

IMPROVING **MATERNAL & ADOLESCENT** NUTRITION IN TANZANIA

BASELINE SURVEY IN
MBEYA REGION, TANZANIA

FEBRUARY, 2021



IMPROVING MATERNAL & ADOLESCENT NUTRITION IN TANZANIA

BASELINE SURVEY IN
MBEYA REGION,
TANZANIA

FEBRUARY, 2021

TABLE OF CONTENTS

List of tables	v
List of figures	vii
List of abbreviations	ix
Acknowledgements	xi
Executive summary	1
Background	4
Nutritional status of women, adolescents, and children	4
Current status of adolescent and maternal nutrition program	5
Objectives and programme description	6
Broad objective	6
Specific objectives	6
Methods	7
Study design and study population	7
Sample size and sampling technique	7
Data-collection tools	8
Data analysis plan	8
Ethics	8
Results	9
Sociodemographic information	9
Characteristics of the surveyed health facilities	9
Anaemia among pregnant women	10
Provision of ANC services	12
ANC visits	12
ANC measurements	14
Service linkages	14
ANC services	14

Quality of the ANC services as perceived by ANC clients	15
Type of counselling and food types covered during counselling	17
IFA uptake	18
Adherence to FEfo	19
Stock outs	21
Supportive supervisions	22
Dietary patterns	22
Food security and production	24
Water Sanitation and Hygiene (WASH)	26
CHWs' tables	26
Discussion	30
Recommendations	33
References	35

LIST OF TABLES

Table 1:	Anaemia	10
Table 2:	Socio-demographic characteristics of participants (N=2183)	10
Table 3:	ANC bookings and number of contacts	13
Table 4:	Counselling on primary food groups	16
Table 5:	Perception of pregnant women on the quality of ANC services	16
Table 6:	Use of IFA	18
Table 7:	Reasons for poor adherence to FEfo	20
Table 8:	Dietary diversity and MAD	23
Table 9:	Source of food	25
Table 10:	Sociodemographic characteristics of CHWs (N=149)	26
Table 11:	Community health care workers work experience (N=149)	27
Table 12:	Nutritional services conducted by community health workers (n=149)	28
Table 13:	Job satisfaction among community health workers (n=149)	29

LIST OF FIGURES

Figure 1:	Anaemia status by gestational age	12
Figure 2:	Anaemia status by women age group and location	12
Figure 3:	Health services provided at ANC – rural vs urban	14
Figure 4:	Type of counselling and food types covered during counselling session among the surveyed health facilities (N=78)	17
Figure 5:	Knowledge of benefits of FEfo across women age groups and by rural versus urban	18
Figure 6:	Percentage of surveyed health facilities reporting stock out of selected essential commodities in the last three months prior to the survey (N=73)	21
Figure 7:	Reported availability and provision of FEfo among surveyed health facilities (N=78)	21
Figure 8:	Percentage of surveyed health facilities reported presence of anthropometrics measurement tools (N=78)	22
Figure 9:	Reported supportive supervision among surveyed health facilities (N=78)	22
Figure 10:	Dietary information across women age groups by rural versus urban	24
Figure 11:	Types of latrines	26
Figure 12:	Drinking water management	26

LIST OF ABBREVIATIONS

AAPH	Africa Academy for Public Health
ANC	Antenatal clinic
BMI	Body mass index
BNA	Bottleneck analysis
CHMT	Council Health Management Team
CHW	Community health workers
DALYs	Disability adjusted life years
DHS	Demographic Health Survey
HIMS	Health Information Management System
IFA	Iron and folic acid tablets
IHI	Ifakara Institute of Health
LGA	Local government authority
IMAN	Improvement in Maternal and Adolescent Nutrition
HIV	Human Immunodeficiency virus
MUAC	Mid Upper Arm Circonference
M&E	Monitoring and evaluation
MUIC	Median urinary iodine concentration
MMS	Multiple micronutrients supplements
MoHCDGEC	Ministry Of Health, Community Development, Gender, Elderly and Children
NGO	Non-governmental organizations
NMNAP	National Multi-sectoral Nutrition Action Plan
PORALG	President's Office, Regional Administrative Authority and Local Government
RCH	Reproductive and Child Health
RHMT	Regional Health Management Team
TAG	Technical advisory group
TFNCs	Tanzania Food and Nutrition Centre
UNICEF	United Nations International Children's Emergency Fund

ACKNOWLEDGEMENTS

The completion of this report was made possible by the joint efforts of many people from different institutions. Although all contributions are greatly acknowledged, not all can be listed here. The Africa Academy for Public Health (AAPH) would like to express their sincere appreciation to the following organizations whose outstanding commitment and support made this work possible.

- ◆ UNICEF Tanzania for their leadership and technical support from the inception to the completion of this baseline survey
- ◆ The Tanzanian mainland Ministry of Health, Community Development, Gender, Elderly and Children (MoHCDGEC), and Presidents' Office–Regional Administration and Local Government (PORALG) for their guidance and support in the implementation of this project
- ◆ Tanzania Food and Nutrition Centre (TFNC) for their invaluable contribution in the development of the study protocol and the data-collection materials
- ◆ The Regional Health Management Teams (RHMT) in the Mbeya region, Council Health Management Teams (CHMT) in Mbeya city, Mbeya DC, Mbarali, Rungwe, Busokelo and Kyela for their support and cooperation during the data-collection process
- ◆ All respondents (pregnant women and lactating mothers, health-care workers and community health workers), for making themselves available for the interviews and for their overall support to the data-collection teams
- ◆ The AAPH team, our pool of experts and partners, for their dedication and commitment throughout the implementation of this project

This study was made possible by the generous support of the Bill and Melinda Gates Foundation (BMGF).

Dr. Mary Mwanyika Sando
CEO, AAPH



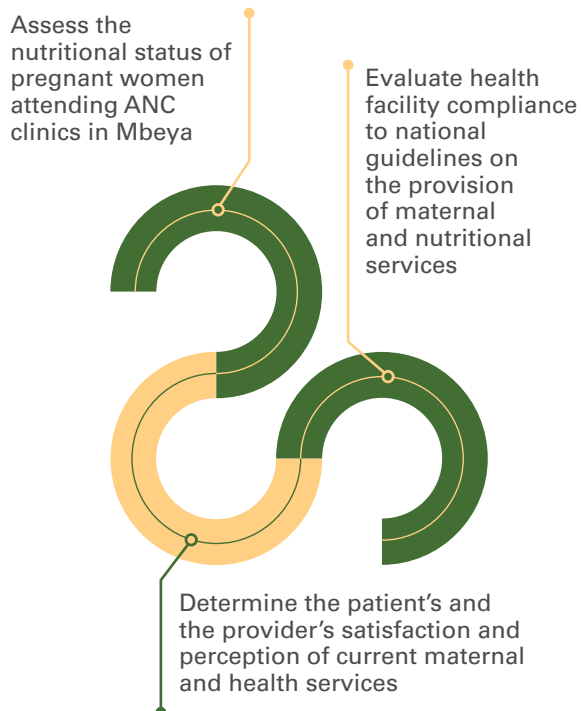
EXECUTIVE SUMMARY

Background: Adequate nutrition is a fundamental cornerstone of any individual's health. This is particularly critical for women of reproductive age, because inadequate nutrition impairs not only women's own health but also the health of their unborn children. Malnourished children are more likely to face cognitive impairments, lower immunity to infections, and an elevated risk for non-communicable diseases (NCDs) in their adult lives. Despite several global and national efforts to improve maternal and child nutrition, 45 per cent of women of reproductive age (15–49 years) and 57 per cent of the pregnant women in the country were found to be anaemic in 2015 (TDHS 2015/16). Although 98 per cent of the women in Tanzania received antenatal care (ANC) from skilled providers, only 51 per cent

had four or more ANC visits as recommended and 21 per cent of the women took iron supplements for 90 days or more during their last pregnancy (TDHS 2015–16). There remains scarce information on the current nutritional status of pregnant women and its associated bottlenecks in the Mbeya region. The findings and recommendations of this study will be used to inform the design and implementation of the interventions but will also, more importantly, be used to estimate the effect of the intervention by using before and after evaluation design.

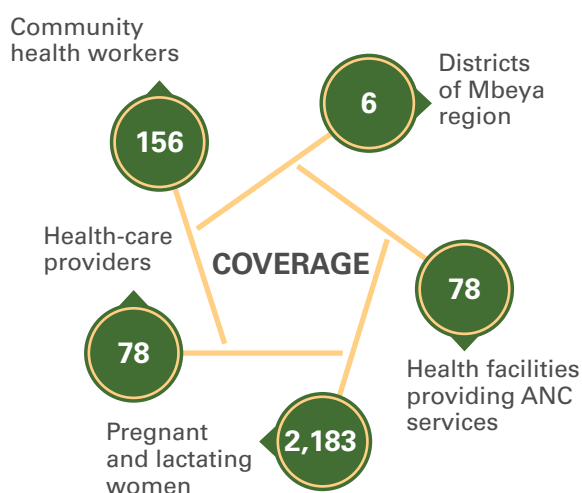
Objectives: The purpose of this survey was to assess the nutritional status of pregnant women and the existing barriers to the access to quality maternal and nutrition health services in the Mbeya region.

SPECIFIC AIMS OF THE STUDY



Methods: This was a cross-sectional survey using quantitative data-collection methods covering six (6) districts of the Mbeya region (Mbeya city, Mbeya DC, Mbarali DC, Rungwe DC, Kyela DC, and Busokelo DC). Data was collected from 78 health facilities providing

CROSS-SECTIONAL SURVEY



ANC services, where 2,183 women (pregnant and lactating), 78 health-care providers, and 156 community health workers (CHWs) were surveyed. Results are presented for each of the six districts and as combined estimates in selected analyses.

Results: Overall, about 39 per cent of women in the surveyed Mbeya districts were found to be anaemic. The women in the first trimester had the lowest percentage of anaemia (27 per cent) as compared to those in the second (44 per cent) and third trimesters (40 per cent). Approximately 17.6 per cent of the women who had delivered within the four weeks prior to the survey had anaemia. About 8 per cent of women reported experiencing a shortage of food in their households in the previous four weeks. Approximately, 64 per cent of the women depend on farming as the primary source of food for their households. Among those depending on farming to obtain food, for 25.7per cent, their husbands are the ones who decided how to use the harvested food.

We found variations in the proportion of women who had received clinical examinations and laboratory tests in their first ANC visit. About half (52 per cent) of the women received a urinalysis test, while blood pressure for 22 per cent was not measured, with great variation between the districts. Most facilities had equipment for anthropometric measurements such as length boards, Mid Upper Arm Circumference (MUAC) tapes, and weighing scales. Almost all surveyed health facilities reported to have counselled women on dietary diversity.

We found that more than half of the women (53 per cent) attended ANC in the current pregnancy, within the first trimester. Less than half (45 per cent) of the surveyed women attended ANC clinics four or more times during the pregnancy and on the day of the interview. Most women (72 per cent) have used IFA

at least once during the current pregnancy. About 20 per cent of them reported not having received IFA drugs in some of their ANC visits due to stock outs. A majority of the women understood that IFA helps to prevent anaemia, but very few knew other benefits of IFA such as making bones strong and preventing birth defects. Overall, women reported being satisfied with ANC services. However, about 11 per cent of them were not satisfied with the waiting time, 8 per cent were not happy with the distance and travel hurdles to the facility and 8 per cent complained about difficulty in getting prescribed medicines. Among the interviewed CHWs, a majority were satisfied with their work, however, about half (50 per cent) reported not having the required resources for their job. A majority (80 per cent) of the CHWs were not satisfied with their stipend.

This study showed that more than 90 per cent of the surveyed facilities received supportive supervision in the year prior to the survey,

and among them, only 45 per cent received supportive supervision in the previous six months.

Conclusion and recommendation: This study found low demand for ANC services, suboptimal quality and delivery of ANC services as well as food insecurity among the surveyed participants. In light of the study findings, programmatic interventions need to target community and health facility entry points in order to ensure the long-term sustainable impact of interventions. Social behaviour change intervention packages addressing community gender roles, and cultural norms promoting positive behavioural shifts and encouraging male involvement in nutritional care, could be the gateway for the sustainability of programmes. This can further be enriched through continuous mentorship, support and capacity-building across the health-care system in order to ensure the delivery of quality maternal, newborn and child health (MNCH) services in the community.





BACKGROUND

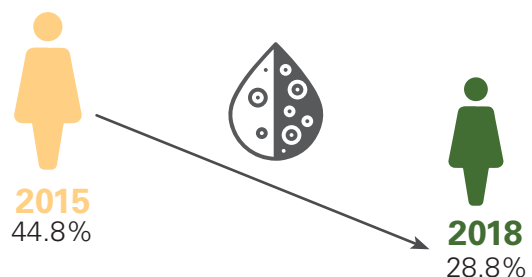
Nutritional status of women, adolescents, and children

Tanzania has made significant progress in improving the nutritional status of children under-five years. Evidence suggests that the national anaemia prevalence among women of reproductive age has decreased from 44.8 per cent in 2015 to 28.8 per cent in 2018.⁽²⁾ Additionally, recent reports have shown that 57 per cent of the pregnant women are anaemic.⁽²⁾ Similarly, 7 per cent of the children are born with low birthweight ⁽³⁾.

The 2010 DHS showed that 30 per cent of women (aged 15–49 years) and 33 per cent

of the pregnant women had iron deficiency,⁽⁶⁾ while 14 per cent of women (aged 15–49 years) and 23 per cent of the pregnant women had iron deficiency anaemia.⁽⁷⁾ The same report showed

NATIONAL ANAEMIA PREVALENCE AMONG WOMEN OF REPRODUCTIVE AGE

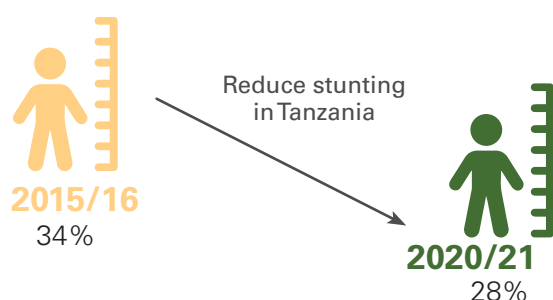


that 37 per cent of women (aged 15–49 years) and 42 per cent of the pregnant women were suffering from vitamin A deficiency.⁽⁸⁾ Median urinary iodine concentration (MUIC) for women aged 15–49 years increased from 160 µg/L in 2010 to 180 µg/L in 2015–16⁽⁹⁾.

Current status of adolescent and maternal nutrition programme

The 2016–2021 National Multi-sectoral Nutrition Action Plan (NMNAP) guides the implementation of maternal and child nutrition interventions in Tanzania.⁽¹⁰⁾ The NMNAP is an evidence-based and costed action plan which is aligned to the global nutrition objectives, including the World Health Organization (WHO) and the Sustainable Development Goals (SDGs). One of the main NMNAP targets is to reduce the prevalence of stunting in Tanzania from 34 per cent in 2015/16 to 28 per cent in 2020/21.

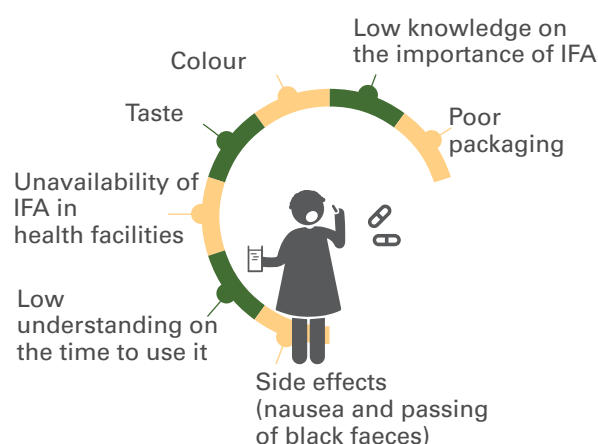
MAIN TARGET OF NMNAP



The NMNAP currently focuses on interventions targeted to improve the health and nutrition status of under-five children. Even though the policies and delivery systems exist to reach pregnant women with counselling, IFA, and deworming medication, the provision of adolescent and maternal nutrition services has

received less attention as compared to other services targeting under-five children. Currently, 98 per cent of women receive ANC from skilled providers and 51 per cent have four or more ANC visits as recommended. Twenty-seven per cent of pregnant women receive any IFA during pregnancy,⁽¹²⁾ and only 21 per cent receive 90+ tablets of IFAS.⁽¹⁾ The reasons given for the low uptake of IFA are poor packaging, taste, colour, low knowledge on the importance of IFA, unavailability of IFA in health facilities, low understanding on the time to use it, and its side effects, particularly nausea and passing of black faeces.

REASONS FOR LOW UPTAKE OF IFA



This study seeks to establish a baseline understanding of the maternal nutrition interventions coverage and existing bottlenecks on delivering integrated nutrition services at scale. Findings from this study will inform the design of the IMAN demonstration project on the delivery of a comprehensive package for improving maternal nutrition. It will also assist relevant authorities in decision-making regarding the scale-up of the maternal and adolescent nutrition programme in Tanzania and inform the development of the maternal nutrition component of the NMNAP II (2021–2025) by 2021.



OBJECTIVES AND PROGRAMME DESCRIPTION

Broad objective

To understand the nutritional status of pregnant women, the access to, and the existing barriers to quality maternal and nutrition health services in the Mbeya region.

Specific objectives

.....

THE SPECIFIC OBJECTIVES ARE TO:



Estimate the nutritional status of pregnant women attending ANC clinics in Mbeya

Evaluate health facility compliance to national guidelines on the provision of maternal health care and nutritional services



Determine the patient's and provider's satisfaction and perception on the current maternal and health services



METHODS

Study design and study population

A baseline survey was conducted using a cross-sectional survey design and employing mainly quantitative data-collection methods. The primary target population in this project were pregnant women attending ANCs in public health facilities and women who have delivered from public health facilities within the previous two weeks. The baseline survey also targeted health-service providers and CHWs working in health facilities located in the selected study districts.

Sample size and sampling technique

Each district was sampled independently to enable making of district-based estimates on key parameters. Sample size was calculated based on the proportion of pregnant women using IFA according to the guidelines, which the national nutrition survey reported to be 34 per cent. The total sample size was 2,070 (345 women x 6 districts). The proportion base sampling approach of the number of deliveries per health facility was considered in determining the number of interviews per health facility.

To allow fair representation of the different levels of health facilities, one hospital, four health centres and eight dispensaries were randomly selected in each district, making a total of 78 study health facilities in the region. A proportion base sampling approach of the number of ANC attendees per health facility was considered to determine the number of interviews per health facility. Systematic random selection of pregnant women was done to obtain study participants for the exit interviews. In each facility, the interview questionnaire was administered to at least one experienced service provider and two CHWs working on maternal and nutritional health services. This made a total of 78 health-care providers and 156 CHWs who were interviewed.

Data collection tools

Structured questionnaires were developed in English and translated into Kiswahili. The questionnaires were divided into three main sections: the health facility questionnaire (facility background, available services, clinical practices, anaemia management, IFA, stock outs), which was administered to health providers; the pregnant women questionnaire, which was administered in exit interviews; and the CHW questionnaire, which was administered to CHWs to assess their perceptions of maternal and nutritional services, including gaps. The survey questionnaires were pre-tested in the field and revised for improvement after training. 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. In October 2021, a three-day training on data-collection was held in Dar es Salaam (DSM) a week prior to the actual data-collection and a two-day pilot test of the study tools and protocol. Four health facilities were selected in DSM for the pilot test, where each member functioned as a part of a team and participated in the selection of pregnant women, health-care providers and CHWs. This process was done to ensure the survey methodology and the use of measurement equipment was well adopted.

Data analysis plan

Descriptive analysis for continuous and binary variables were presented in means and proportions respectively. The nutritional status of women was calculated based on national and international guidelines. We used STATA quantitative software package (version 14.2) for the analysis. The wealth index was calculated using data on a household's ownership of selected assets. The weights (factor scores) for each of the assets were generated through principal components analysis (PCA). Weights were summed by household, and after ranking the total scores, the households were divided into quintiles. Household members acquired the total score and quintile of their household.

Ethics

The study was approved by the National Institute for Medical Research (NIMR). Further to this ethical approval, the study received permission from PO-RALG.



RESULTS

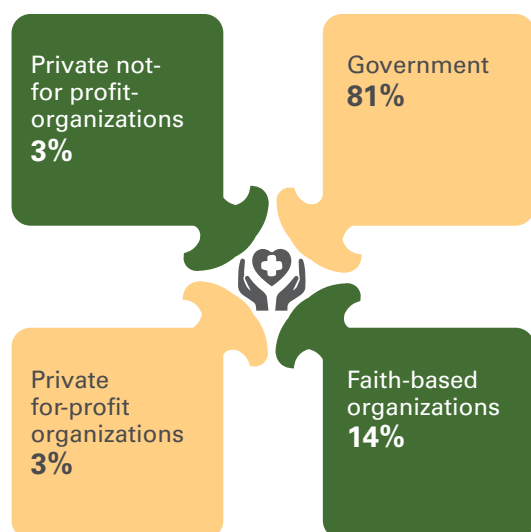
Sociodemographic information

The study was conducted in six districts of the Mbeya region. The total number of participants (women of reproductive age) was 2,183. Of these, 83.8 per cent were above the age of 20 and 16.2 per cent were aged 19 years and below. A majority (92.8 per cent) of the participants were married, and 11.6 per cent had more than three births. Table 2 provides the sociodemographic details of the participants.

Characteristics of the surveyed health facilities

The total number of surveyed health facilities was 78. About 81 per cent of them were government owned, 14 per cent were owned by faith-based organizations, 3 per cent were owned by private for-profit organizations and the remaining 3 per cent were owned by private not-for profit-organizations. Geographically, more than three quarters (76.9 per cent) of the surveyed health facilities were located in urban

OWNERSHIP OF HEALTH FACILITIES SURVEYED



settings and only 23.1 per cent were located in rural areas. Additionally, 91.0 per cent of the surveyed health facilities provided outpatient (OPD) services only.

Anaemia among pregnant women

The distribution of anaemia across the districts is shown in Table 1. Overall, 38.7 per cent of the women in the surveyed districts of Mbeya were found to be anaemic, with varied prevalence across the districts (Kyela (54.8 per cent), Mbarali (52.7 per cent), Mbeya DC (40.6 per cent), and Busokelo (38.4 per cent). The lowest prevalence of anaemia was observed in Mbeya city (19.4 per cent) and Rungwe (22.8 per cent).

Table 1: Anaemia

	Council												Total (n=1892)	
Anaemia in pregnant women	Busokelo (n=344)		Kyela (n=354)		Mbeya City (n=278)		Mbarali (n=313)		Mbeya DC (n=278)		Rungwe (n=325)			
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Normal* (Hb >=11 g/L)	212	61.6	160	45.2	224	80.6	148	47.3	165	59.4	251	77.2	1160	61.3
Anaemia* (Hb <=10 g/L)	132	38.4	194	54.8	54	19.4	165	52.7	113	40.6	74	22.8	732	38.7

*Measurements of haemoglobin were adjusted for altitude.

Table 2: Sociodemographic characteristics of participants (N=2,183)

	Council												Total (n=2183)	
Variable	Busokelo (n=364)		Kyela (n=388)		Mbeya City (n=349)		Mbarali (n=353)		Mbeya DC (n=351)		Rungwe (n=378)			
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%		
Age groups														
15–19 years	70	19.2	81	21	30	8.6	56	15.9	52	14.8	64	16.9	353	16.2
20–49 years	294	80.8	307	79	319	91.4	297	84.1	299	85.2	314	83.1	1830	83.8

	Council												Total (n=2183)	
Variable	Busokelo (n=364)		Kyela (n=388)		Mbeya City (n=349)		Mbarali (n=353)		Mbeya DC (n=351)		Rungwe (n=378)			
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Age groups														
Marital status														
Married	337	92.6	374	96	331	94.8	300	85	321	91.5	363	96	2026	92.8
Never married	11	3.0	7	1.8	8	2.3	42	11.9	23	6.6	7	1.9	98	4.5
Divorced, separated, widow	16	4.4	7	1.8	10	2.9	11	3.1	7	2.0	8	2.1	59	2.7
Number of births														
None	119	32.7	120	31	95	27.2	88	24.9	95	27.1	122	32.3	639	29.3
1–3	212	58.2	230	59	225	64.5	195	55.2	212	60.4	216	57.1	1290	59.1
More than three	33	9.1	38	9.8	29	8.3	70	19.8	44	12.5	40	10.6	254	11.6
Women education														
No formal school	33	9.1	23	5.9	23	6.6	97	27.5	50	14.2	26	6.9	252	11.5
Primary level	220	60.4	274	71	194	55.6	192	54.4	202	57.5	231	61.1	1313	60.1
Secondary and above	93	25.5	80	21	98	28.1	54	15.3	82	23.4	101	26.7	508	23.3
Woman’s occupation’														
Farming	148	46.5	96	42	73	27.2	131	61.5	110	46.2	92	33.9	650	42.3
Employed	7	2.2	5	2.2	18	6.7	5	2.3	11	4.6	21	7.7	67	4.4
Others	163	51.3	126	56	177	66	77	36.2	117	49.2	158	58.3	818	53.3
Wealth quintiles														
Poorest	118	35.2	85	22	21	6.0	89	28	54	15.4	55	14.8	422	20
Poor	87	26	86	22	30	8.6	52	16.4	84	24	81	21.8	420	19.9
Medium	64	19.1	97	25	52	14.9	59	18.6	72	20.6	81	21.8	425	20.1
Wealthy	39	11.6	77	20	83	23.8	65	20.4	73	20.9	85	22.8	422	20
Wealthiest	27	8.1	43	11	163	46.7	53	16.7	67	19.1	70	18.8	423	20

Assessing anaemia by the trimester of pregnancy, the results show that 35.9 per cent of the women surveyed were found to have anaemia. About 27 per cent of the surveyed pregnant women had anaemia in their first trimester, and 45 per cent of the surveyed women had anaemia in their second trimester. The percentage of pregnant women with anaemia in the third trimester decreased to 40 per cent, and among those who were breastfeeding, the percentage of anaemia was found to be 18 per cent, (see Figure 1). Furthermore, 39.1 per cent of the women aged 15–19 years had anaemia. This number was slightly less for women in the age group of 20–49 years (35.2 per cent). By location, women in rural areas (39 per cent) were more anaemic than women in urban areas (28 per cent) (see Figure 2).

Figure 1: Anaemia status by gestational age

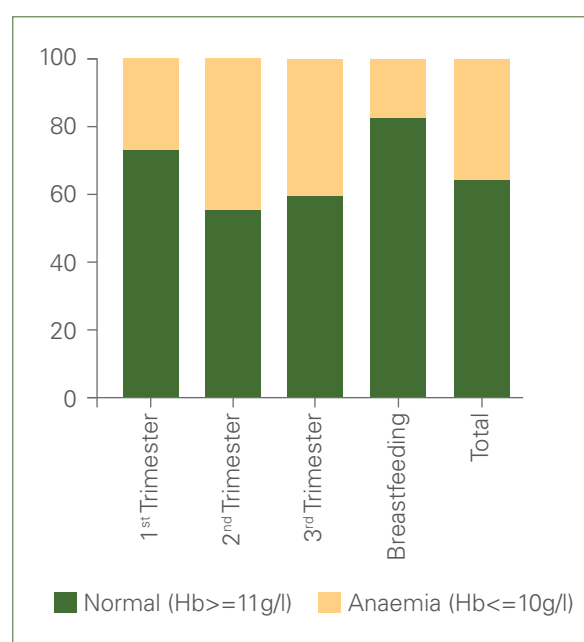
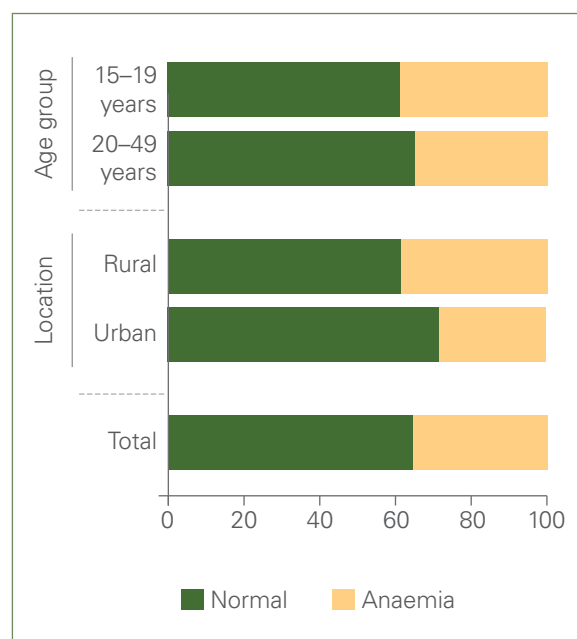


Figure 2: Anaemia status by women's age groups and location



Provision of ANC services

ANC visits

Overall, 52.5 per cent of the surveyed participants reported attending the ANC within their first trimester, and 47.5 per cent after the first trimester of their pregnancy, while the mean number of ANC attendance was three (see Table 3). With the exception of Busokelo

57%

of pregnant women visited the ANC four or more times by the 3rd trimester.

Majority of them were from urban areas.



and Kyela, less than 50 per cent of the participants reported attending the ANC within their first trimester. Similarly, less than 46 per cent reported attending the ANC four or more times during a single pregnancy. In Mbarali, 73 per cent reported attending the ANC less

than four times during a single pregnancy. The overall results show that 57 per cent of the pregnant women visited the ANC four or more times by the third trimester, with a slightly higher proportion of women residing in urban areas.

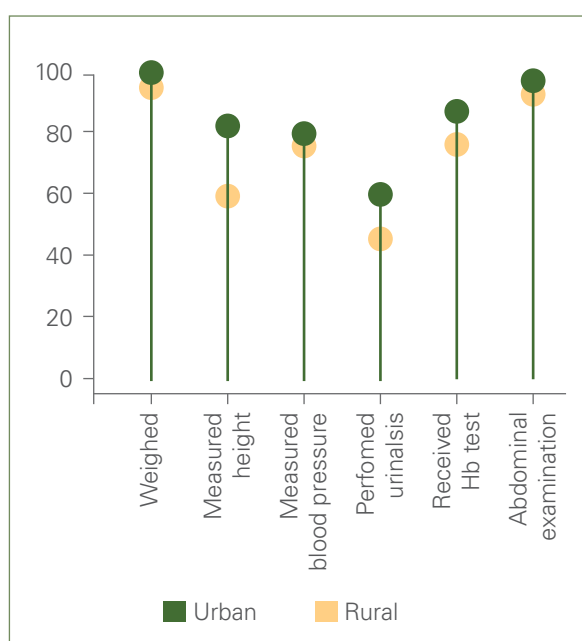
Table 3: ANC bookings and number of contacts

	Council												Total (n=2183)	
Variable	Busokelo (n=364)		Kyela (n=388)		Mbeya City (n=349)		Mbarali (n=353)		Mbeya DC (n=351)		Rungwe (n=378)			
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Mean ANC visit (mean, SD)	3.69	1.49	3.58	1.46	3.94	1.80	3.04	1.08	3.60	1.41	3.92	1.94	3.61	1.57
Gestation age at ANC booking														
Within first trimester	196	65.6	219	62.4	121	44.5	146	46.0	147	47.0	157	48.3	986	52.5
After first trimester	103	34.4	132	37.6	151	55.5	171	54	167	53	168	51.7	892	47.5
Number of ANC visits														
Less than four	143	51.8	181	53.2	116	46.8	222	73	152	53	142	48.6	956	54.7
Four or more	133	48.2	159	46.8	132	53.2	83	27	135	47	150	51.4	792	45.3

ANC measurements

Over 50 per cent of the surveyed health facilities measured weight, height, blood pressure, haemoglobin and abdominal examination and less than 50 per cent of the rural health facilities conducted urinalysis. Clients who attended urban facilities received more measurements as compared to those who attended rural facilities. The difference was pronounced in the height, urinalysis and haemoglobin measurements (see Figure 3).

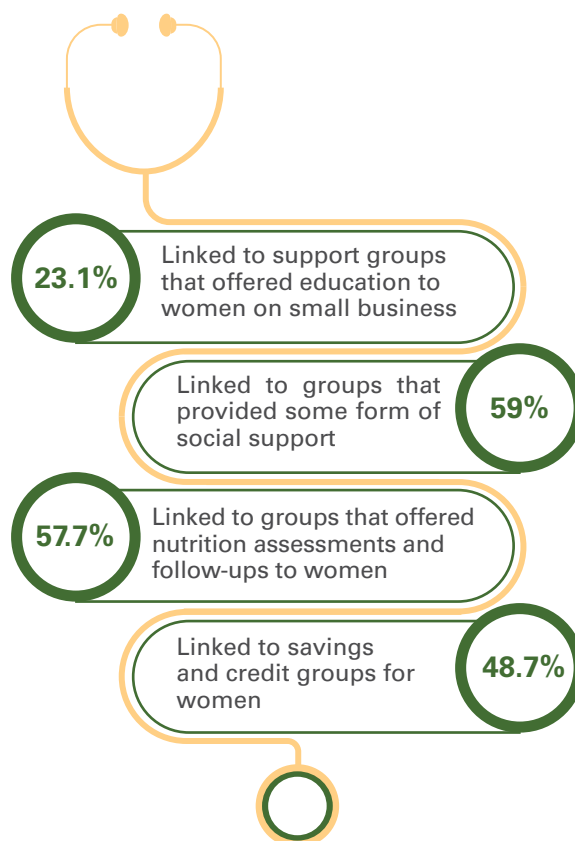
Figure 3: Health services provided at ANC – rural versus urban



Service linkages

A majority of the health facilities reported to offer CHW services, however, only 23.1 per cent of the respondents reported being linked to support groups that offered education to women on small business. Overall, more than half (59 per cent) of the respondents reported that the surveyed facilities were linked to groups that provided some form of social support. Almost two thirds (57.7 per cent) were linked

HEALTH FACILITIES REPORTING BEING LINKED TO SERVICES



to groups that offered nutrition assessments and follow-ups to women and 48.7 per cent were linked to savings and credit groups for women. Additional details on service linkages are provided in Supplementary Table 4.

ANC services

During ANC visits, over half of the interviewed women reported receiving nutrition counselling at the ANC, while around 9 out of 10 women reported receiving counselling on consuming vitamins. Furthermore, 61 per cent, 58 per cent and 29 per cent of women reported receiving counselling on the consumption of carbohydrates, proteins and fats respectively (see Table 4).

Quality of ANC services as perceived by ANC clients

Approximately 9 out of 10 women were satisfied by the ANC services provided at health facilities. Across all councils, more than 88 per cent agreed that the waiting time was reasonable. It was observed that ANC

privacy was provided in above 85 per cent of facilities across all councils. Over 93 per cent of women agreed that the time spent on the pregnant woman was sufficient in all councils. Furthermore, women agreed that the opening hours for the facility were adequate and that the quality of the services provided was satisfactory in more than 98 per cent of the facilities across all councils (see Table 5).



Table 4: Counselling on primary food groups

	Council												Total (n=2183)	
Variable	Busokelo (n=364)		Kyela (n=388)		Mbeya City (n=349)		Mbarali (n=353)		Mbeya DC (n=351)		Rungwe (n=378)			
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%		
Received Nutrition Counselling	161	44.48	332	85.57	179	51.29	109	30.97	224	64.00	228	60.48	1233	56.61
Carbohydrates (Yes)	74	46.0	198	59.6	164	91.6	46	42.0	143	63.8	121	53.0	746	61.0
Proteins (Yes)	97	60.0	159	47.9	151	84.4	51	47.0	128	57.1	128	56.0	714	58.0
Fats (Yes)	48	30.0	111	33.4	72	40.2	29	27.0	80	35.7	22	9.6.0	362	29.0
Vitamin (Yes)	151	94.0	265	79.8	178	99.4	105	96.0	222	99.1	218	96.0	1139	92.0
Were you satisfied with the nutrition advice you received?														
Very satisfied	81	50.0	53	16.0	107	59.8	51	47.0	123	54.9	124	54.0	539	44.0
Satisfied	73	45.0	274	82.8	72	40.2	51	47.0	96	42.9	98	43.0	664	54.0
Not satisfied	7	4.3	4	1.2	0	0	6	5.6	5	2.2	6	2.6.0	28	2.3

Table 5: Perception of pregnant women on the quality of ANC services

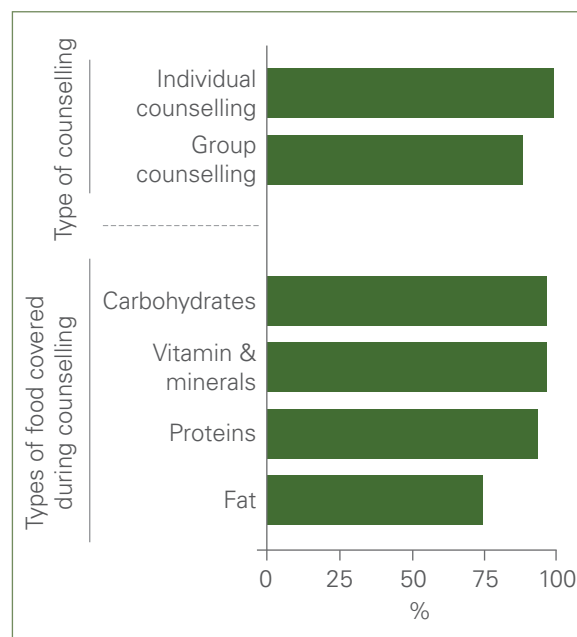
	Council												Total (n=2183)	
Variable	Busokelo (n=364)		Kyela (n=388)		Mbeya City (n=349)		Mbarali (n=353)		Mbeya DC (n=351)		Rungwe (n=378)			
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Waiting time was reasonable (per cent agree)	320	88.2	348	89.9	311	89.1	318	90.1	317	90.6	336	89.1	1950	89.5
Enough privacy during the visit? (per cent agree)	356	98.1	364	93.8	343	98.3	345	97.7	298	85.1	362	96.5	2068	94.9
Did the provider spend sufficient time with you? (per cent agree)	353	97.2	374	96.4	333	95.7	343	97.4	338	96.3	350	93.6	2091	96.1

	Council												Total (n=2183)	
Variable	Busokelo (n=364)		Kyela (n=388)		Mbeya City (n=349)		Mbarali (n=353)		Mbeya DC (n=351)		Rungwe (n=378)			
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%		
Opening hours of the facility are adequate? (per cent agree)	355	98.3	383	98.7	341	98.3	342	98.8	346	99.1	362	97.6	2129	98.5
Quality of the provided service was satisfactory? (per cent agree)	358	98.9	379	97.7	343	98.3	350	99.2	347	98.9	362	96.3	2139	98.2

Type of counselling and food types covered during counselling

Figure 4 presents the type of counselling provided at ANC clinics in the Mbeya region. Almost 98 per cent of the clinics provided individual nutrition counselling, while around 80 per cent of the facilities provided group counselling sessions. A majority of the facilities provided counselling on carbohydrates, vitamins, minerals and proteins, while counselling for the use of fats was done by fewer health facilities (74 per cent) (see Figure 4).

Figure 4: Type of counselling and food types covered during counselling sessions among the surveyed health facilities (N=78)



IFA uptake

During pregnancy, maternal demand for iron increases to meet the needs of both the mother and the growing fetus. Therefore, a daily intake of oral iron (30–60 mg of elemental iron) and folic acid (0.4 mg) supplementation is recommended as part of ANC to reduce the risk of low birthweight, maternal anaemia, and iron deficiency. During the survey, 75 per cent of the women were given free IFA supplements. Among the remain 25% who don't received IFA for free, 12 per cent were told to buy IFA. Additionally, 72 per cent used IFA during pregnancy while 28 per cent never used IFA (see Table 6).

Across all age groups in both rural and urban locations, a majority of the respondents reported to know that IFA supplementation prevented anaemia. A few respondents reported to know about other benefits such as

making bones strong, and prevention of birth defects (see Figure 5).

Figure 5: Knowledge of benefits of FEfo across women's age groups and by rural versus urban

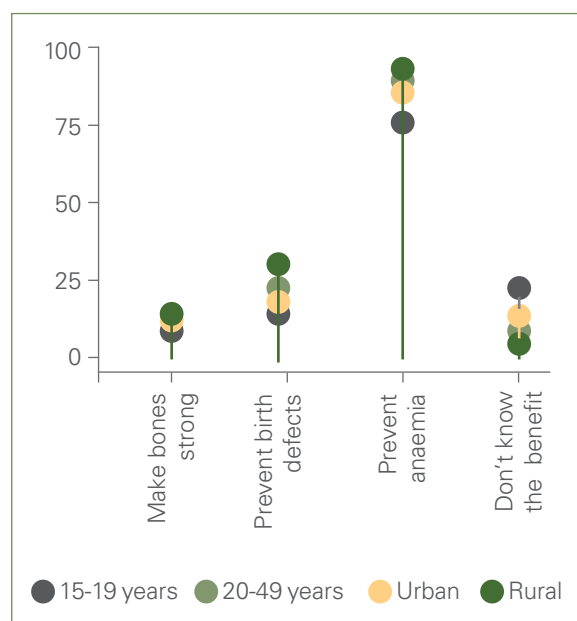


Table 6: Use of IFA

	Council												Total (n=2183)	
Variable	Busokelo (n=364)		Kyela (n=388)		Mbeya City (n=349)		Mbarali (n=353)		Mbeya DC (n=351)		Rungwe (n=378)			
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
During this pregnancy, were you given free IFA (Yes)	214	60.6	337	87.1	288	82.5	202	58.7	293	84.0	279	75.8	1613	75.0
During this pregnancy, were you told to buy IFA? (Yes)	55	15.6	48	12.4	53	15.2	38	10.9	16	4.6	51	13.6	261	12.1
During this pregnancy, did you ever use IFA? (Yes)	216	59.3	337	86.9	276	79.1	218	61.8	260	74.1	271	71.7	1578	72.3
At any time during this pregnancy, not given IFA because of stock out (Yes)	61	28.9	41	12.7	45	16.4	44	21.5	21	8.2	99	37.4	311	20.3

Adherence to FEfo

Overall, 6 per cent of the women reported bad taste as the reason for poor adherence to FEfo (FEfo Tablet contains a combination of vitamin B9 (folic acid) and iron), while less than 3 per cent of the women mentioned other reasons, such as side effects, did not think they need them, cost, too many pills, and didn't know why they should take them, while 11 per cent of the women in Mbeya city, 6.3 per cent in Rungwe and 6 per cent in Mbarali said that the bad taste was a major reason for poor adherence to FEfo.

Less than 6 per cent of the women mentioned other reasons across the councils (see Table 7).

FEFO TABLET

Combination of:

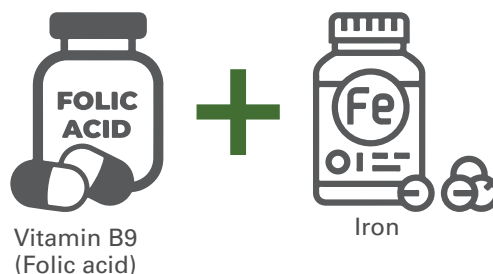


Table 7: Reasons for poor adherence to FEfo

	Council												Total	
Reasons for FEfo adherence	Busokelo		Kyela		Mbeya City		Mbarali		Mbeya DC		Rungwe			
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%		
Never thought I need them	0	0	2	0.6	0	0	12	5.5	0	0	1	0.4	15	1.0
Bad taste	6	2.8	17	5.0	31	11.2	13	6.0	11	4.2	17	6.3	95	6.0
Didn't know why I should take them	0	0	0	0	1	0.4	0	0	0	0	1	0.4	2	0.1
Too many pills	1	0.5	0	0	1	0.4	1	0.5	1	0.4	0	0	4	0.3
Expensive	1	0.5	1	0.3	3	1.1	1	0.5	1	0.4	1	0.4	8	0.5
Side effects	3	1.4	18		8	2.9	5	2.3	3	1.2	2	0.7	39	2.5



Stock outs

Of the surveyed facilities, 53 per cent reported to have stock outs of haemoglobin test kits and 49 per cent of the facilities had stock outs of syphilis test kits three months prior to the survey. 17 per cent of the surveyed facilities reported to have stock outs of malaria and HIV test kits (see Figure 6).

Figure 6: Percentage of surveyed health facilities reporting stock outs of selected essential commodities in the last three months prior to the survey (N=73)

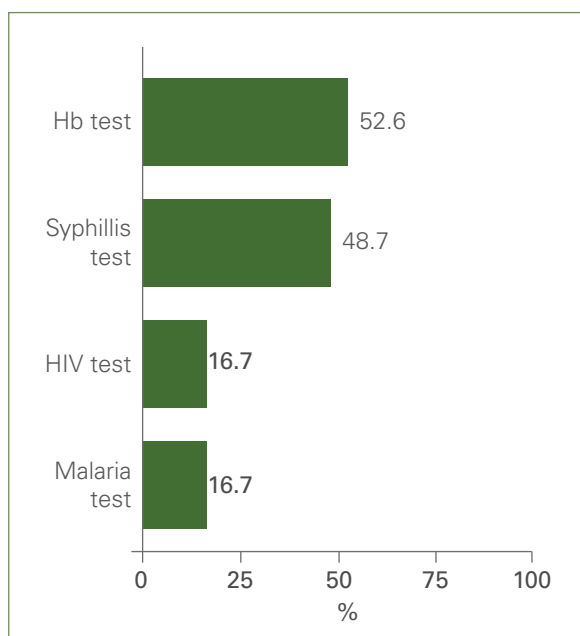
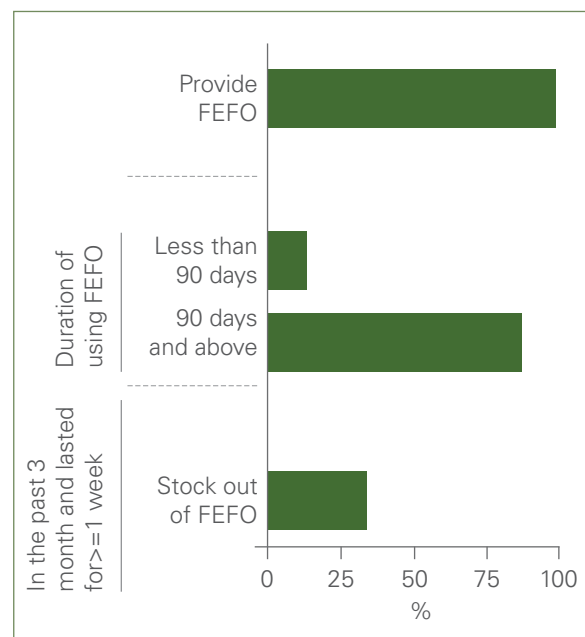


Figure 7 presents information about the availability and use of IFA supplements in the surveyed health facilities in Mbeya. Approximately 98 per cent of the health facilities reported providing tablets and most facilities (80 per cent) advised pregnant women to take them for 90 days and more (see Figure 7). About 30 per cent of the surveyed health facilities reported to have experienced a stock out FEfo during the three months prior to the survey. This stock out lasted for one week or more.

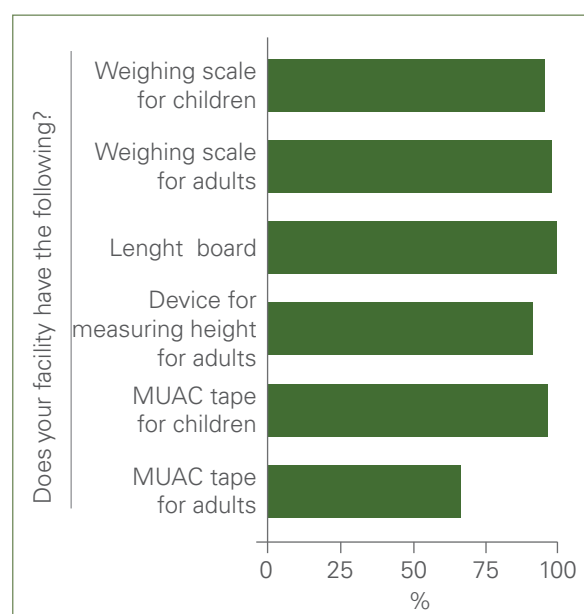
Figure 7: Reported availability and provision of FEfo among surveyed health facilities (N=78)



The percentage of surveyed health facilities that reported the availability of anthropometric measurement tools is presented in Figure 16. Overall, more than 90 per cent of the facilities had weighing scales for children, more than 95 per cent had weighing scales for adults, 99 per cent had length boards, 90 per cent had devices for measuring the height of adults, 97 per cent had MUAC tapes for children and only 65 per cent had MUAC tapes for adults (see Figure 8).



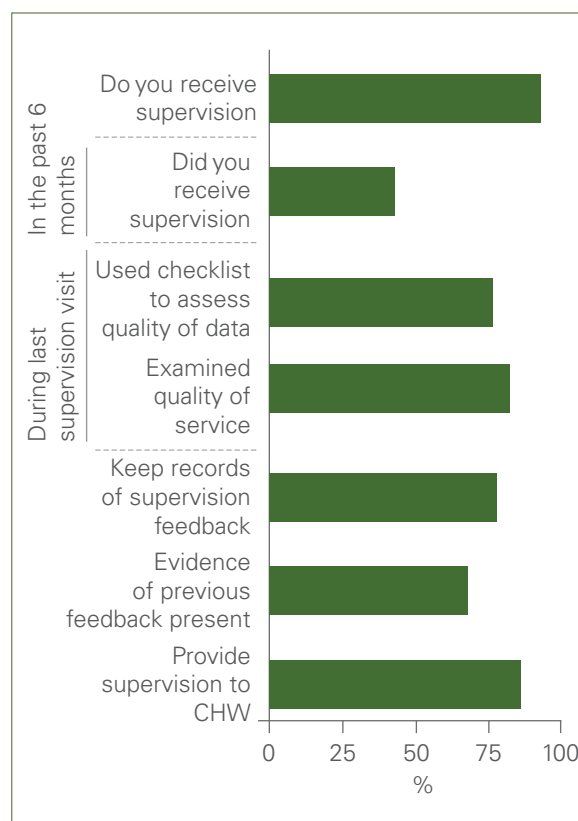
Figure 8: Percentage of surveyed health facilities reported availability of anthropometrics measurement tools (N=78)



Supportive supervisions

Figure 9 presents the percentage of reported supportive supervision among the surveyed health facilities. More than 90 per cent of the surveyed facilities received supportive supervision in the year prior to the survey, and among them, only 45 per cent received supportive supervision in the previous six months. Furthermore, during the last supervision visit, more than three quarters (77 per cent) of the surveyed facilities used a checklist to assess the quality of data and nearly 80 per cent of the surveyed facilities examined the quality of services. Findings in Figure 17 depict that more than three quarters of the surveyed facilities kept records of supervision feedback, while nearly 70 per cent of the facilities had evidence of previous supervision feedback. Nearly 80 per cent of the surveyed facilities provided supervision to CHWs (see Figure 9).

Figure 9: Reported supportive supervision among surveyed health facilities (N=78)



Dietary patterns

Table 8 presents the dietary patterns among the surveyed pregnant women attending ANC in the Mbeya region. A majority (69.2 per cent) of the surveyed women reported eating three meals a day of which the lowest proportions were found in Mbeya DC (52.5 per cent), Busokelo (65.8 per cent) and Mbeya city (68.9 per cent). Around 68.4 per cent of the women attained dietary diversity in the previous 24 hours. This was seen to vary across the districts with the highest proportion of women attaining dietary diversity in Mbeya city (84.2 per cent), Kyela (68.4 per cent), Mbeya DC (68.1 per cent) and Rungwe (68.1 per cent). The lowest proportion of women attaining dietary diversity was found in Busokelo

(55.6 per cent) and Mbarali (41.8 per cent) (see Table 8). Only 58 per cent of the women attained a minimum acceptable diet (MAD)

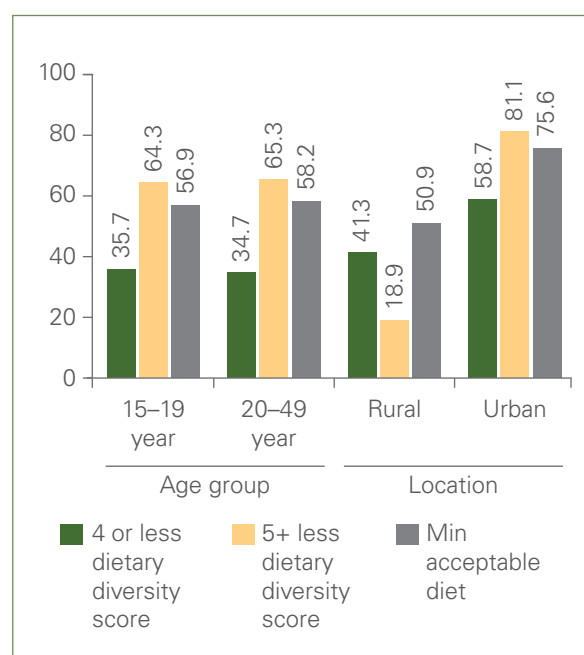
in the surveyed districts. This was highest in Mbeya city (80.2 per cent) and lowest in Mbarali (41.1 per cent).

Table 8: Dietary diversity and MAD

	Council												Total	
Variable	Busokelo		Kyela		Mbeya City		Mbarali		Mbeya DC		Rungwe			
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Number of meals in the past 24 hours														
One to two meals	31	31.6	48	13.9	52	8.8	58	19.6	101	21.2	62	19	352	16.5
Three meals	64	65.8	293	84.6	409	68.9	227	77	249	52.5	233	71.3	1476	69.2
More than three meals	3	2.6	5	1.4	133	22.3	10	3.4	125	26.3	32	9.7	307	14.4
Individual Dietary Diversity Score														
Less than four	43	44.4	110	31.6	94	15.8	171	58.2	152	31.9	104	31.9	673	31.6
Five or more	54	55.6	237	68.4	500	84.2	123	41.8	323	68.1	223	68.1	1461	68.4
Minimum Acceptable Diet – Women														
No	202	55.5	134	34.5	69	19.8	208	58.9	156	44.4	148	39.2	917	42.0
Yes	162	44.5	254	65.5	280	80.2	145	41.1	195	55.6	230	60.8	1266	58.0

Figure 10 presents dietary information among pregnant women attending the ANC disaggregated by age group and location. Of the women residing in urban areas, 75.6 per cent attained a MAD and 81.1 per cent had a dietary diversity score of five food groups or more (see Figure 10).

Figure 10: Dietary information across women's age groups by rural versus urban



Across age groups, there was a significant variation in dietary information patterns between pregnant women aged 15–19 years and those aged 20–49 years ($P\text{-chi}^2 < 0.01$). A total of 65.3 per cent of the pregnant women aged 20–49 years achieved a dietary diversity score of five or more food groups in comparison to 64.3 per cent of the pregnant women aged 15–19 years who achieved a dietary diversity score of 5+ (see Figure 10). This difference was also found to be statistically significant ($P\text{ chi}^2 < 0.01$). There was substantial variation in the proportion of women who achieved a MAD, where more than half of the surveyed women from both age groups achieved a MAD (58.2 per cent among women 20–49 years versus

56.9 per cent among women aged 15–19 years) ($P\text{-chi}^2 < 0.01$).

Food security and production

Supplementary Table 6 summarizes food production and food security responses from the interviewed respondents. Overall, 72.9 per cent of the respondents reported having assurance for meals, however, 13.3 per cent and 10 per cent of the respondents in Rungwe and Busokelo respectively reported that they often go to bed with no food. About 38 per cent of the respondents reported having a food shortage between the months of January and March. Meanwhile, 84.9 per cent of the respondents reported having no food shortages throughout the year. About 44.3 per cent and 48.6 per cent of the respondent's households reported having fruit trees and vegetable gardens respectively. Busekelo had the highest percentage in these categories (72.0 per cent and 81.9 per cent), while Mbarali had the lowest (22.7 per cent and 17.3 per cent) as indicated (see Supplementary Table 6).

Table 9 provides information about the sources of food. Findings showed that 64.2 per cent of the respondents get their food primarily from farming, while 35.8 per cent of the respondents purchase food. Busokelo had the highest percentage (88.4 per cent) of households sourcing their food from farming, while Mbeya city had about 72.1 per cent respondents primarily purchasing food. Of the households reported to source food from farming (see Table 3), only 5.1 per cent had wives as the decision makers on the use of the harvested food. About 69.3 per cent of the women reported making joint decisions with their spouses on the use of the harvested food (see Table 9).

Table 9: Sources of food

	Council												Total (n=2183)	
Variable	Busokelo (n=364)		Kyela (n=388)		Mbeya City (n=349)		Mbarali (n=353)		Mbeya DC (n=351)		Rungwe (n=378)			
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Primary source of food in the household														
Farming	320	88.4	252	65	97	27.9	274	77.6	240	68.6	215	56.9	1398	64.2
Purchase	42	11.6	136	35	251	72.1	79	22.4	110	31.4	163	43.1	781	35.8
Who decides on the use of the harvested food**														
Husband	40	16.6	60	26	16	17.2	123	49.6	40	18.7	34	17.4	313	25.7
Wife	19	7.9	4	1.7	3	3.2	9	3.6	14	6.5	13	6.7	62	5.1
Jointly	182	75.5	165	72	74	79.6	116	46.8	160	74.8	148	75.9	845	69.3

**This was asked to only to those with farming as the primary source of food



Water, sanitation and hygiene (WASH)

The data collected indicated that 63.7 per cent of the participants' households in Busekelo had unimproved latrines, while 59.1 per cent had improved shared latrines and 33.4 per cent had improved not shared latrines in Mbeya city (see Figure 11). On the other hand, only six per cent had improved not shared latrines in Busekelo and only 7.5 per cent had unimproved latrines in Mbeya city.

Figure 11: Types of latrines

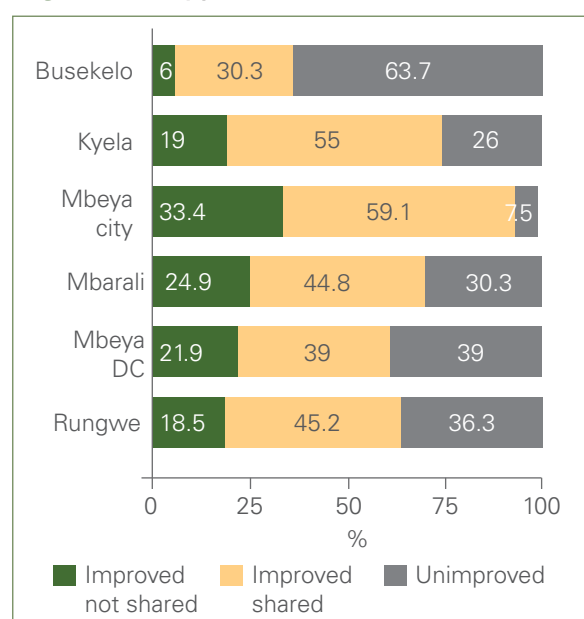
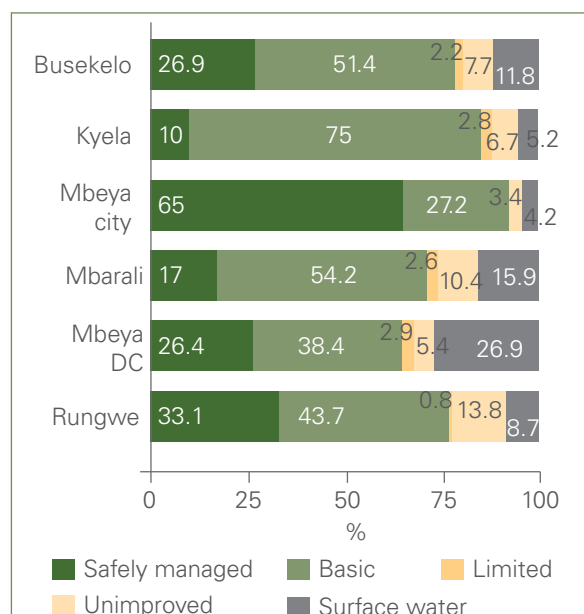


Figure 12: Drinking water management



In Mbeya city, none of the interviewed women reported to have limited drinking water management, whereas 65.0 per cent reported to have safely managed drinking water. As indicated in Figure 20, in Mbeya DC, 26.7 per cent of the women reported to use surface water as the source of drinking water. In Kyela, 75.0 per cent of the women reported having basic drinking water management, but only 10 per cent had safely managed drinking water. In Mbeya DC, 26.9 per cent of the women reported using surface water for drinking, while only two per cent reported doing the same in Mbeya city (see Figure 12).

CHWs' tables

The sociodemographic characteristics of the CHWs are shown in Table 10. In the sampled districts, most of the CHWs originated from Busokelo (18.1 per cent), Mbarali (17.4 per cent), and Rungwe (17.4 per cent). Overall, a majority of the CHWs were female (52.3 per cent), aged between 40–49 years (43 per cent) and had attained primary education levels (20.1 per cent) (Table 10).

Table 10: Sociodemographic characteristics of CHWs (N=149)

Variable	n	%
District name		
Busokelo	27	18.1
Kyela	25	16.8
Mbeya City	21	14.1
Mbarali	26	17.4
Mbeya DC	24	16.1
Rungwe	26	17.4
Sex		
Male	71	47.7
Female	78	52.3
Age at last birthday		

Variable	n	%
29 years and below	15	10.1
30–39 years	34	22.8
40–49	64	43
50 years and above	36	24.2
Highest level of education attained		
Pre-primary	1	0.7
Primary	102	68.5
Post primary training	7	4.7
Secondary 'O' level	30	20.1
Post-secondary 'O' level training	9	6

The work experience information among the surveyed CHWs in the Mbeya region is presented in Table 11. Approximately 55 per cent of the CHWs had more than seven years of work experience, 99.3 per cent reported having a cell phone and 88.6 per cent reported working less than five days in a week as a CHW. Most CHWs (96 per cent) worked eight hours or less per day and about 79.9 per cent worked a total of 19 hours or less per week (see Table 11). A total of 91.9 per cent of the CHWs reported being attached to a health facility with 63.5 per cent of them being attached to government dispensaries.

Table 11: Community health care workers work experience (N=149)

Variable	n	%
Length of time as community health workers		
Less than 1 year	6	4
1–3 years	27	18.1
4–7 years	34	22.8
More than 7 years	82	55
Have a cell phone	148	99.3

Variable	n	%
Days per week work as a CHW		
Less than 5 days	132	88.6
5 days and more	17	11.4
Hours of work per day		
8 hours and less	143	96
More than 8 hours	6	4
Hours of work per week		
19 hours and less	119	79.9
20–40 hours	27	18.1
41 hours and above	3	2
Attached to a health facility	137	91.9
Level of the facility you are attached to (n=137)		
Government hospital	5	3.6
Government health centre/clinic	26	19
Government dispensary	87	63.5
Religious/voluntary hospital/health centre/clinic	16	11.7
Private hospital/clinic	3	2.2

Table 12 summarizes findings concerning the nutritional services provided by the CHWs within their respective areas. Most CHWs (96 per cent) reported conducting home visits to pregnant women and 97.9 per cent reported that they provided nutrition counselling to these pregnant women. Of the types of nutrition advice given to the pregnant women, a majority reported counselling the women to eat a variety of foods from different food groups (97.9 per cent), to reduce heavy workloads and rest for one hour during the day (48.6 per cent) and to eat an extra meal and a snack each day (47.9 per cent). Very few (9.3 per cent) CHWs reported counselling the pregnant women on the use of iodized salt and only 2.9 per cent of the CHWs reported counselling the pregnant women to avoid consuming tea or coffee during meals (see Table 12).

Among the surveyed CHWs, most (99.3 per cent) reported that they traced pregnant women who missed their ANC appointments and identified those who had not yet made their ANC bookings and referred them (97.1 per cent). A majority of the CHWs (92.6 per cent) reported having received supportive supervision from health workers (see Table 12).

Table 12: Nutritional services conducted by CHWs (N=149)

Variable	n	per cent
Conduct home visits to pregnant women	143	96
Provide nutritional counselling to pregnant women	140	97.9
Types of nutrition advice do you give to pregnant women		
To eat variety of foods from different food groups	137	97.9
To eat extra meal and a snack each day	67	47.9
To avoid consuming tea or coffee during meal	4	2.9
To avoid alcohol, narcotics or tobacco products	36	25.7
To use iodized salt	13	9.3
To use Insecticide-treated bed nets (ITNs), deworming and IPTMs	52	37.1
Reduce heavy workloads and rest for at least 1-hour during the day	68	48.6

Variable	n	per cent
Importance of personal hygiene, hygiene of food, water and environment	62	44.3
What frequency of meals do you advise pregnant women to take at home?		
Less than three meals	77	55
4 meals and more	63	45
Food groups you advise women to include in their diet		
Carbohydrates e.g. cereals	128	91.4
Proteins e.g. animal meat	130	92.9
Fats i.e. animal meat	105	75
Vitamins/Minerals i.e. fruits and vegetables	136	97.1
Advice on the use of iron folic acid supplements to pregnant women	136	97.1
For how long did you advise pregnant women to take IFA		
Less than 90 days	8	5.7
90 days and above	114	81.4
Don't know	18	12.9
Trace pregnant women who have missed attending ANC	139	99.3
Identify pregnant women who have not booked ANC and refer them	136	97.1
Receive supportive supervision from health workers	138	92.6

Table 13 presents the number and corresponding percentage of CHWs who agreed to a list of indicators on job satisfaction. Among the 149 respondents, 91.3 per cent reported having learned a lot of new things as a CHW. Only 20.1 per cent of the respondents were satisfied with their stipend as a CHW. A majority of the respondents (99.3 per cent) enjoyed working with doctors; similar results were obtained which showed that 99.3 per cent of the respondents enjoyed working with nurses. Moreover, the results show that a majority of the respondents (99.3 per cent) were aware of the duties and responsibilities of CHWs; meanwhile, 50.3 per cent of the respondents reported being provided with the resources needed to do their jobs. A majority of the respondents (81.2 per cent) reported getting support from their supervisors and only 42.3 per cent attended training sessions often. All respondents, as indicated in Table 13, reported that the community benefited from the presence of the CHWs and a majority of the respondents (98.7 per cent) reported being available for community members who wanted to see them.

Table 13: Job satisfaction among CHWs (N=149)

	n (Yes)	%
I have learned a lot of new things as a CHW	136	91.3
I am satisfied with my stipend as a CHW	30	20.1
I enjoy working with doctors	148	99.3
I enjoy working with nurses	148	99.3
I am aware of the duties/ responsibilities of a CHW	148	99.3
I am provided with the resources I need to do my job	75	50.3
I get support from my supervisor	121	81.2
I attend training session often	63	42.3
My community has benefited from the presence of a CHW	149	100
I am available for community members who want to see me	147	98.7



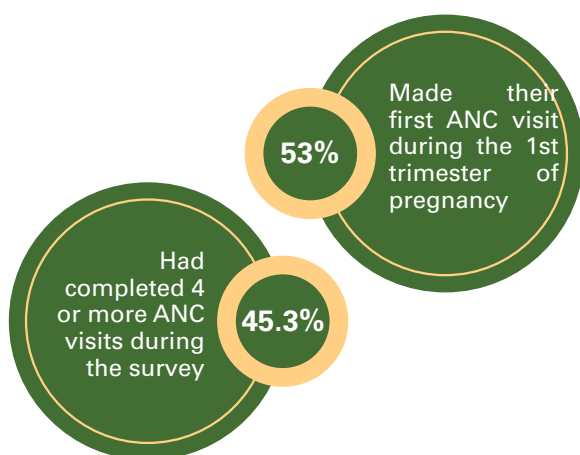
DISCUSSION

This study presents important findings on the nutritional status of pregnant women and the existing barriers to accessing quality maternal and nutrition health services in the Mbeya region. The findings show remarkable variation in the levels of anaemia among pregnant women; access to food; nutrition practices; and the determinants of ANC care utilization.

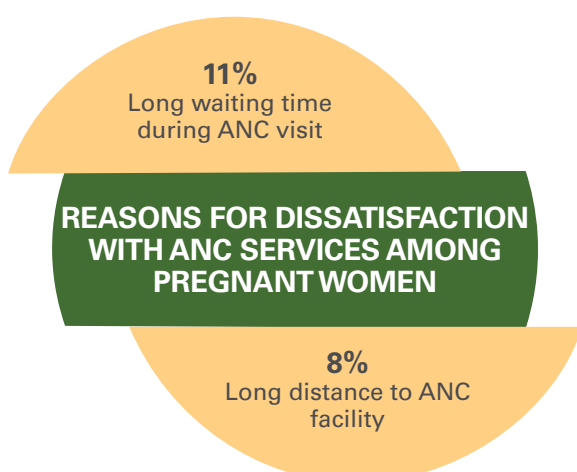
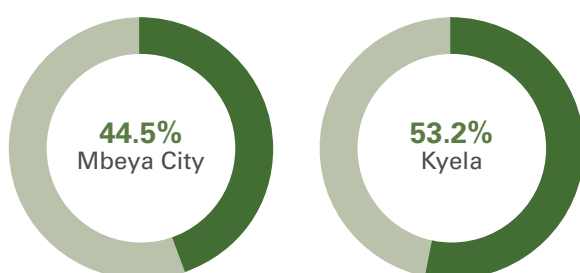
Better utilization of ANC services, which is measured as the gestational age at the first ANC visit and the total number of visits during pregnancy is a strong determinant of pregnancy outcomes. In Mbeya, half (53 per cent) of the pregnant women made their first ANC visit during the first trimester of their pregnancy. Despite this being higher than the

24 per cent reported in 2015 (TDHS), a large proportion of pregnant women still delay their initial visit to ANC till the second or even the third trimester. Utilization of ANC services varied greatly between the surveyed districts. Even though study participants were pregnant women who were still attending ANC services, approximately 45.3 per cent of them had completed four or more ANC visits during the survey. Pregnant women in Mbeya city had the lowest percentage of those who attended four or more visits (44.5 per cent), while the highest was in Kyela (53.2 per cent). The observed disparities between the districts could be attributed to various reasons. Pregnant women in Mbeya city were found to be relatively older than others, more educated, and more were

UTILIZATION OF ANC SERVICES AMONG PREGNANT WOMEN



DISPARITY IN PERCENTAGE OF PREGNANT WOMEN WHO ATTENDED 4 OR MORE ANC VISITS



employed than in the other districts which showed better performance. This points to the lack of ANC-friendly services, especially for urban pregnant women as compared to rural ones. Inadequate quality of care, which includes both technical and interpersonal aspects, may affect women's attendance to ANC. A sizeable proportion of women was not satisfied with ANC services, especially the long waiting time during an ANC visit (11 per cent), and long distance to the ANC facility (8 per cent).

The amount and quality of services provided to pregnant women during an ANC visit is critical to fetus development and maternal health. Most women received nutrition counselling during their ANC visit, however, there was substantial variation in the quality of the counselling. When looking at individual elements of counselling according to national guidelines, less than half of the women (29 per cent) were found to have been counselled on eating fatty foods and 39 per cent were not counselled on including carbohydrates in their meals. Disparities were observed in the proportion of pregnant women who received clinical examination and laboratory tests during the first ANC visit. About half (52 per cent) of the women received urinalysis test, while blood pressure of 22 per cent of the women was not measured. This differed greatly between the districts and could be due to inadequate training, mentorship and supportive supervision. In this study, it was found that most ANC facilities had not received supportive supervision in the six months prior to the survey. There was inadequate supplementation of IFA to pregnant women in Mbeya. Even though a majority (72 per cent) of the pregnant women had used IFA at least once during the pregnancy, about 20 per cent had not received IFA during some of

their ANC visits due to stock outs. This could also be explained by inadequate knowledge on the importance of IFA among pregnant women. Even though a majority of the women demonstrated better understanding about the importance of IFA, especially on prevention of anaemia, only a few were able to mention other benefits such as prevention of birth defects and bone strengthening.

This study demonstrated the high prevalence of anaemia among pregnant women attending ANC in the Mbeya region. About 38.7 per cent of the surveyed women were found to be anaemic, which varied substantially between the five surveyed districts. The prevalence of anaemia was highest in Kyela (54.8 per cent) and lowest in Mbeya city (19.4 per cent). Although the regional prevalence of anaemia is lower than the national average of 57 per cent, the observed differences between the study districts indicate that disparity exists in the access to health care among women in the region. This variation could be explained by the findings of this study, which showed that districts with low prevalence of anaemia were also likely to have better nutrition practices, more ANC visits and were more knowledgeable on the use of FFeO. Food shortage could partly explain the high prevalence of anaemia. It was found that about 64 per cent of the women depended on farming as the primary source of food for their household, yet 8 per cent of

these women experienced food shortage in the four weeks prior to the survey. It was also reported that male spouses were the decision makers for the use of the harvested foods. Food shortage was highest in the Mbarali district and lowest in the Rungwe district, correlating to the anaemia trend observed.

The study also found inadequate access to improved latrine facilities in the households of women who participated in the survey. Mbeya city had the highest percentage of households with improved and not shared toilet facilities (33.4 per cent), while Busekelo had households with fewer improved but not shared toilet facilities (6 per cent). Additionally, 63.7 per cent of the women reported having unimproved toilet facilities in their households. Fewer women were found having access to safe sources of water, with the highest percentage of women with access to safe water sources being in Mbeya city (65 per cent) and the lowest in Kyela (10 per cent). Findings of this study showed that about 27 per cent of the women in Mbeya DC used surface water as the source of drinking water. Overall, women attending ANC in Mbeya city had relatively greater access to latrine facilities and safe water sources.



RECOMMENDATIONS

Having observed the findings of the survey and analysed what could be the underlying factors for the nutritional status of women in the Mbeya region, these 1) community and 2) facility-level entry point actions are recommended:

1. Community-level entry point

Gender roles and culture norms place men as decision makers within their families. This calls for social and behaviour change communication (SBCC) interventions at the household level that will engage men in advocacy for prioritizing their family's nutritional needs over economic

gains obtained from selling food produce. In particular, the SBCC package should promote a healthy diet at the family level, which includes homestead production, consumption of fruits and vegetables, use of fortified foods, incorporating WASH activities at home, home gardening and the raising of poultry. These ideas can be further extended to Village Health and Nutrition Days (VHNDs) by incorporating evidence-based examples for male involvement in supporting healthy diets and maternal health. The delivery of the SBCC package can be catalysed by advocacy through the influential members, faith leaders and village government leaders of the community. This will generate ANC demand by promoting early ANC booking and enhance services that are offered at

community health platforms. These efforts have to be preceded by capacitating CHWs to deliver the SBCC package, reviewing incentive models for CHWs and ensuring the availability of job aids for CHWs.

2. Facility-level entry point

At the facility level, integrating health-care facility (HCF) SBCC package which promotes maternal nutrition counselling; strengthening the importance of ANC attendance completeness; food fortification and healthy diets (which include the consumption of fruits and vegetables); and compliance to IFA are all recommended actions.

Capacity-building for health-care providers through refresher courses and enhanced supportive supervision should also be undertaken. Training courses will allow the provision of quality nutrition counselling and management of anaemia, together with addressing the challenges of stock outs of medical supplies (including IFA).

Delayed service provision observed at Health facilities undermines the ongoing collective efforts. For this, CHWs could be capacitated, given resources, and financially supported to offer some less clinical ANC services such as anthropometric measurements, which can ultimately reduce the waiting time and thereby improve client satisfaction. This, together with other efforts, would improve timely health care seeking behaviour and generate demand for ANC services among pregnant women.

It is also important to improve the education offered together with the SBCC strategies to promote the use of supplements and early ANC booking; and to increase ANC visits for pregnant women after having improved access to health facilities. It was observed in this study that when IFA is available and dispensed, it is used by pregnant women who are motivated by the knowledge that IFA prevents anaemia and has other advantages.

REFERENCES

1. TDHS, "Tanzania," Tanzania 2015–16 Demogr. Heal. Surv. Malar. Indic. Surv., 2015.
2. Ministry of Health, Community Development, Gender, Elderly and Children (MoHCDGEC) [Tanzania Mainland], Ministry of Health (MoH) [Zanzibar], Tanzania Food and Nutrition Centre (TFNC), National Bureau of Statistics (NBS), Office of the Chief Government Statistician (OCGS) [Zanzibar] and UNICEF. 2018. Tanzania National Nutrition Survey using SMART Methodology (TNNS) 2018. Dar es Salaam, Tanzania: MoHCDGEC, MoH, TFNC, NBS, OCGS, and UNICEF.
3. Lee ACC, Katz J, Blencowe H, et al. Born too small: national and regional estimates of term and preterm small-for-gestational-age in 138 low-income and middle-income countries in 2010. *Lancet Glob Health*. in press
4. Gunaratna NS, Masanja H, Mrema S, Levira F, Spiegelman D, Hertzmark E, et al. (2015) Multivitamin and Iron Supplementation to Prevent Periconceptional Anemia in Rural Tanzanian Women: A Randomized Controlled Trial. *PLoS ONE* 10(4): e0121552. doi:10.1371/journal.pone.0121552
5. Alexandra L. Bellows, Emily R. Smith, Alfa Muhihi, Christina Briegleb, Ramadhani A, et al. (2017) Micronutrient Deficiencies among Breastfeeding Infants in Tanzania. *Nutrients*. 2017 Nov; 9(11): 1258. doi: 10.3390/nu9111258.
6. Bahman Kashi, Caroline M Godin, Zuzanna A Kurzawa, Allison M J Verney, Jennifer F Busch-Hallen, Luz M De-Regil. (2019). Multiple Micronutrient Supplements Are More Cost-effective Than Iron and Folic Acid: Modelling Results from 3 High-Burden Asian Countries. *The Journal of Nutrition*, Volume
7. Black, R. E., Victora, C. G., Walker, S. P., Bhutta, Z. A., Christian, P., de Onis, M., et al. (2013). Maternal and child undernutrition and overweight in low-income and middle-income. *Lancet*. 2013 Aug 3; 382(9890):427–451. doi: 10.1016/S0140-6736(13)60937-X. Epub 2013 Jun 6.

