 [0.0-0.6]
14	Tabora	345	0	0.0
15	Rukwa	357	17	4.8 [0.5-9.0]
16	Kigoma	346	16	4.6 [2.1-7.2]
17	Shinyanga	370	1	0.3 [0.0-0.8]
18	Kagera	314	12	3.8 [1.8-5.8]
19	Mara	358	2	0.6 [0.0-1.3]
20	Mwanza	489	23	4.7 [1.8-7.6]
21	Manyara	342	4	1.2 [0.0-2.5]
22	Njombe	405	27	6.7 [3.8-9.5]
23	Katavi	384	20	5.2 [1.8-8.6]
24	Simiyu	337	11	3.3 [1.2-5.3]
25	Geita	378	2	0.5 [0.0-1.2]
26	Songwe	649	4	0.6 [0.0-1.3]
	Zanzibar	1,786	14	0.6 [0.0-1.2]
27	Unguja North	391	3	0.8 [0.0-1.6]
28	Unguja South	402	0	0.0
29	Stone Town	316	0	0.0
30	Pemba North	346	11	3.2 [0.0-6.8]
31	Pemba South	331	0	0.0
	National	13,326	348	2.7% [2.3-3.2]

4.10 Sanitation facilities

Table 56: Proportion of households with safe excreta disposal, by region, Tanzania Mainland, Zanzibar and National

No.	Region	N	Proportion of households that use:					
			An improved excreta disposal facility (improved toilet facility, not shared)		A shared facility (improved toilet facility, 2 households or more)		An unimproved toilet (unimproved toilet facility or public toilet)	
			n	% [95% CI]	n	% [95% CI]	n	% [95% CI]
	Mainland	14,468	3,550	24.0 [22.5-25.5]	2,665	20.1 [18.3-21.9]	8,253	55.9 [53.7-58.1]
1	Dodoma	590	117	19.8 [14.0-25.6]	82	13.9 [8.6-19.2]	391	66.3 [57.7-74.8]
2	Arusha	604	195	32.3 [24.9-39.7]	155	25.7 [16.3-35.0]	254	42.0 [31.0-53.1]
3	Kilimanjaro	561	302	53.8 [46.8-60.9]	108	19.3 [9.9-28.6]	151	26.9 [20.3-33.5]
4	Tanga	509	160	31.4 [23.9-39.0]	110	21.6 [12.8-30.5]	239	47.0 [35.1-58.8]
5	Morogoro	602	250	41.5 [32.4-50.7]	90	15.0 [7.8-22.1]	262	43.5 [31.2-55.8]
6	Pwani	671	320	47.7 [39.3-56.1]	179	26.7 [19.9-33.4]	172	25.6 [15.4-35.8]
7	Dar es Salaam	1,011	343	33.9 [27.1-40.7]	606	60.0 [52.9-67.0]	62	6.1 [2.4-9.8]
8	Lindi	428	61	14.3 [8.5-20.0]	16	3.7 [0.0-8.1]	351	82.0 [74.1-89.9]
9	Mtwara	659	142	21.5 [15.1-28.0]	38	5.8 [2.4-9.1]	479	72.7 [64.7-80.7]
10	Ruvuma	465	100	21.5 [13.2-29.8]	69	14.8 [6.9-22.8]	296	63.7 [50.4-76.9]
11	Iringa	650	187	28.8 [21.5-36.0]	85	13.1 [5.9-20.2]	378	58.1 [47.0-69.3]
12	Mbeya	830	272	32.8 [24.7-40.9]	139	16.7 [10.0-23.5]	419	50.5 [39.0-62.0]
13	Singida	656	67	10.2 [4.0-16.4]	29	4.4 [0.8-8.1]	560	85.4 [77.2-93.5]
14	Tabora	434	26	6.0 [1.9-10.1]	38	8.7 [0.6-16.9]	370	85.3 [75.2-95.3]
15	Rukwa	483	59	12.2 [7.9-16.6]	107	22.2 [11.7-32.6]	317	65.6 [53.8-77.5]
16	Kigoma	503	39	7.8 [2.1-13.5]	46	9.1 [2.3-16.0]	418	83.1 [72.9-93.3]
17	Shinyanga	457	60	13.1 [7.0-19.3]	81	17.8 [8.4-27.0]	316	69.1 [55.6-82.7]
18	Kagera	433	34	7.8 [4.3-11.4]	19	4.4 [0.0-10.1]	380	87.8 [80.1-95.4]
19	Mara	487	146	30.0 [20.9-39.0]	136	27.9 [15.7-40.1]	205	42.1 [28.6-55.6]

No.	Region	N	Proportion of households that use:					
			An improved excreta disposal facility (improved toilet facility, not shared)		A shared facility (improved toilet facility, 2 households or more)		An unimproved toilet (unimproved toilet facility or public toilet)	
			n	% [95% CI]	n	% [95% CI]	n	% [95% CI]
20	Mwanza	475	118	24.9 [17.2-32.5]	116	24.4 [14.3-34.5]	241	50.7 [38.0-63.4]
21	Manyara	467	52	11.1 [4.4-17.9]	41	8.8 [0.9-16.6]	374	80.1 [68.5-91.7]
22	Njombe	462	146	31.6 [21.9-41.3]	48	10.4 [2.6-18.2]	268	58.0 [45.4-70.7]
23	Katavi	439	69	15.7 [10.5-20.9]	103	23.5 [12.0-34.9]	267	60.8 [46.9-74.8]
24	Simiyu	348	31	8.9 [4.2-13.6]	44	12.6 [2.2-23.1]	273	78.5 [66.2-90.7]
25	Geita	468	128	27.4 [19.6-35.1]	96	20.5 [12.7-28.3]	244	52.1 [39.5-64.7]
26	Songwe	776	126	16.2 [10.8-21.7]	84	10.8 [5.1-16.6]	566	73.0 [63.3-82.6]
	Zanzibar	2,330	1,284	59.2 [55.4-62.9]	207	13.9 [11.4-16.4]	839	26.9 [24.0-29.9]
27	Unguja North	510	247	48.4 [41.7-55.2]	19	3.7 [1.3-6.1]	244	47.9 [40.7-55.0]
28	Unguja South	555	203	36.6 [29.8-43.4]	38	6.8 [3.4-10.3]	314	56.6 [47.8-65.4]
29	Stone Town	481	297	61.8 [55.5-68.0]	106	22.0 [17.4-26.7]	78	16.2 [12.0-20.5]
30	Pemba North	367	264	71.9 [66.6-77.3]	17	4.6 [1.8-7.4]	86	23.5 [18.7-28.2]
31	Pemba South	417	273	65.5 [56.1-74.8]	27	6.5 [3.4-9.5]	117	28.0 [18.9-37.3]
	National	16,798	4,834	25.0 [23.5-26.4]	2,872	19.9 [18.2-21.7]	9,092	55.1 [53.0-57.2]

Table 57: Proportion of households with children under three years old that dispose of faeces safely by region, Tanzania Mainland, Zanzibar and National

No.	Region	N	Proportion of households with children under three years old that dispose of faeces safely	
			n	% [95% CI]
	Mainland	8,123	7,121	87.3 [85.9-88.8]
1	Dodoma	307	262	85.3 [78.2-92.5]
2	Arusha	448	364	81.3 [71.1-91.4]
3	Kilimanjaro	240	229	95.4 [92.6-98.2]
4	Tanga	272	260	95.6 [92.8-98.4]
5	Morogoro	273	252	92.3 [84.3-100.0]
6	Pwani	377	359	95.2 [91.3-99.1]

No.	Region	N	Proportion of households with children under three years old that dispose of faeces safely	
			n	% [95% CI]
7	Dar es Salaam	370	369	99.7 [99.2-100.0]
8	Lindi	132	126	95.5 [91.4-99.5]
9	Mtwara	245	232	94.7 [90.9-98.5]
10	Ruvuma	341	323	94.7 [91.1-98.3]
11	Iringa	362	311	85.9 [78.7-93.2]
12	Mbeya	326	307	94.2 [89.5-98.8]
13	Singida	343	276	80.5 [74.5-86.4]
14	Tabora	294	242	82.3 [73.3-91.4]
15	Rukwa	284	251	88.4 [83.0-93.8]
16	Kigoma	346	311	89.9 [85.8-94.0]
17	Shinyanga	327	276	84.4 [76.1-92.7]
18	Kagera	277	206	74.4 [66.4-82.3]
19	Mara	276	259	93.8 [89.2-98.5]
20	Mwanza	363	284	78.2 [69.0-87.4]
21	Manyara	379	277	73.1 [62.1-84.1]
22	Njombe	289	285	98.6 [97.3-99.9]
23	Katavi	279	218	78.1 [71.1-85.2]
24	Simiyu	303	206	68.0 [58.9-77.0]
25	Geita	315	303	96.2 [93.5-98.9]
26	Songwe	355	333	93.8 [89.0-98.6]
	Zanzibar	1,152	909	79.4 [75.8-83.0]
27	Unguja North	203	161	79.3 [72.7-86.0]
28	Unguja South	201	169	84.1 [78.3-89.9]
29	Stone Town	174	142	81.6 [75.3-87.9]
30	Pemba North	295	240	81.4 [73.7-89.0]
31	Pemba South	279	197	70.6 [61.8-79.4]
	National	9,275	8,030	87.1 [85.7-88.5]

5. Discussion

Children Nutritional Status

Stunting

Childhood stunting is one of the most significant impediments to human development. Stunting, or being too short for one's age, is a largely irreversible outcome of inadequate nutrition and repeated bouts of infection during the first 1000 days of child's life. Stunting has long term effects on individuals and societies, including: diminished cognitive and physical development, reduced productive capacity and poor health, and an increased risk of degenerative diseases such as diabetes [17]. In September 2018, the report on "The State of Food Security and Nutrition in the World" mentioned that worldwide nearly 151 million children under five – over 22% of all children in the age range – were affected by stunting in 2017. In 2017, 39% of all children affected by stunting globally were in Africa [18].

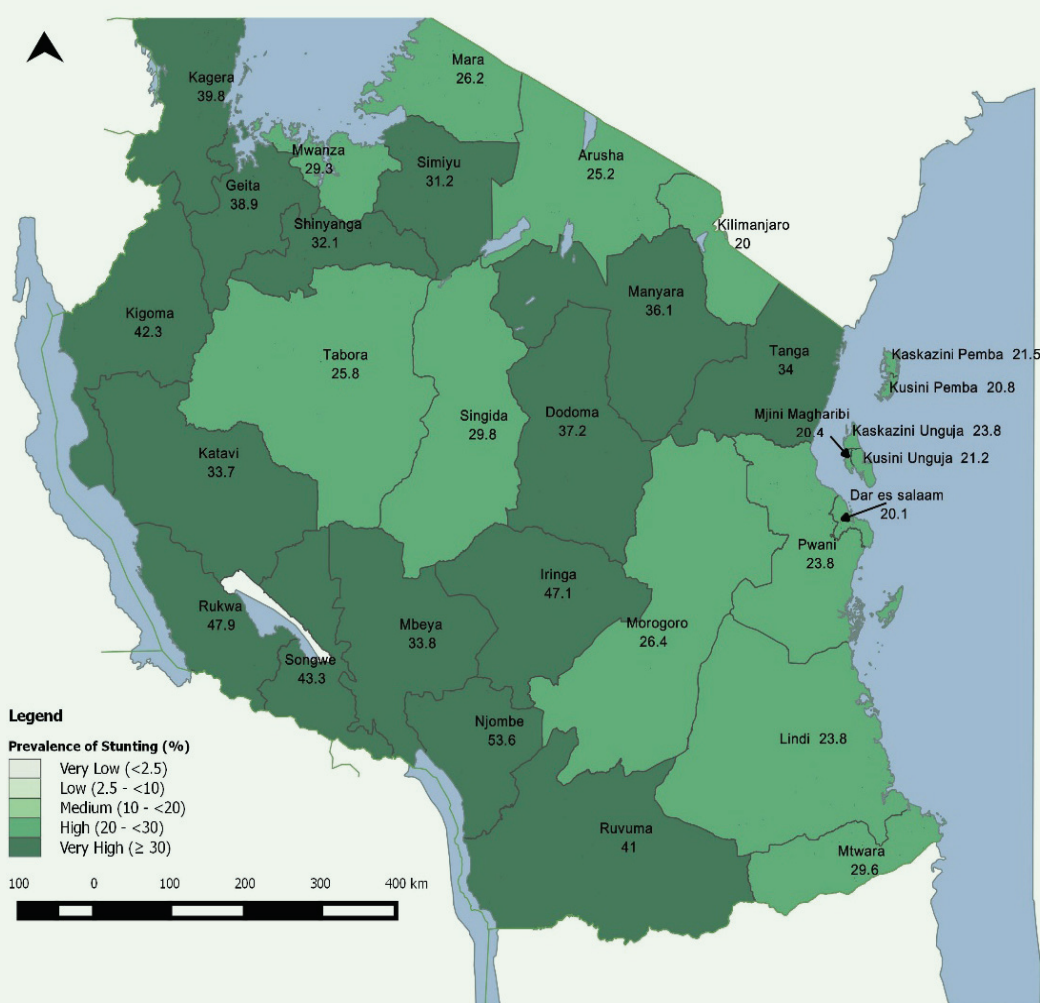


Figure 9: Prevalence of Stunting among children 0 to 59 months of age - 2018 by region

In Tanzania Mainland, based on the new WHO-UNICEF prevalence thresholds [19], the survey results showed a level of stunting considered "very high," exceeding the 30% threshold, in 15 regions out of 26 (Dodoma, Tanga, Ruvuma, Iringa, Mbeya, Rukwa, Kigoma, Shinyanga, Kagera, Manyara, Njombe, Katavi, Simiyu, Geita and Songwe). The most affected regions with a prevalence of stunting exceeding 40% were: Ruvuma (41.0%), Iringa (47.1%), Rukwa (47.9%), Kigoma (42.3%), Njombe (53.6%) and Songwe (43.3%) (Figure 9 and 10).

Stunting - Mainland (Regions 1-13)

TNNS 2014 versus TNNS 2018

Children 0-59 months of age, assessed by WHO 2006 Growth Standards

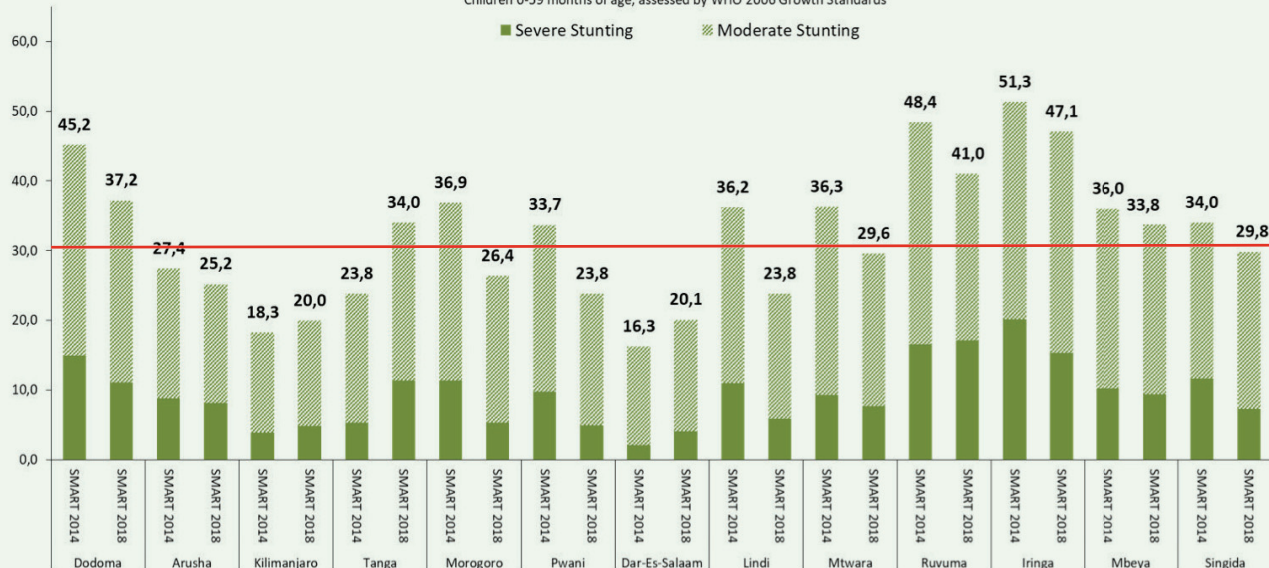


Figure 10: Prevalence of Stunting among children 0 to 59 months of age (WHO Growth Standards 2006) – TNNS 2014 versus TNNS 2018 by region (Tanzania Mainland – Regions 1-13)

However, a significant decrease of the prevalence of stunting was observed in several regions between 2014 and 2018. There was a significant decrease ($p < 0.05$) in Dodoma (from 45.2% to 37.2%), in Morogoro (from 36.9% to 26.4%), in Pwani (from 33.7% to 23.8%), in Lindi (from 36.2% to 23.8%), in Tabora (from 31.8% to 25.8%), in Kagera (from 51.9% to 39.8%), in Mwanza (from 34.2% to 26.2%), and in Katavi (from 43.8% to 33.7%).

In several regions stunting prevalence was higher than in 2014. An increase in the prevalence of stunting was observed in Kilimanjaro (18.3% to 20.0%), in Tanga (23.8% to 34.0%), in Dar es Salaam (16.3% to 20.1%), in Rukwa (47.5% to 47.9%), in Shinyanga (30.0% to 32.1%), in Njombe (51.5% to 53.6%) and in Simiyu (26.1% to 31.2%) (Figure 9 and 10). There was a significant increase ($p < 0.05$) of the prevalence of stunting only for Tanga (from 23.8% to 34.0%).

Stunting - Mainland (Regions 14-26)

TNNS 2014 versus TNNS 2018

Children 0-59 months of age, assessed by WHO 2006 Growth Standards

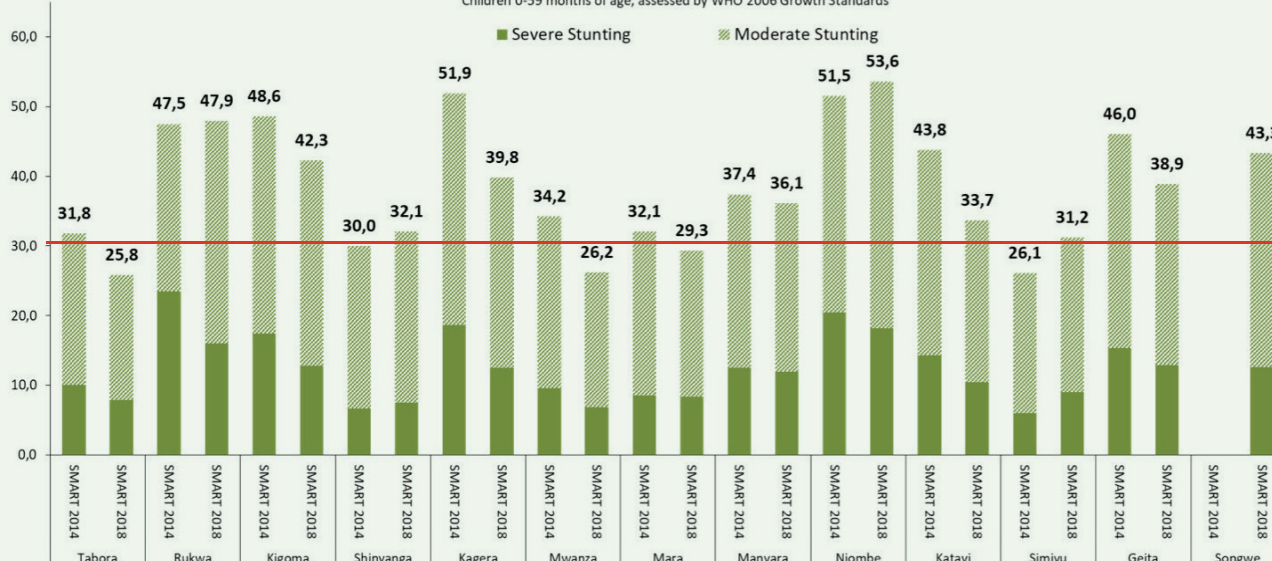


Figure 11: Prevalence of Stunting among children 0 to 59 months of age (WHO Growth Standards 2006) – TNNS 2014 versus TNNS 2018 by region (Tanzania Mainland – Regions 14-26)

For Zanzibar, stunting rates were ranging from 20.4% in Stone Town to 23.8% in Unguja North (Figure 9 and 11). In all 5 regions, prevalence of stunting were lower than in 2014. There was a significant decrease of the prevalence of stunting ($p < 0.05$) in Pemba South (from 28.2% to 20.8%).

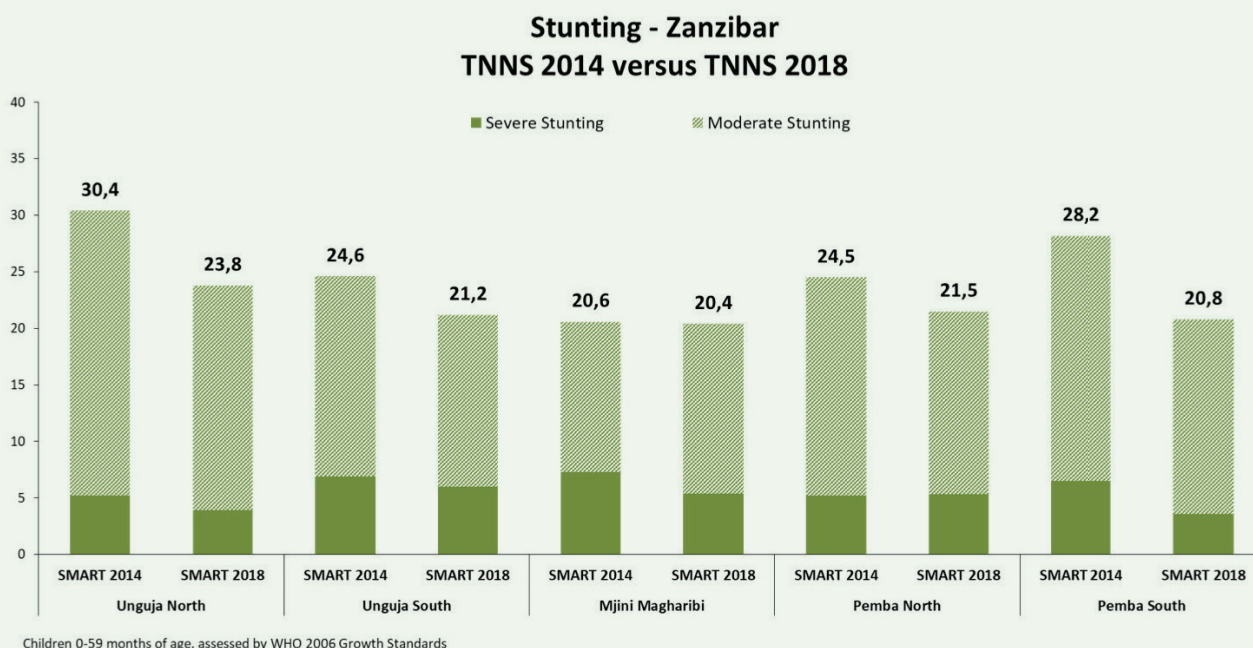


Figure 12: Prevalence of Stunting among children 0 to 59 months of age (WHO Growth Standards 2006) – TNNS 2014 versus TNNS 2018 by region (Zanzibar)

At national level, stunting was identified in 31.8% (30.7-32.9 95% CI) of children 0-59 months of age, which is a “very high” prevalence according to the new UNICEF-WHO classification ($\geq 30\%$). Severe stunting was found in 10.0% of children countrywide. There was a significant decrease of the prevalence of stunting ($p < 0.05$) at national level between 2014 and 2018 (from 34.7% to 31.8%). According to these results, approximately 3 million children under five years of age are stunted in Tanzania.

Acute Malnutrition

Wasting, or acute malnutrition, is a reduction or loss of body weight in relation to height. Addressing wasting is of critical importance because of the heightened risk of disease and death for children who lose too much of their body weight. In 2012, the World Health Assembly Resolution 65.6 endorsed a “Comprehensive implementation plan on maternal infant and young child nutrition”, which specified six global nutrition target for 2025. The sixth target is to reduce and maintain childhood wasting to less than 5% [20].

For Tanzania Mainland, based on the new WHO-UNICEF prevalence thresholds, the survey results showed a level of Global Acute Malnutrition (GAM) considered “very low” ($< 2.5\%$) in 7 regions out of 26: Kilimanjaro (1.5%), Mtwara (1.6%), Lindi (2.3%), Rukwa (2.2%), Mara (1.7%), Njombe (2.1%) and Songwe (2.3%). The prevalence of GAM was exceeding the 5% threshold in one region only, Singida with a GAM prevalence of 5.2%. In all other regions the prevalence of GAM was ranging from 2.7% (Tanga) to 4.9% (Kigoma) which is considered as “low” (2.5-5%) according to the new WHO-UNICEF prevalence thresholds (Figure 13, 14 and 15). Five cases of bilateral edema were identified during data collection.

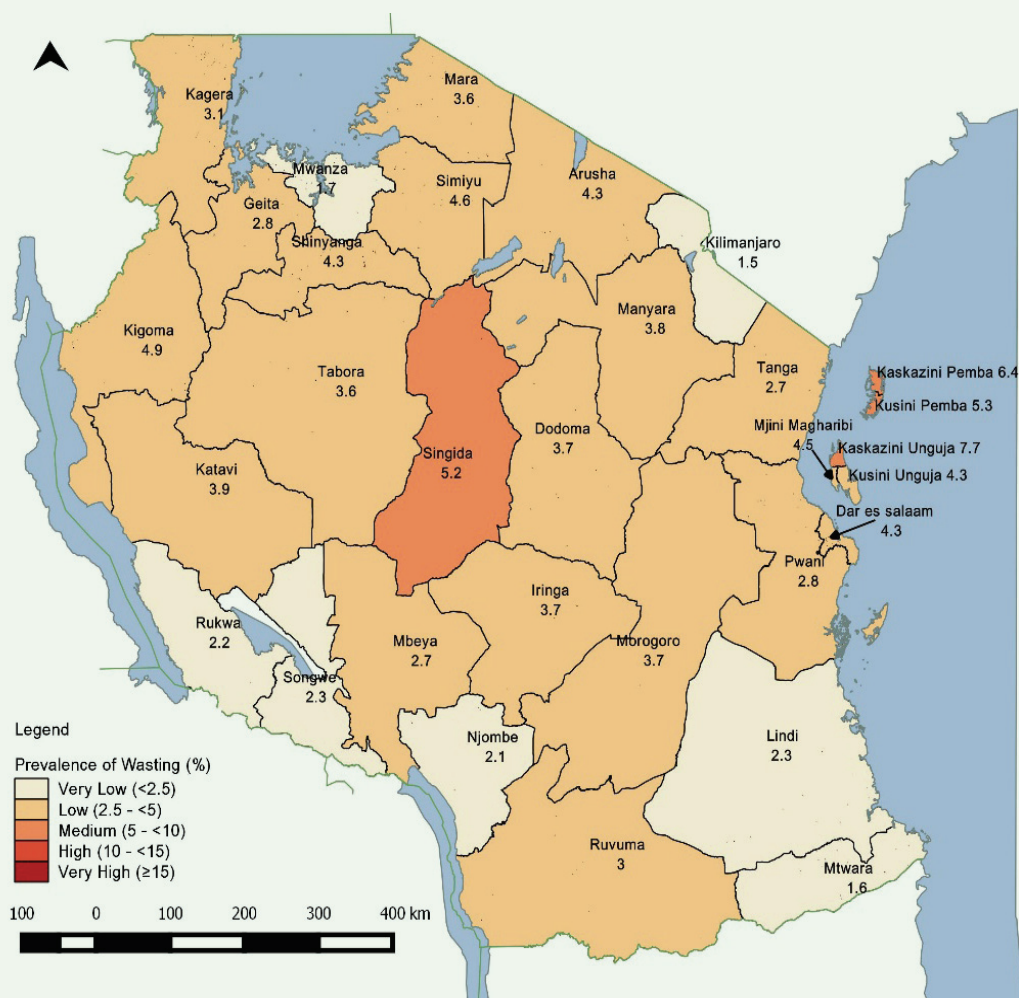


Figure 13: Prevalence of Acute Malnutrition (Global, Moderate and Severe) among children 0 to 59 months of age by region

Acute Malnutrition - Mainland (Regions 1-13) TNNS 2014 versus TNNS 2018

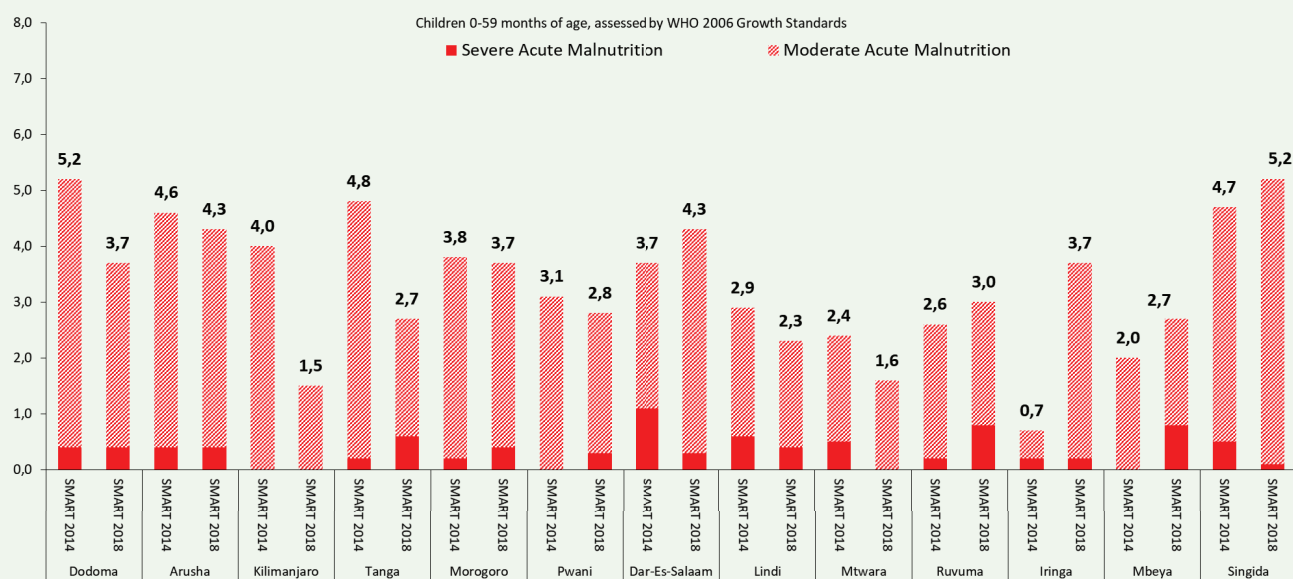


Figure 14: Prevalence of Acute Malnutrition (Global, Moderate and Severe) according to WHO Growth Standards 2006 among children 0 to 59 months of age – TNNS 2014 versus TNNS 2018 by region (Tanzania Mainland – Regions 1-13)

Acute Malnutrition - Mainland (Regions 14-26) TNNS 2014 versus TNNS 2018

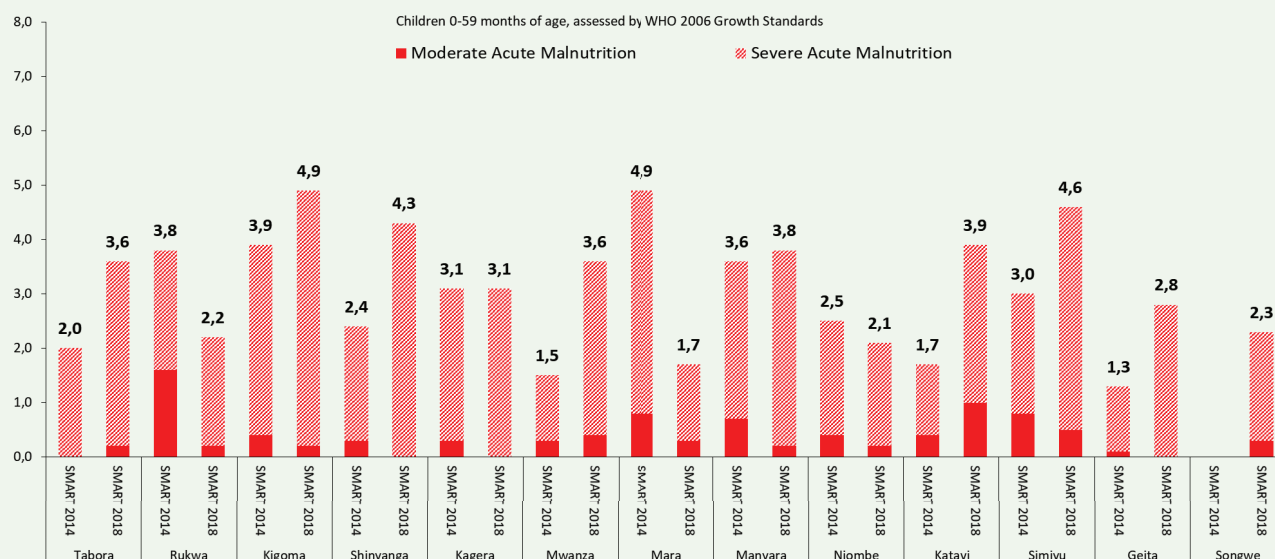


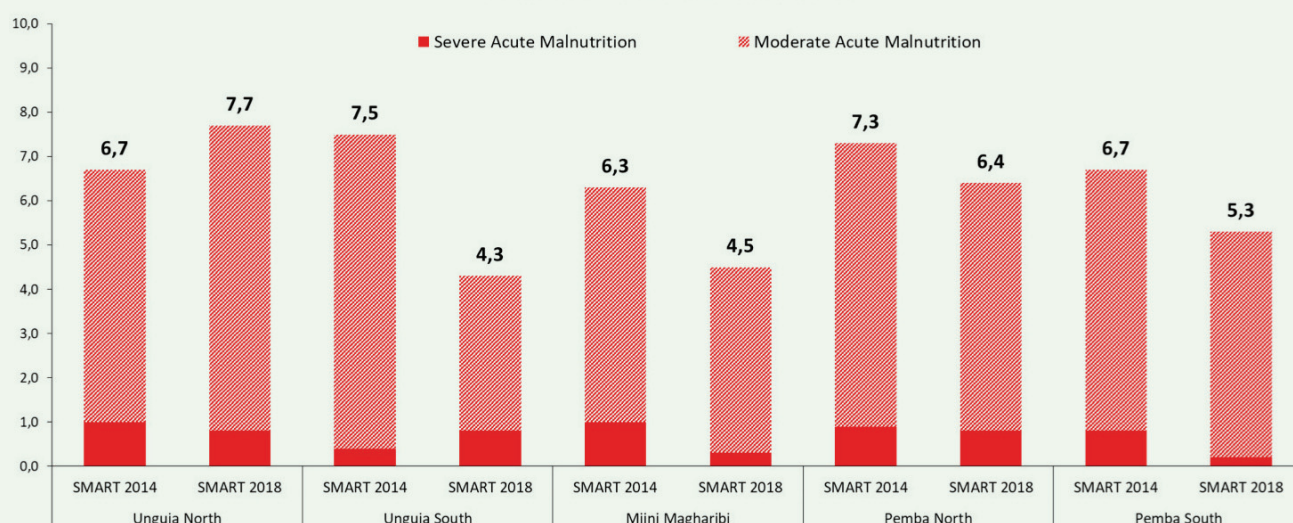
Figure 15: Prevalence of Acute Malnutrition (Global, Moderate and Severe) according to WHO Growth Standards 2006 among children 0 to 59 months of age – TNNS 2014 versus TNNS 2018 by region (Tanzania Mainland – Regions 14-26)

A significant decrease of GAM ($p < 0.05$) was observed in two regions between 2014 and 2018. Those regions were Kilimanjaro (from 4.0% to 1.5%) and Mara (from 4.9% to 1.7%).

Nevertheless, in three regions GAM prevalence is higher than in 2014. An significant increase in the prevalence of GAM ($p < 0.05$) was observed in Iringa (from 0.7% to 3.7%), in Mwanza (from 1.5% to 3.6%) and in Katavi (from 1.7% to 3.9%) (Figure 12 and 13).

For Zanzibar, the prevalence of GAM was ranging from 4.3% in Unguja South to 7.7% in Unguja North (Figure 14). All prevalence of GAM were lower than in TNNS 2014 except in Unguja North where the prevalence increased from 6.7% to 7.7%. The GAM prevalence for Zanzibar decreased from 7.2% in 2014 to 6.1%.

Acute Malnutrition - Zanzibar TNNS 2014 versus TNNS 2018



Children 0-59 months of age, assessed by WHO 2006 Growth Standards

Figure 16: Prevalence of Acute Malnutrition (Global, Moderate and Severe) according to WHO Growth Standards 2006 among children 0 to 59 months of age – TNNS 2014 versus TNNS 2018 by region (Zanzibar)

At national level and according to the new WHO-UNICEF classification, the results of the survey showed a level of Global Acute Malnutrition considered “low” (>2.5%-5%) with 3.5%. The prevalence of GAM was lower than in 2014 (3.8%) and 2015-16 (4.5%).

According to these results, there are approximately 440,000 moderately acute malnourished children and 90,000 severely acute malnourished children in Tanzania in 2018.

Overweight

Overweight and obesity are defined as abnormal or excessive fat accumulation that presents a risk to health. Overweight and obesity are major risk factors for a number of chronic diseases, including diabetes, cardiovascular diseases and cancer. Globally, an estimated 41 million children under the age of 5 years were overweight or obese in 2016. Once considered a high-income country problem, overweight and obesity are now on the rise in low- and middle-income countries, particularly in urban settings. In Africa, the number of overweight children under 5 has increased by nearly 50 per cent since 2000¹³.

The prevalence of overweight in children 0 to 59 months of age was ranging from 0.8% in Pemba North to 5.3% in Mbeya. At national level, the prevalence of overweight was 2.8%, including 0.5% of severe overweight, which was significantly lower than in 2014 (3.5%).

Underweight

Children with low weight-for-age are known as underweight. A child who is underweight may be stunted, wasted, or both.

At national level, the prevalence of underweight among children 0-59 months of 14.6% was significantly higher than in 2014 (13.4%; $p < 0.05$). The prevalence of underweight was higher for Mainland than for Zanzibar with respectively 14.7% and 14.0% (Figure 15).

**Trends of Underweight (National, Mainland and Zanzibar)
TNNS 2014 - TDHS 2015-16 - TNNS 2018**

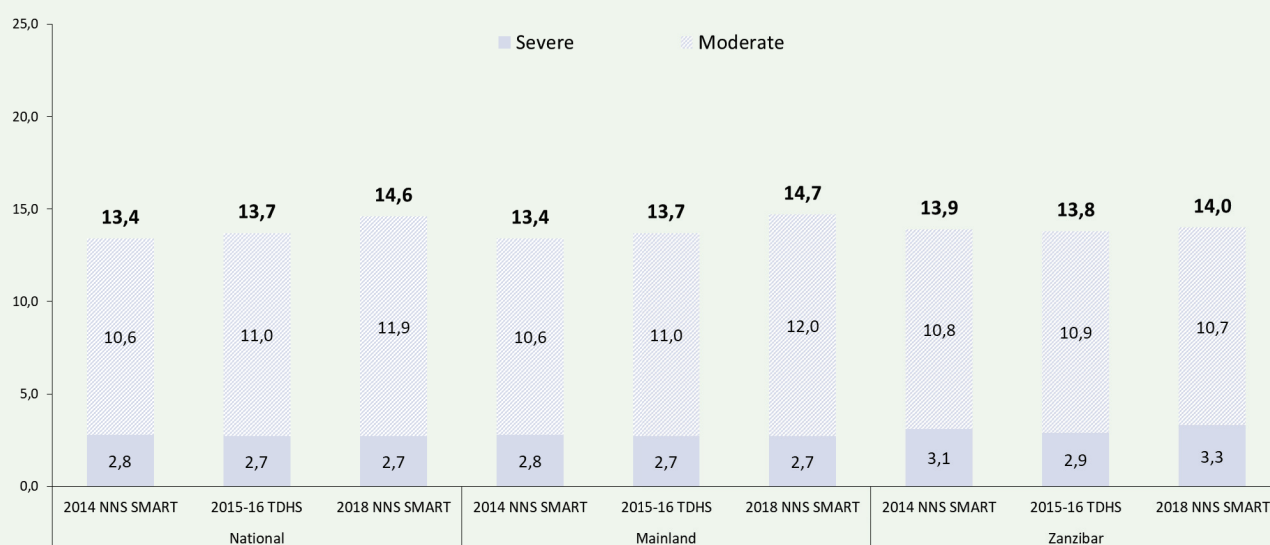


Figure 17: Prevalence of Underweight (Global, Moderate and Severe) according to WHO Growth Standards 2006 among children 0 to 59 months of age – TNNS 2014 versus TNNS 2018 (National, Tanzania Mainland and Zanzibar)

Trends in nutritional status of children for the period 1991-92 to 2018 are shown in Figure 16. All prevalences are coming from the WHO Global Database on Child Growth and Malnutrition where the 2006 WHO Growth Standards were used to calculate prevalence when it was calculated with the NCHS reference.

Figure 16 shows a downward trend in stunting. Stunting declined of more than 10% between 2010 and 2018. Between 2014 and 2018, the prevalence of stunting reduced of 2.9%. The prevalence of GAM decreased from 4.5% in 2015-16 to 3.5% in 2018 which was the GAM prevalence in 2005 at national level.

Underweight dropped from 25.1 % (1991-1992) to 13.4 % (2014) but increased from 13.4 % to 14.6 % between 2014 and 2018.

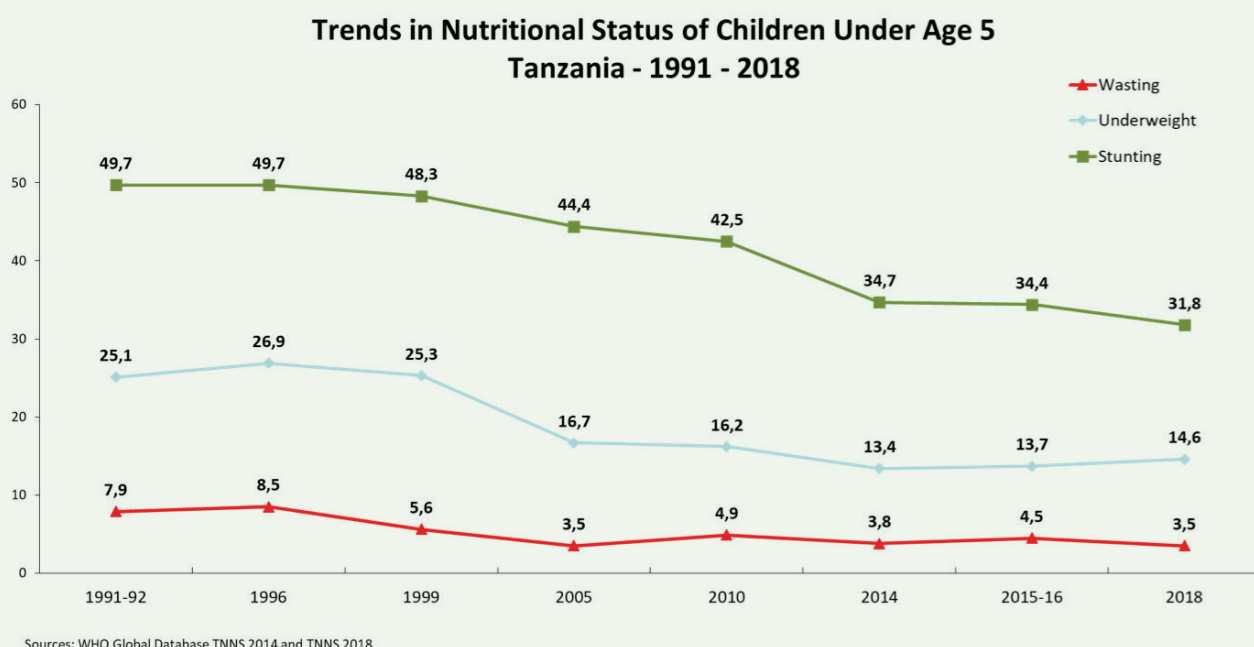


Figure 18: Trends in nutritional status of children under age 5 according to WHO Growth Standards 2006 from 1991 to 2018

Child's size and weight at birth

In 2012, the World Health Assembly endorsed a global low birth weight target to reduce the number of infants born low birth weight by 30 % by 2025. Low birth weight remains a significant public health problem in many developing countries, and poor nutrition both before and during pregnancy is recognized as an important cause. All low birth weight babies have an increased risk of: illness, complications and death, especially in the first days after birth; having low stores of iron and other nutrients and of developing iron and other micronutrient deficiencies; delayed growth and development; and developing obesity and non-communicable diseases later in life, such as diabetes and cardiovascular disease.

Among all births of surveyed children, 2.5 % of infants were reported as very small, 4.0 % smaller than average, and 83.7 % average or larger than average. The percentage of children considered very small or smaller than average was slightly higher in the 2015-16 TDHS with respectively 3 % and 7.2 %.

Weight at birth was available for 80.9 %. Birth weight information was available for a larger percentage of births in the 2018 TNS compared with the 2015-16 TDHS and the 2010 TDHS when birth weights were reported for only 63.5 % and 52.9 % respectively.

Among the infants whose birth weight was reported, 6.3 % weighed less than 2.5 kg at birth. The prevalence of low birth weight was ranging from 3.8 % in Manyara and Mara to 11.0 % in Ruvuma. The highest prevalence of low birth weight were found in Ruvuma, Mtwara (9.8 %), Lindi (9.2 %) and Dar es Salaam (8.8 %). In Zanzibar the percentage of births with a reported birth weight less than 2.5 kg was higher than for Mainland with 8.3 % (from 7.4 % in Pemba North to 8.5 % in Unguja North). Since 2010, the prevalence of low birth weight is between 6-7 %.

Vitamin A Supplementation and Deworming

Vitamin A deficiency greatly increases the risk of death, and is the leading cause of preventable blindness among children. The underlying causes of deficiency are due to low dietary intake and high levels of infections. Young children and pregnant and lactating women are at most risk. WHO recommends that all children aged 6-59 months of age, living in vitamin A-deficient areas, receive a high-dose capsule of vitamin A every 4-6 months, starting at the age of 6 months. Giving a high-dose vitamin A capsule twice a year helps to protect children from vitamin A deficiency.

In Tanzania, 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 in June 2018. 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 63.8% which is lower than in 2014 (72.2%), but better than in 2015-16 (41.2%). About 36.2% of the children did not receive vitamin A supplement, which is alarming. In Zanzibar, the coverage of vitamin A supplementation increased from 58.2% in 2014 to 78.9%. By region, coverage of vitamin A supplementation was below 90% in all regions and was ranging from 30.0% in Katavi to 84.9% in Iringa. The lowest coverage of vitamin A supplementation were noted in Tanga, Rukwa, Shinyanga and Katavi, 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 June 2018. At national level, the proportion of all children aged 12-59 months who had received deworming in the last 6 months was 59.0%. The coverage is directly correlated with Vitamin A coverage which probably happened due to effectiveness of the integrated campaign organized in June 2018 at national level. Coverage of deworming decreased from 70.6% in 2014 to 59.0%. In Zanzibar, coverage of deworming increased from 68.4% in 2014 to 80.7%. By region, coverage of deworming was below 90% in all regions and was ranging from 33.0% in Shinyanga to 85.0% in Pemba North. The lowest coverage of deworming were noted in Tanga, Rukwa, Shinyanga, Tabora, Kigoma, Manyara and Katavi, with less than 50%.

Infant and Young Child Feeding (IYCF) Practices

Following recommended feeding practices for infants and young children can increase their chances of survival. It can also promote optimal growth and development, especially during the critical "window of opportunity" from pregnancy to 2 years of age. Ideally, infants should be breastfed within one hour of birth, breastfed exclusively for the first six months of life and continue to be breastfed up to 2 years of age and beyond. Starting at 6 months, breastfeeding should be combined with safe, age appropriate feeding of solid, semi-solid and soft foods.

Breastfeeding Practices

Improving optimal breastfeeding practices is key to ensuring a child's healthy growth and development. Early initiation and exclusive breastfeeding for six months provides protection against gastrointestinal infections, which can lead to severe nutrient depletion and therefore stunting [21].

The survey findings indicated that 96.6% of children 0-23 months reported to have been ever breastfed. This was significantly lower than the national rate of 98.4% found in 2014 and in 2015-16.

A marked improvement in timely initiation of breastfeeding was observed. The survey revealed that 53.5% of children 0-23 months initiated breastfeeding within 1 hour. This result was very close to the national rate recorded in 2015-16: 51.2% (TDHS 2015-16), and was significantly higher than the rate found in 2014 (50.8%). In Zanzibar, timely initiation of breastfeeding significantly decreased from 61.7% in 2014 to 52.7%.

At national level, almost 58% of infants under six months of age were exclusively breastfed. A significant improvement was noticed from 2014 (41.1%) to 2018. The 2015-16 TDHS shows the proportion of children exclusively breastfed was 59.2% which is very close to the results found in 2018. In Zanzibar, a significant increase of the exclusive breastfeeding rate was noticed: from 19.7% in 2014 to 30.0% in 2018.

Continued breastfeeding in the second year contributes significantly to intake key nutrients that are lacking in low-quality complementary diets in resource poor-settings [22-24]. The survey revealed that 92.2% of children 12-15 months were fed breast milk during the day prior to survey. This result is very close to the national rates recorded in 2014 and in 2015-16, with respectively: 90.0% and 92.1%. Less than 45% of children 20-23 months were still breastfed (43.3%). The proportion of children less than 2 years of age who were fed breast milk the day prior the survey was identical in 2015-16 with 43.4%. There was a slight decrease between 2014 and 2018 (48.2% vs 43.3%).

Complementary feeding practices

After six months, adequate and appropriate infant complementary foods become necessary to complement breastmilk in order to meet the energy and other nutrient requirements of the infant (timely complementary feeding).

At national level, the survey showed that 86.8% of children from 6 to 8 months had a timely introduction of complementary food. TNNS 2014 reported that 89.5% of breastfeeding children aged 6-8 months of age had a timely introduction of complementary food.

At national level, the proportion of children aged 6-23 months who received foods from 4 or more food groups was 35.1%. The survey showed a significant improvement of the minimum dietary diversity for children 6-23 months of age, between 2014 and 2018 (24.5% vs 35.1%). On average, 3 food groups out of 7 were consumed. In Zanzibar, the minimum dietary diversity also improved from 12.1% in 2014 to 18.8% in 2018.

The proportion of children aged 6-23 months who received solid, semi-solid or soft foods the minimum number of times or more was 57.4%. The minimum meal frequency was significantly higher than in 2015-16 (39.9%), but significantly lower than in 2014 (65.7%).

The survey revealed that 30.3% of children 6-23 months received a minimum acceptable diet. A significant improvement was observed for this indicator between 2014 and 2018 (from 20.0% to 30.3%).

Women Nutritional Status

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, according to Body Mass Index (BMI) classification, 7.3% of non-pregnant women 15-49 years of age were considered being in underweight (BMI<18.5); this prevalence was lower than in 2015-16 (9.5%). A prevalence of underweight exceeding 10% was found in Unguja North (14.9%), in Pemba North (12.1%), Manyara (12.9%), Kagera (11.2%) and Singida (10.8%). Prevalence of underweight were higher in age groups 15-19 years and 20-24 years with respectively 14.8% and 7.6%.

Trends in nutritional status of non-pregnant women for the period 1991-92 to 2018 are shown in Figure 17 below. At national level, the prevalence of thinness or underweight was lower than in 2015-16 with 7.3% vs. 9.5%, even if the prevalence of underweight is oscillating between 5 and 10% for several decades now.

In contrast to the prevalence of underweight, 31.7% of women were found to be overweighted or obese. The prevalence of obesity was 11.5%. High levels of obesity were found in Kilimanjaro (20.6%), Dar es Salaam (24.0%), Stone Town (26.0%) and Unguja South (24.6%). In Zanzibar, the prevalence of overweight was 41.8%. Prevalence of obesity among women 15-49 years was increasing with age ranging from 1.9% among women aged 15-19 years to 21.0% among women aged 45-49 years.

As shown in Figure 17, the prevalence of overnutrition (overweight or obese) increased from 11.3% in 1991-92 to 31.7% in 2018. Obesity is a global pandemic with rates at least doubling in more than 70 countries since 1980. A majority of countries now face a double burden: where undernutrition coexists with overnutrition.

Trends Nutritional Status of non pregnant women 15-49 years (BMI) Tanzania - 1991 - 2018

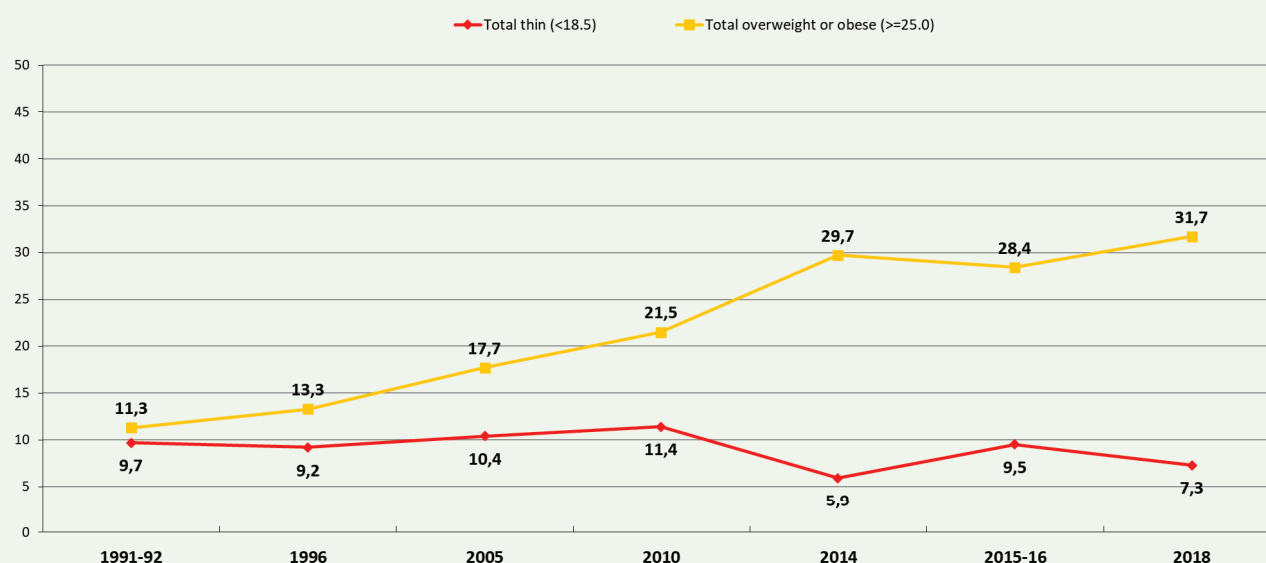


Figure 19: Trends in nutritional status of non-pregnant women according to BMI from 1991 to 2018

At national level, the proportion of pregnant women of reproductive age who were malnourished (MUAC<220 mm) was 1.6%. The highest prevalence of low MUAC were found in Arusha (11.4%), in Mbeya (8.7%) and in Singida (6.7%). By age group, the prevalence of low MUAC was higher among the adolescent girls aged from 15 to 19 years with 3.4% than among older age groups (from 0.0% to 1.9%).

Iron-Folic Acid (IFA) Supplementation

Deficiencies in iron and folic acid during pregnancy can potentially negatively impact the health of the mother, her pregnancy, as well as fetal development. Evidence as shown that the use of iron and folic acid supplements is associated with a reduced risk of iron deficiency and anaemia in pregnant women. According to WHO, a daily oral iron and folic acid supplementation is recommended as part of the antenatal care to reduce the risk of low birth weight, maternal anemia and iron deficiency, as well as neural tube defects in new-born.

At national level, 28.5% of women 15-49 years of age with children under five years of age took an iron-folic acid supplementation during 90 days or longer during pregnancy for past birth, as recommended by WHO. In Zanzibar this rate was much lower than for Mainland with respectively 12.8% and 28.7%. The proportion of pregnant women taking iron-folic acid supplements has increased over time from 3.5% in TDHS 2010 to 17.5% in the TNNS 2014, to 21.4% in the TDHS 2015-16, and further to 28.5% in 2018.

Women Anaemia

Women who are underweight and anemic during pregnancy are more likely to have stunted children, perpetuating the inter-generational transmission of stunting. Iron deficiency anaemia and poor maternal nutrition during pregnancy and breastfeeding may increase the risk of preterm delivery or low birth weight baby and lead to stunted growth of the child.

Anaemia prevalence in women aged 15-49 years decreased in Tanzania when compared to 2015-16. At national level, the prevalence of anaemia significantly decreased from 44.8% in 2015-16 to 28.8% in 2018. In Mainland like in Zanzibar, the decrease between 2015-16 and 2018 was mainly due to the reduction of the prevalence of mild anaemia. In Mainland, prevalence of anaemia was ranging from 13.5% in Kilimanjaro to 38.4% in Mwanza. The highest prevalences were found in Mwanza (38.4%), Simiyu (37.4%), Geita (36.3%) and Mara (35.7%). The lowest prevalences were found in Kilimanjaro (13.5%), Iringa (16.8%), Singida (17.0%) and Songwe (19.1%). In Zanzibar, the prevalence of anaemia was ranging from 37.5% in Stone Town to 49.2% in Pemba South.

Trends Anaemia Categories in Women 15-49 years National, Mainland and Zanzibar - TNS 2014 - TDHS 2015-16-TNS 2018

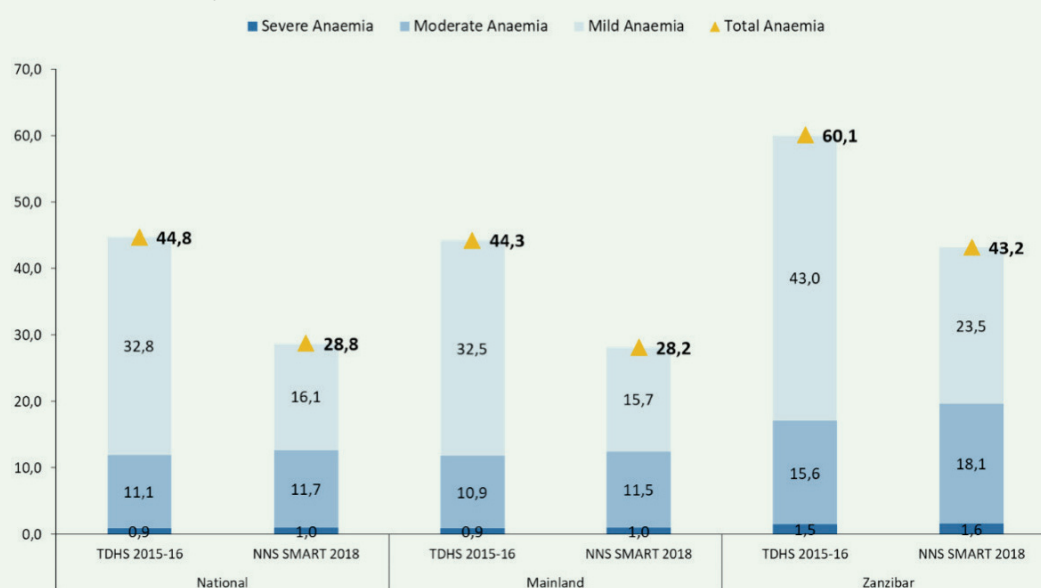


Figure 20: Trends in anaemia in women of reproductive age (15-49 years) – TDHS 2015-16 versus TNS 2018 (National, Tanzania Mainland and Zanzibar)

Salt Adequately Iodized

Iodine deficiency is the commonest cause of preventable mental retardation. Even a mild deficiency reduces the learning potential of children and has a harmful effect on the economy and quality of life of people living in iodine deficient communities [25]. Fortification of salt with iodine is the most common method of preventing iodine deficiency.

Salt was collected for testing in the laboratory from 90.5% of the 8,864 households in the subsample. Between 4.0% (Mbeya) and 20.1% (Unguja North) of the households surveyed had no salt the day of the survey.

The percentage of households with iodized salt was 95.2%, which is close to the percentage found in 2015-16 (96.4%). At national level, the salt was adequately iodized (iodine content ≥ 15 ppm), in only 61.2% of households. There is no significant improvement between 2015-16 and 2018 as the percentage of household with adequately iodized salt was 60.6% in 2015-16. In Zanzibar, the percentage of households with adequately iodized salt is significantly lower than in Mainland, with respectively 39.0% and 61.8%. In Zanzibar, 47.1% of the households had a salt with less than 10 ppm for iodine content. Four regions had a percentage of salt non-iodized above 10%: Dodoma (11.0%), Simiyu (18.9%), Manyara (28.6%) and Singida (34.2%).

Sanitation and Hygiene

To accelerate progress in eliminating stunting, broader efforts are needed that reach beyond the nutrition sector to tackle the underlying determinants of undernutrition. The lack of water, sanitation and hygiene practices - which leads to illnesses and life-threatening diseases like diarrhoea - is thought to cause of up to 50 per cent of all child malnourishment.

Sanitation Facilities

Without toilets and without adequate facilities, there is an elevated risk of bacterial infection. In Tanzania, one in four households (25.0%) used improved toilet facilities. Use of improved non-shared toilet facilities was much higher among households in Zanzibar (59.2%) than in Mainland (24.0%). At national level, approximately 20% of households (20.1% in Mainland and 13.9% in Zanzibar) used a shared toilet facility (improved toilet facility shared with two households or more).

Fifty five percent of households in Tanzania used unimproved toilet facilities or had no toilet facilities at all, which increases the risk of disease transmission. Approximately 56% of households in Mainland used unimproved toilet facilities or had no toilet facilities at all, while only one household out of four (26.9%) in Zanzibar used unimproved toilet facilities or had no toilet at all. Six percent of households in Tanzania had no toilet at all (6.1% - results not presented).

Use of improved non-shared toilet facilities increased from 19.1% in TDHS 2015-16 to 25.0% in 2018. The percent of households using unimproved toilet facilities decreased from 64.5% in TDHS 2015-16 to 55.1% in 2018.

The safe disposal of children's faeces is of particular importance because children's faeces are the most likely cause of faecal contamination to the immediate household environment. At national level, 87.1% of the households were disposing children's faeces safely. This rate was higher than in TDHS 2015-16 where the proportion of households with children under three years old that dispose of faeces safely was 71.9%.

Diarrhoea

Diarrhoea is a leading cause of death among children under five worldwide. Repeat episodes of diarrhoea are increasingly thought to be connected to chronic malnutrition, stunting and death.

At national level, the survey findings indicated that 14.0% of children had diarrhoea (3 or more times loose or watery stools in a day) in the past two weeks preceding the survey; this prevalence was higher than in TDHS 2015-16 (11.8%). The highest rates were in Manyara (27.8%), Arusha (25.2%), Songwe (23.8%) and Kigoma (20.9%) where approximately one child out of four was suffering from diarrhoea.

Use of Soap and 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.

At national level, use of soap was 69.4%. Availability of soap was ranging from 46.1% in Songwe to 86.9% in Njombe. In Zanzibar, use of soap was ranging from 40.5% in Unguja North to 63.6% in Pemba North.

In the TDHS 2015-16, use of soap¹⁴ was lower than in 2018 with 59.2% of households who report having soap.

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 2.7% of the interviewed households members reported having used soap for handwashing at least at two critical times during past 24 hours (including "after defecating") (2.8% in Mainland and 0.6% in Zanzibar). In Mainland, several regions were below 1%: Dar es Salaam, Lindi, Iringa, Mbeya, Singida, Tabora, Shinyanga, Mara, Geita and Songwe. The highest rates were found in Arusha and Ruvuma with respectively 14.0% and 7.8%. In Zanzibar, it was ranging from 0.0% in Unguja South, Stone Town and Pemba South to 3.2% in Pemba North.

Those results were much lower than in 2014 where 11.7% of households were reported having used soap for handwashing at least at two critical times during past 24 hours.

14 DHS: Soap, detergent and other cleaning agent

6. Conclusion and Recommendations

The second National Nutrition Survey conducted in 2018 shows a significant improvement in the prevalence of chronic malnutrition, or stunting, among children under five years in Tanzania. Between 2014 and 2018, stunting, was reduced from 34.7% to 31.8%. The prevalence of stunting is the main malnutrition problem affecting children in Tanzania and the reduction of stunting has been the main objective of the national nutrition policies and programmes during the last years. The results now show that these have been effective. The National Multi-Sectoral Nutrition Action Plan (NMNAP, 2016-2021) among other targets aims to reduce the percentage of stunted children in Tanzania from 34.5% to 28% by 2021; the mid-term target 2018-19 of 32% was met. Despite this progress, it is estimated that approximately 3 million children under five years of age were stunted in 2018. Nutrition interventions should be prioritized in the regions with the highest number of stunted children (>150,000): Dodoma, Dar es Salaam, Kigoma, Kagera, Mwanza, Simiyu and Geita; and in the regions with the highest stunting prevalence ($\geq 40\%$): Njombe, Rukwa, Iringa, Songwe, Ruvuma, Kagera and Kigoma.

The first 1,000 days of life – between a child’s conception and their second birthday – has been proven to be the key opportunity to prevent child stunting, promote child nutrition, growth and development, which will have a lasting effect over the child’s whole life [26]. Chronic and acute malnutrition were found high in the age groups 12-23 months and 24-35 months of age.

The prevalence of global acute malnutrition among children under five years decreased from 3.8% in 2014 to 3.5% in 2018. It is estimated that approximately 530,000 children under five years suffer from acute malnutrition. Among them approximately 90,000 suffer from severe acute malnutrition with high risk of dying if they do not receive appropriate treatment.

The coverage of vitamin A supplementation and deworming was below 90% in all regions of Tanzania, and below 50% in Tanga, Rukwa, Shinyanga, Tabora, Kigoma, Manyara and Katavi.

Regarding the breastfeeding practices some improvements were noticed as compared to the 2014 survey results (timely initiation of breastfeeding and exclusive breastfeeding under 6 months). The survey showed also a significant improvement of the minimum dietary diversity and the minimum acceptable diet. The mid-term target from the NMNAP regarding the minimum acceptable diet was also met with a prevalence of 30% against a target of 25%.

Women who are underweight and anemic during pregnancy are more likely to have stunted children, perpetuating the inter-generational transmission of stunting. Iron deficiency anaemia and poor maternal nutrition during pregnancy and breastfeeding may increase the risk of preterm delivery or low birth weight baby and lead to stunted growth of the child. Survey results showed that it is important to strengthen interventions to improve maternal nutrition and health, beginning with adolescent girls. Among the non-pregnant women 15-49 years of age considered being in underweight (BMI<18.5), the prevalence of underweight was higher in age groups 15-19 years and 20-24 years. The proportion of pregnant women of reproductive age who were malnourished (MUAC<220 mm) was also higher among the adolescent girls aged from 15 to 19 years than among the older women.

An important improvement was noticed regarding the proportion of pregnant women taking iron-folic acid supplements which has increased over time from 3.5% in TDHS 2010 to 28.5% in 2018. Also, the prevalence of anaemia among women of reproductive age significantly decreased from 44.8% in 2015-16 to 28.8% in 2018.

Nevertheless, another form of malnutrition, linked to the economic development, is raising in Tanzania. According to the survey results, 31.7% of women 15-49 years were found to be overweight and 11.5% were obese. In Zanzibar, the prevalence of overweight was exceeding 40%.

Because stunting results from several household, environmental, socioeconomic and cultural factors, reduction of stunting requires that direct nutrition interventions are integrated and implemented in tandem with nutrition-sensitive interventions. For example, prevention of infections requires household practices such

as handwashing with soap.

At national level, use of soap was 69.4% and only 2.7% of the interviewed households members reported having used soap for handwashing at least at two critical times during past 24 hours (including “after defecating”). Fifty five percent of households in Tanzania used unimproved toilet facilities or had no toilet facilities at all, which increases the risk of disease transmission (55.9% in Mainland and 26.9% in Zanzibar). Although it is difficult to compare cross sectional survey data collected during different seasons, there was no reduction in the number of children who had diarrhoea in the current survey compared to the previous DHS. This may be due to poor hygienic practices.

Some general recommendations are provided below. However, it is important to note that these recommendations are preliminary and that the survey findings will be reviewed and analyzed in-depth during the mid-term review of the National Multisectoral Nutrition Action Plan 2016-21 which is taking place in 2019. More in-depth analysis is needed to understand the results and the trends outlined in this survey report.

With regards to stunting, it is highly recommended to target children under 2 years of age and pregnant women in priority regions in terms of high stunting prevalence and burden, through improving infant and young child feeding practices and maternal education towards behavioral and practice changes. It is recommended to:

- Continue promoting appropriate IYCF practices (Early initiation of breastfeeding, exclusive breastfeeding, continued breastfeeding up to 2 years, timely introduction of appropriate and adequate complementary feeding) through nutrition education sessions and using behavior change communication interventions;
- Continue to improve the health and nutrition programmes for promoting, supporting and protecting exclusive breastfeeding for the first six months of life, continued breastfeeding up to two years of age and beyond;
- Scale-up community-based programmes to provide information and counselling on optimal and appropriate breastfeeding and complementary feeding practices;
- Conduct communication campaigns on preventative activities more frequently (prenatal care, nutrition of pregnant women, promotion of exclusive breastfeeding, complementary feeding and continued breastfeeding, good hygienic practices, etc.).

With regards to acute malnutrition, it is recommended to:

- Continue and strengthen the existing nutrition programmes (Community-based Management of Acute Malnutrition (CMAM), screening activities especially at community level) in order to maintain these low levels of acute malnutrition and decrease prevalence of moderate acute malnutrition.

With regards to vitamin A supplementation and deworming, it is recommended to:

- Strengthen integrated child health days (improved planning at district level, strengthening distribution channels of vitamin A and deworming supplies and monitoring and evaluation of child health days;
- Increased social mobilization and community involvement before and during child health days;
- Strengthen integration of vitamin A supplementation into routine health services and health campaigns.

With regards to women of reproductive age and pregnant and lactating women, it is recommended to:

- Review of policies and strategic planning documents that are relevant for the prevention of overweight and obesity;
- Improve adolescent girl and adult women’s knowledge on diet quality (focus on adolescent women and pregnant women food needs and on low birth weight matter).
- Promote the multiple micronutrient supplementation in pregnancy (including iron and folic acid) and a balanced food intake.

Iodine deficiency has adverse effects on both pregnant outcome and child development, and school performance. Tanzania has adopted universal salt iodization as a measure to prevent iodine deficiency disorders among children and adults. Consequently, it is recommended to strengthen action towards universal iodization of salt in all regions, especially in Zanzibar, in regions with a low percentage of use of adequately iodized salt at household level and in the four regions with the highest percentage of salt non-iodized (Dodoma, Simiyu,

Manyara and Singida).

With regards to management of diarrhoea episodes and hygiene it is recommended to:

- Strengthen sensitization about handwashing practices (critical times) and use of soap. Soap eliminates diarrhea-inducing pathogens from the skin;
- Increase awareness about the importance of oral rehydration therapy (ORS or increased fluids) and continuous feeding to treat an episode of diarrhea.

Finally, it is recommended to repeat the National Nutrition Survey every four years, in between Demographic Health Surveys that are carried out every five years, to ensure regular monitoring of the situation of the nutritional status of Tanzanian children, adolescents and women and provide essential information for evidence-based planning and programming for nutrition. The next National Nutrition Survey is planned to be conducted in September - November 2022 following the same methodology as the present investigation.

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Annexes

Annex 1 – TNNS Questionnaire

HOUSEHOLD QUESTIONNAIRE 1 questionnaire per household

THIS QUESTIONNAIRE IS TO BE ADMINISTERED TO THE HEAD OF THE HOUSEHOLD OR, IF HE/SHE IS ABSENT, ANOTHER ADULT MEMBER OF THE HOUSEHOLD.

No	QUESTION	ANSWER CODES
SECTION IDENTIFICATION THIS SECTION IS TO BE COMPLETED IN ALL SELECTED HOUSEHOLDS.		
ID1	Region Name REGNAME	
ID2	Council Name COUNCIL	
ID3	Ward/Shehia Name WARD	
ID4	Village/Street Name VILLAGE	
ID5	Date of interview (dd/mm/yyyy) SURVDAT	Day/Month/Year.... / /
ID6	Team Number TEAM	
ID7	Cluster Number CLUSTER	
ID8	Household Number HH	
ID9	Please take a GPS reading AVOID TAKING IT INSIDE THE HOUSE OR UNDER TREES (TO MAKE IT FASTER) GPS	

No	QUESTION	ANSWER CODES
SECTION Demography: Survey of Household Members		
SA1	Was consent given for conducting the interview? ENSURE THAT YOU HAVE INTRODUCED THE TEAM TO PARTICIPANT AND INFORM THEM ABOUT THE INTERVIEW HHCONST	Yes 1 No 2 Absent 3 IF ANSWER IS 2 or 3 STOP HERE
Note	Please complete the following questions for all household members.	

SA2	Name of household member: PLEASE ENTER ONLY THE FIRST NAME		
	NAME		
SA3	What is the sex of the household member?	Male..... m Female..... f	
	HHMSEX		
SA4	What is the age of the household member (years)?	RECORD THE NUMBER IN YEARS IF KNOWN. IF AGE IS LESS THAN 1 YEAR, RECORD 0. RECORD 97 IF 97 YEARS OR OLDER. RECORD 98 IF UNKNOWN.	years
	HHMAGE		
SECTION SALT: Adequately Iodized Salt			
SA5	We would like to check whether the salt used in your household is adequately iodized. May I have a sample of the salt used to cook meals in your household? ASK FOR A FULL TABLESPOON OF SALT. PLACE SALT IN THE PLASTIC TUBE. PUT THE SAMPLE ID LABEL ON THE RESPONDENT'S PLASTIC TUBE OF SALT AND MARK THE SAME SAMPLE ID IN THE SALT SAMPLES TRANSMITTAL FORM.	Salt collected 1 No salt 2	
	SALT		
SECTION WASH: Handwashing Practices			
WS1	Please show me the soap you have in the household. ONLY ASK FOR THE AVAILABILITY OF SOAP, NOT OTHER CLEANING AGENTS LIKE DETERGENTS, ASH OR SAND. SELECT ONE.	Presented within one minute 1 Presented in more than one minute 2 No soap 3	 IF ANSWER IS 3 GO TO WS4
	SOAP		
WS2	Have you used soap today or yesterday?	Yes 1 No 2 Don't know 8	 IF ANSWER IS 2 or 8 GO TO WS4
	YESTSOAP		
WS3	When you used soap today or yesterday, what did you use it for IF FOR WASHING MY OR MY CHILDREN'S HANDS IS MENTIONED, PROBE WHAT WAS THE OCCASION, BUT DO NOT READ THE SPECIFIC ANSWERS. ASK TO BE SPECIFIC, ENCOURAGE "WHAT ELSE" UNTIL NOTHING FURTHER IS MENTIONED AND CHECK ALL THAT APPLY.	Washing clothes 01 Washing cooking pots or dishes 02 Washing my body 03 Washing my children 04 Washing child's bottoms 05 Washing my children's hands 06 Washing hands after defecating 07 Washing hands after cleaning child 08 Washing hands before feeding child 09 Washing hands before preparing food 10 Washing hands before eating 11 Other 12	
	CLOTHES/POTS/BODY/CHILDWS/CHILD-BOT/ HANDCHIL/HANDDEF/HANDCLEA/ HANDFEED/HANDFOOD/HANDEAT/ HANDOT		

SECTION WASH: Sanitation facilities			
WS4	What kind of toilet facility does this household use? DO NOT READ THE ANSWERS. SELECT ONE ONLY	Flush to piped sewer system01 Flush to septic system02 Pour-flush to pit.....03 VIP/simple pit latrine with floor/slab04 Composting/dry latrine05 Flush or pour-flush elsewhere06 Pit latrine without pour-flush/slab07 Service or bucket latrine08 Hanging toilet/latrine09 No facility, field, bush, plastic bag, lake, ocean10	 IF ANSWER IS 10 GO TO WS6
WS5	How many households share this toilet? THIS INCLUDE THE SURVEYED HOUSEHOLD	RECORD NUMBER OF HOUSEHOLDS IF KNOWN (RECORD 96 IF PUBLIC TOILET OR 98 IF UNKNOWN)	 Households
WS6	Do you have children under three years old ? CHILD	Yes 1 No2	 IF ANSWER IS 2 STOP HERE
WS7	The last time [NAME OF YOUNGEST CHILD] passed stools, what was done to dispose of the stools? DO NOT READ THE ANSWERS. SELECT ONE ONLY	Child used toilet/latrine01 Put/rinsed into toilet or latrine02 Buried03 Thrown into garbage.....04 Put/rinsed into drain or ditch.....05 Left in the open06 Other96 Don't know98	
Interviewer: I confirm that questionnaire is complete: yes/no			
Supervisor: I confirm that questionnaire is complete.: yes/no			
MESSAGE TO INTERVIEWER: DO NOT ANSWER THIS QUESTION.			

CHILDREN 0-59 ANTHROPOMETRY, HEALTH & IYCF
1 questionnaire per child 0-59 months

THIS QUESTIONNAIRE IS TO BE ADMINISTERED TO ALL CHILDREN BETWEEN 0-59 MONTHS OF AGE

No	QUESTION	ANSWER CODES
SECTION IDENTIFICATION THIS SECTION IS TO BE COMPLETED IN ALL SELECTED HOUSEHOLDS.		
ID1	Region Name REGNAME	
ID2	Council Name COUNCIL	
ID3	Ward/Shehia Name WARD	
ID4	Village/Street Name VILLAGE	
ID5	Date of interview (dd/mm/yyyy) SURVDAT	Day/Month/Year... / /
ID6	Team Number TEAM	
ID7	Cluster Number CLUSTER	
ID8	Household Number HH	

No	QUESTION	ANSWER CODES
SECTION CHILD1: Details of the Child 0-59 months THIS SECTION IS TO BE ADMINISTERED TO ALL CHILDREN IN THE SELECTED HOUSEHOLDS BETWEEN 0-59 MONTHS		
Note	THESE QUESTIONS NEED TO BE ASKED TO THE MOTHER OR THE MAIN CAREGIVER.	
CH1	Was consent given for conducting the interview and the measurements? ENSURE THAT YOU HAVE INTRODUCED THE TEAM TO PARTICIPANT AND INFORM THEM ABOUT THE INTERVIEW AND THE MEASUREMENTS CHCONST	Yes 1 No 2 IF ANSWER IS 2 STOP HERE

CH2	ID Number		
	ID		
CH3	Name of the child		
	ONLY WRITE FIRST NAME		
	CHNAME		
CH4	Sex of [NAME OF CHILD]?	Male..... m Female..... f	
	CHSEX		
CH5	Do you have an official age documentation for [NAME OF CHILD]? (RCH card, Birth certificate, Passport or other relevant documentation)	Yes 1 No 2	 IF ANSWER IS 2 GO TO CH7
	XDOBK		
CH6	[NAME OF CHILD]'s date of birth	Day/Month/Year..... / /	
	THE EXACT BIRTH DATE SHOULD ONLY BE TAKEN FROM AN AGE DOCUMENTATION SHOWING DAY, MONTH AND YEAR OF BIRTH.		
	BIRTHDAT		
CH7	Age of [NAME OF CHILD] in months	SINCE NO AGE DOCUMENTATION IS AVAILABLE, ESTIMATE AGE USING A LOCAL EVENTS CALENDAR.	months
	MONTHS		
Note	Verify that the child is \${MONTHS} months old. Remember, if they are older than 59 months; they are not eligible for inclusion and you should stop here.		
SECTION CHILD2: Nutrition and Health Status of the Child 0-59 months THIS SECTION IS TO BE ADMINISTERED TO ALL CHILDREN BETWEEN 0 AND 59 MONTHS OF AGE.			
CH8	Is [NAME OF CHILD] currently present in the household?	Yes 1 No 2	 IF ANSWER IS 2 GO TO CH15
	CHPRES		
CH9	[NAME OF CHILD]'s weight in kilograms (±0.1kg)		. kg
	DON'T FORGET THE DECIMAL		
	Lower limit=1.0kg Upper limit=31.0kg		
	WEIGHT		
CH10	Was [NAME OF CHILD] dressed during weight measurement?	Yes y No n	
	CLOTHES		

CH11	[NAME OF CHILD]'s length/height in cm (± 0.1 cm) DON'T FORGET THE DECIMAL Lower limit=40.0cm Upper limit=124.0cm HEIGHT		cm
CH12	Was [NAME OF CHILD] measured lying down or standing up? MEASURE	Child lying downl Child standing uph	
CH13	Clinical examination: Does [NAME OF CHILD] present bilateral pitting oedema? EDEMA	Yesy Non	
CH14	[NAME OF CHILD]'s middle upper arm circumference (MUAC) in mm (± 1 mm) MEASURE LEFT ARM. Lower limit=70mm Upper limit=235mm MUAC		mm
CH15	When [NAME OF CHILD] was born, was [NAME OF CHILD] very large, larger than average, average, smaller than average, or very small? AVWEIGHT	Very large1 Larger than average2 Average3 Smaller than average4 Very small5 Don't know8	
CH16	Was [NAME OF CHILD] weighed at birth? BIWEIGHT	Yes1 No2 Don't know8	IF ANSWER IS 2 or 8 GO TO CH19
CH17	How much did [NAME OF CHILD] weigh in kg (± 10 g)? KIWEIGHT	RECORD 8.880 IF UNKNOWN.	kg IF ANSWER IS 8.880 CHOOSE "NOT APPLICABLE" TO THE NEXT QUESTION (CH18)
CH18	Was this weight recorded from a health card or from mother's recall? REWEIGHT	Health card1 Recall2 Not applicable3	

CH19	Has [NAME OF CHILD] received a vitamin A capsule in the past 6 months? CHECK VACCINATION/HEALTH CARD AND SHOW VITAMIN A CAPSULE. VITA	Yes, card 1 Yes, recall..... 2 No or don't know 3	☐
CH20	Was [NAME OF CHILD] given any drug for intestinal worms in the last six months? CHECK VACCINATION/HEALTH CARD AND SHOW MEBENDAZOLE TABLET. DEWORM	Yes, card 1 Yes, recall..... 2 No or don't know 3	☐
CH21	Has [NAME OF CHILD] had diarrhoea in the past 2 weeks? CASE DEFINITION: THREE OR MORE LOOSE OR LIQUID STOOLS DURING 24 HOURS DIAR	Yes 1 No 2 Don't know 8	☐

SECTION IYCF1: Breastfeeding Status for the Child 0-23 months (part 1)

THIS SECTION IS TO BE ADMINISTERED TO THE MOTHER OR THE MAIN CAREGIVER WHO IS RESPONSIBLE FOR FEEDING THE CHILD AND THE CHILD SHOULD BE BETWEEN 0 AND 23 MONTHS OF AGE.

Note	THESE QUESTIONS NEED TO BE ASKED TO THE MOTHER OR THE MAIN CAREGIVER WHO IS RESPONSIBLE FOR FEEDING THE CHILD.		
IF1	Has [NAME OF CHILD] ever been breastfed? EVERBF	Yes 1 No 2 Don't know 8	☐ IF ANSWER IS 2 or 8 GOTO IF4
IF2	How long after birth did you first put [NAME OF CHILD] to the breast? INITBF	Less than one hour 1 Between 1 and 23 hours 2 More than 24 hours 3 Don't know 8	☐
IF3	Was [NAME OF CHILD] breastfed yesterday during the day and at night? YESTBF	Yes 1 No 2 Don't know 8	☐

SECTION IYCF2: Breastfeeding Status of the Child 0-23 months (part 2)

THIS SECTION IS TO BE ADMINISTERED TO THE MOTHER OR THE MAIN CAREGIVER WHO IS RESPONSIBLE FOR FEEDING THE CHILD AND THE CHILD SHOULD BE BETWEEN 0 AND 23 MONTHS OF AGE.

IF4	Now I would like to ask you about liquids that [NAME OF CHILD] 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? ASK ABOUT EVERY LIQUID. EVERY QUESTION MUST HAVE AN ANSWER. IF ITEM WAS GIVEN, SELECT 'YES'. IF ITEM WAS NOT GIVEN, SELECT 'NO'. IF CAREGIVER DOES NOT KNOW, SELECT 'DON'T KNOW'. Yes No DK
------------	---

	4A. Plain water	4A.....1	2	8
	WATER			
	4B. Infant formula, for example Infa-care, lactogen, NAN, SMA, S-26	4B.....1	2	8
	INFORM			
	4C. Milk such as tinned, powdered, or fresh animal milk, for example Nido, Cowbell, Tanga Fresh, Al-mudhish, first choice	4C.....1	2	8
	MILK			
	4D. Juice or juice drinks, for example Ceres, Azam, Mo juice	4D.....1	2	8
	JUICE			
	4E. Clear broth (water-based without food ingredient and boiled)	4E.....1	2	8
	BROTH			
	4F. Sour milk or yogurt, for example Asas, Tanga Fresh, Serengeti, Dar Fresh, Mara Milk	4F.....1	2	8
	YOGURT			
	4G. <u>Thin</u> porridge, for example made with maize, sorghum, millet, cassava or finger millet	4G.....1	2	8
	THINPOR			
	4H. Tea or coffee with milk	4H.....1	2	8
	WHTACOF			
	4I. Any other water-based liquids, for example sodas such as Azam Cola, Pepsi, Twist, Coca cola , other sweet drinks, herbal infusion, gripe water, clear tea with no milk, black coffee , ritual fluids (togwa)	4I.....1	2	8
	WATLQD			
IF5	Yesterday, during the day or at night, did [NAME] eat solid or semi-solid (soft, mushy) food?	Yes.....1 No..... 2 Don't know..... 8		☐
	FOOD			

SECTION IYCF3: Complementary Feeding Status for the Child 6-23 months

THIS SECTION IS TO BE ADMINISTERED TO THE MOTHER OR THE MAIN CAREGIVER WHO IS RESPONSIBLE FOR FEEDING THE CHILD AND THE CHILD SHOULD BE BETWEEN 6 AND 23 MONTHS OF AGE.

IF6	Now I would like to ask you about some particular foods [NAME OF CHILD] may eat. 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] consume any of the following? ASK ABOUT EVERY ITEM. EVERY QUESTION MUST HAVE AN ANSWER. IF ITEM WAS GIVEN, SELECT 'YES'. IF ITEM WAS NOT GIVEN, SELECT 'NO'. IF CAREGIVER DOES NOT KNOW, SELECT 'DON'T KNOW'. Yes No DK		
6A. Porridge, staff porridge, bread, rice, noodles, sweet potatoes and irish potatoes, white yams, cassava, millet, sorghum, pastries, cakes, biscuits, plantains CRL	6A.....	1	2 8
6B. Beans, peas, lentils, peanuts, cashew nuts, pumpkin seeds, soy, sesame, green grams, Bambara nuts, groundnuts, pigeon peas LEGNUT	6B.....	1	2 8
6C. Dairy products: milk, yogurt, cheese DAIRYFD	6C.....	1	2 8
6D. 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 FLESHFD	6D.....	1	2 8
6E. Eggs EGGS	6E.....	1	2 8
6F. 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 VITAFRUIT	6F.....	1	2 8
6G. Any other fruits and vegetables OTHFRUIT	6G.....	1	2 8
IF7 How many times did [NAME] eat solid, semi-solid, or soft foods other than liquids yesterday during the day or at night? FDTIMES	Number of times..... Don't know 98		_ _
Interviewer: I confirm that questionnaire is complete: yes/no			
Supervisor: I confirm that questionnaire is complete.: yes/no MESSAGE TO INTERVIEWER: DO NOT ANSWER THIS QUESTION.			

WOMEN ANTHROPOMETRY & HEALTH
1 questionnaire per woman 15-49 years

THIS QUESTIONNAIRE IS TO BE ADMINISTERED TO ALL ELIGIBLE WOMEN AGED BETWEEN 15 AND 49 YEARS IN THE SELECTED HOUSEHOLD.

No	QUESTION	ANSWER CODES
SECTION IDENTIFICATION THIS SECTION IS TO BE COMPLETED IN ALL SELECTED HOUSEHOLDS.		
ID1	Region Name REGNAME	
ID2	Council Name COUNCIL	
ID3	Ward/Shehia Name WARD	
ID4	Village/Street Name VILLAGE	
ID5	Date of interview (dd/mm/yyyy) SURVDAT	Day/Month/Year: / /
ID6	Team Number TEAM	
ID7	Cluster Number CLUSTER	
ID8	Household Number HH	

No	QUESTION	ANSWER CODES
SECTION WM1: Details of the Woman 15-49 years THIS SECTION IS TO BE ADMINISTERED TO ALL ELIGIBLE WOMEN AGED BETWEEN 15 AND 49 YEARS IN THE SELECTED HOUSEHOLDS.		
Note	THESE QUESTIONS NEED TO BE ASKED TO EACH ELIGIBLE WOMAN	
WM1	Was consent given for conducting the interview and the measurements? ENSURE THAT YOU HAVE INTRODUCED THE TEAM TO PARTICIPANTS AND INFORM THEM ABOUT THE INTERVIEW AND THE MEASUREMENTS WMCONST	Yes 1 No 2 Absent 3 IF ANSWER IS 2 or 3 STOP HERE

WM2	ID Number		
	WMID		
WM3	Name of the woman		
	ONLY WRITE FIRST NAME		
	WMNAME		
WM4	Age of [NAME OF WOMAN] in years	RECORD THE NUMBER IN YEARS BASED ON AN OFFICIAL AGE DOCUMENTATION IF AVAILABLE. RECORD 98 IF UNKNOWN.	years
	Lower limit=15 years Upper limit=49 years		
	WMAGE		
WM5	Are you pregnant?	Yes1 No2 Don't know8	
	PREGNANT		
WM6	Are you currently breastfeeding?	Yes1 No2 Don't know8	
	LACTAT		
WM7	Do you have a child under age 5?	Yes1 No2 Don't know8	 IF ANSWER IS 2 OR 8 GO TO WM10
	WMCHILD		
WM8	During your last pregnancy, were you given or did you buy any iron syrup/iron or iron/folate tablets?	Yes1 No2 Don't know8	 IF ANSWER IS 2 OR 8 GO TO WM10
	WMIFA		
WM9	During the whole pregnancy, for how many days did you take iron syrup/iron or iron/folate tablets?	Number of days Don't know	 998
	WMIFADAY		

SECTION WM2: Anthropometry and Anaemia of the woman 15-49 years

THIS SECTION IS TO BE ADMINISTERED TO ALL ELIGIBLE NON-PREGNANT WOMEN AGED BETWEEN 15 AND 49 YEARS IN THE SELECTED HOUSEHOLDS. QUESTION WM13 WILL ONLY BE FOR PREGNANT WOMEN.

WM10	[NAME OF WOMAN]'s weight in kg (± 0.1 kg) DON'T FORGET THE DECIMAL Lower limit=35.0kg Upper limit=150.0kg WMWEIGHT		_ _ _ . _ kg
WM11	[NAME OF WOMAN]'s height in cm (± 0.1 cm) DON'T FORGET THE DECIMAL Lower limit=130.0cm Upper limit=200.0cm WMHEIGHT		_ _ _ . _ cm
WM12	[NAME OF WOMAN]'s haemo- globin in g/dL (± 0.1 g/dL) DON'T FORGET THE DECIMAL. Lower limit=2.0g/dL Upper limit=22.0g/dL WMHB		_ _ . _ g/dL
WM13	[NAME OF WOMAN]'s MUAC in mm (± 1 mm) MEASURE LEFT ARM. PREG- NANT WOMEN ONLY Lower limit=160 mm Upper limit=500 mm WMMUAC		_ _ _ mm
	Interviewer: I confirm that questionnaire is complete: yes/no		
	Supervisor: I confirm that questionnaire is complete.: yes/no MESSAGE TO INTERVIEWER: DO NOT ANSWER THIS QUESTION.		

Annex 2 – Persons Involved in the Tanzania 2018 National Nutrition Survey

Principal Investigators

Dr. Vincent Didas Assey – Acting Managing Director - TFNC
Dr. Angyelile Kapologwe – Director of Health, Social Welfare and Nutrition Services – PORALG
Dr. Fadhil Mohammed Abdalla – Director of Preventive Services and Health Promotion – MoH Zanzibar

Technical Committee Members

Adam Hancy – TFNC
Maria Ngilisho – TFNC
Peter Kaswahili – MoHCDGEC
Asha Hassan Salmin – MoH Zanzibar
Sabiha Khalfan Said – MoH Zanzibar
Khamis Msham – OCGS
Mlemba Abassy Kamwe – NBS
Stephen Kibusi – UDOM
Shabbir Lalji – IMA
Giulia Segafredo – Doctors with Africa CUAMM
Bernard Makene – Nutrition International
Ramadhani Mwiru – UNICEF

SMART Survey Consultant

Fanny Cassard – UNICEF

Trainers

Fanny Cassard – UNICEF
Adam Hancy – TFNC
Maria Ngilisho – TFNC
Giulia Segafredo – CUAMM
Lydia Ndungu – ACF-Canada

Supervisors

Samson Ndimanga – TFNC (Kagera/Kigoma)
Julius Edward Ntwanya – UDOM (Katavi/Rukwa)
Medina Wandella – TFNC (Mwanza/Geita)
Leonard Katalambula – UDOM (Simiyu/Mara)
Mariam Athuman Mwita – RNuO Dodoma (Mbeya/Songwe/Dar es Salaam)
Maria Ngilisho – TFNC (Mbeya/Songwe/Dar es Salaam)
Julieth Itatiro – TFNC (Manyara/Arusha)
Jeremiah Mwambange – PO-RALG (Iringa/Singida)
Jehovaness John Mollel – RNuO Pwani (Morogoro/Pwani)
Napendaeli Philemon – DNuO Kagera (Lindi/Mtwara)
Emma V. Kilimali – DNuO Mwanza (Tanga/Kilimanjaro)
Elina Kweka – DNuO Morogoro (Ruvuma/Njombe)
Deborah Charwe – TFNC (Shinyanga/Tabora)
Asha Hassan – MoH Zanzibar (Unguja)
Abdul-Malik Bakar Ali – OCGS (Unguja)
Fatma Ally Said – MoH Zanzibar (Pemba)

Team 1 – Dar es Salaam/Mbeya/Songwe

Team Leader	Nzowa Felick K
Measurer	Chomo Daniel
Assistant Measurer	Angela Jessela

Team 2 – Dar es Salaam/Mbeya and Songwe

Team Leader	Kabinga Amina
Measurer	Ramadhani Juma
Assistant Measurer	Kibakwa Dorice

Team 3 – Dar es Salaam/Mbeya/Songwe

Team Leader	Luoga Alphonse
Measurer	Michael Magnus
Assistant Measurer	Milka Maduhu

Team 4 – Kagera/Kigoma

Team Leader	Abdallah Sulaith
Measurer	Irene France
Assistant Measurer	Ally Mvano Ramadhani

Team 5 – Kagera/Kigoma

Team Leader	Zilabela Yamungu
Measurer	William Wilbroad
Assistant Measurer	Paschal Victor

Team 6 – Katavi/Rukwa

Team Leader	Joseph Elisha
Measurer	Jackline Lugongo
Assistant Measurer	Godwin Mwanga

Team 7 – Katavi/Rukwa

Team Leader	Sinda Laurent
Measurer	Siame Shukrani
Assistant Measurer	Lunyungu Judith

Team 8 – Mwanza/Geita

Team Leader	Mariana Ndetewale
Measurer	Baraka Mashauri
Assistant Measurer	Sarwatt Stella

Team 9 – Mwanza/Geita

Team Leader	Shija Machibya John
Measurer	Paschal Balomi Elias
Assistant Measurer	Shelembe Masalu Kelvin

Team 10 – Simiyu/Mara

Team Leader	Kisute Melckizedeck
Measurer	Eliya Otieno William
Assistant Measurer	Veronica Galiyaya

Team 11 – Simiyu/Mara

Team Leader	Marwa Muhere
Measurer	Kanisio Shija
Assistant Measurer	Senteuh Nyamtacho

Team 12 – Shinyanga/Tabora

Team Leader	Rubavu Pius
Measurer	Machiya Shija
Assistant Measurer	Elisifa Godson

Team 13 – Shinyanga/Tabora

Team Leader	Raphael Rhoda
Measurer	Joseph Shilole
Assistant Measurer	Kapinga Tabitha

Team 14 – Dar es Salaam/Mbeya/Songwe

Team Leader	Amulike Esther
Measurer	Owin Njawike
Assistant Measurer	Buja Emanuel

Team 15 – Dar es Salaam/Mbeya and Songwe

Team Leader	Pius Anjera
Measurer	William Shukrani
Assistant Measurer	Selemani Ally

Team 16 – Iringa/Singida

Team Leader	Elina Ngewe
Measurer	Mugongo Festo Thomas
Assistant Measurer	Tabia John Longo

Team 17 – Iringa/Singida

Team Leader	Subira Charles Wailes
Measurer	Rehema Rajabu
Assistant Measurer	Solo Sayi

Team 18 – Njombe/Ruvuma

Team Leader	Doroth Mtweve
Measurer	Malima Yoram Penina
Assistant Measurer	Steward Mligo

Team 19 – Njombe/Ruvuma

Team Leader	Lunyungu Julieth
Measurer	Mwashipindi Lemson Sikujua
Assistant Measurer	Muyaso Charles

Team 20 – Manyara/Arusha

Team Leader	Paul William
Measurer	Lucia Dismas Ackley
Assistant Measurer	Ally Seif H

Team 21 – Manyara/Arusha

Team Leader	Aneth Stewart
Measurer	Fahad Mahmud
Assistant Measurer	Kahulu Sylvester Godfred

Team 22 – Kilimanjaro/Tanga

Team Leader	Frank Ambroce Massawe
Measurer	Fadhil Shafii
Assistant Measurer	Happy John

Team 23 – Kilimanjaro/Tanga

Team Leader	Materu Patricia
Measurer	Tsoray Augustina Yona
Assistant Measurer	Joshua Nsenga Joel

Team 24 – Morogoro/Pwani

Team Leader	Shedrack Amosi Jackson
Measurer	Michael Ernesta Kavishe
Assistant Measurer	Salum Aisha sande

Team 25 – Morogoro/Pwani

Team Leader	Evelyne Stewart
Measurer	Jackson Francis
Assistant Measurer	Nives Geoffrey

Team 26 – Mtwara/Lindi

Team Leader	Rehema Peter Buruna
Measurer	Mnyago Shabani H
Assistant Measurer	Sauli Mwasenga

Team 27 – Mtwara/Lindi

Team Leader	Stephano Elias
Measurer	Msukwa Eliah
Assistant Measurer	Nnko Gloria Godson

Team 28 – Unguja

Team Leader	Arafa Khamis Machano
Measurer	Bimkubwa Ali Said
Assistant Measurer	Sabahiya Ali

Team 29 – Unguja

Team Leader	Asha Khamis Saleh
Measurer	Maimuna Mohamed
Assistant Measurer	Zahra Sued Jaffer

Team 30 – Unguja

Team Leader	Salehe Seif Hemedi
Measurer	Fatma Twaha
Assistant Measurer	Salama Makame

Team 31 – Pemba

Team Leader	Harusi Masoud
Measurer	Hidaya Ibrahim
Assistant Measurer	Sabiha Khalfan

Team 32 – Pemba

Team Leader	Saumu salum
Measurer	Raya Mkoko
Assistant Measurer	Mwajine Khamis

Annex 3 – Plausibility Check report

Plausibility check for: TZN_1018_OVERALL_CHILDREN_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 out of range subjects)	Incl	%	0-2.5 0	>2.5-5.0 5	>5.0-7.5 10	>7.5 20	0 (0,9 %)
Overall Sex ratio (Significant chi square)	Incl	p	>0.1 0	>0.05 2	>0.001 4	<=0.001 10	4 (p=0,004)
Age ratio(6-29 vs 30-59) (Significant chi square)	Incl	p	>0.1 0	>0.05 2	>0.001 4	<=0.001 10	4 (p=0,002)
Dig pref score - weight	Incl	#	0-7 0	8-12 2	13-20 4	> 20 10	0 (1)
Dig pref score - height	Incl	#	0-7 0	8-12 2	13-20 4	> 20 10	0 (3)
Dig pref score - MUAC	Incl	#	0-7 0	8-12 2	13-20 4	> 20 10	0 (2)
Standard Dev WHZ .	Excl	SD	<1.1 and	<1.15 and	<1.20 and	>=1.20 or	0 (1,02)
.	Excl	SD	>0.9 0	>0.85 5	>0.80 10	<=0.80 20	
Skewness WHZ	Excl	#	<±0.2 0	<±0.4 1	<±0.6 3	>=±0.6 5	0 (0,04)
Kurtosis WHZ	Excl	#	<±0.2 0	<±0.4 1	<±0.6 3	>=±0.6 5	0 (-0,09)
Poisson dist WHZ-2	Excl	p	>0.05 0	>0.01 1	>0.001 3	<=0.001 5	5 (p=0,000)
OVERALL SCORE WHZ =			0-9	10-14	15-24	>25	13 %

The overall score of this survey is 13 %, this is good.

There were no duplicate entries detected.

Percentage of children with no exact birthday: 16 %

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: 0,9 %, HAZ: 2,7 %, WAZ: 1,1 %

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: 0,89 (The value should be around 0.85).:
 p-value = 0,002 (significant difference)

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

Age cat.	mo.	boys	girls	total	ratio boys/girls
6 to 11	6	1007/934,2 (1,1)	927/891,8 (1,0)	1934/1826,0 (1,1)	1,09
12 to 23	12	1845/1822,0 (1,0)	1766/1739,0 (1,0)	3611/3561,0 (1,0)	1,04
24 to 35	12	1795/1766,0 (1,0)	1700/1686,0 (1,0)	3495/3451,0 (1,0)	1,06
36 to 47	12	1765/1738,0 (1,0)	1702/1659,0 (1,0)	3467/3396,0 (1,0)	1,04
48 to 59	12	1566/1719,0 (0,9)	1521/1641,0 (0,9)	3087/3360,0 (0,9)	1,03
6 to 59	54	7978/7797,0 (1,0)	7616/7797,0 (1,0)		1,05

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

Overall sex ratio: p-value = 0,004 (significant excess of boys)

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 = 0,019 (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: 0,151

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: 3 (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: 2 (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 reference mean (WHO flags)	exclusion from observed mean (SMART flags)	exclusion from
WHZ			
Standard Deviation SD:	1,07	1,07	1,02
(The SD should be between 0.8 and 1.2)			
Prevalence (< -2)			
observed:	3,8%	3,8%	3,5%
calculated with current SD:	4,1%	4,0%	3,4%
calculated with a SD of 1:	3,1%	3,1%	3,1%
HAZ			
Standard Deviation SD:	1,29	1,27	1,14
(The SD should be between 0.8 and 1.2)			
Prevalence (< -2)			
observed:	32,3%	32,2%	32,0%
calculated with current SD:	33,5%	33,1%	32,0%
calculated with a SD of 1:	29,1%	28,9%	29,8%
WAZ			
Standard Deviation SD:	1,09	1,09	1,03
(The SD should be between 0.8 and 1.2)			
Prevalence (< -2)			
observed:	14,9%	14,8%	14,5%
calculated with current SD:	16,1%	15,9%	14,6%
calculated with a SD of 1:	14,0%	14,0%	13,9%

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	0,10	0,11	0,04
HAZ	0,18	0,24	0,04
WAZ	0,04	0,00	0,01

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	0,88	0,53	-0,09
HAZ	1,32	1,00	-0,24
WAZ	0,80	0,62	-0,09

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=10,20 (p=0,000)
WHZ	< -3:	ID=1,25 (p=0,000)
Oedema:		ID=1,28 (p=0,000)
GAM:		ID=10,70 (p=0,000)
SAM:		ID=1,53 (p=0,000)
HAZ	< -2:	ID=85,40 (p=0,000)
HAZ	< -3:	ID=26,90 (p=0,000)
WAZ	< -2:	ID=38,80 (p=0,000)
WAZ	< -3:	ID=7,81 (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.**

