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Analysis of Trends in Nutritional Status and Morbidity of Under-fives among Internally Displaced Persons at Chingwizi, Mwenezi District, Zimbabwe 2014-2015

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Abstract:
Background: Tokwe Mukosi flooding in February 2014 forced displacement of over 2670 families from Chivi and Masvingo districts to relocate to Chingwizi in Mwenezi district. Displacement left them in need of basic facilities thereby increasing their risk of malnutrition and illness. A March 2014 survey revealed that fewer children under-five years in Chingwizi received a minimum acceptable diet (MAD) compared to those outside the camp. This study analysed trends in morbidity and nutritional status of under-fives at Chingwizi.
Methods: A secondary dataset analysis was conducted. Cumulatively, 4454 records of children under-five years who had body measurements during the review period and had sufficient demographic and anthropometric detail were analysed. Data were analyzed using Excel software and Stata.
Results: Wasting significantly declined from the first round (7.9%) through the fourth rounds (4.4%) while underweight declined from 15.1% to 12.3%. Boys were more affected by malnutrition throughout the four rounds. Morbidity declined significantly (from 37.4% to 31.9%) over four rounds, among both sexes. Overall, under-nutrition was associated with higher rates of morbidity (Underweight POR 1.27, χ^2 =7.0, p=0.008) and wasting in particular, was 42% more likely to result in illness (χ^2 =8.5, p=0.004).
Conclusion: Malnutrition and morbidity at Chingwizi significantly declined from May 2014 to March 2015 although the rates remained higher compared to the larger population. More boys than girls were affected by malnutrition. The MAD also significantly declined through subsequent rounds as food aid dwindled. Wasting and underweight were strongly associated with higher rates of under-five morbidity. Sustainable food security interventions are crucial.

Keywords: *Chingwizi, Malnutrition, Underweight, Wasting, Morbidity, Under-five years*

1. Introduction

Migration is the movement of people from one place to another. It involves a diverse group of people, including irregular (undocumented) and regular migrants (documented), victims of trafficking, asylum seekers, refugees, displaced persons, returnees, migrant workers and internal migrants [1]. While migrants are more concerned about immediate biological needs such as food and shelter migration often makes people difficult to reach, whether for prevention health and care. Notably, irregular migrants often have limited access to health promotion and care in foreign countries due to fearing of arrest and deportation for not having proper documentation [2]. Some health service providers, including community care workers also believe that migrants increase the burden of diseases and overload the health system [3].

Migration and health are inter-related. The conditions and factors surrounding the migration process (rather than migration itself), often, define the susceptibility to ill-health and risks for migrants, their families and the communities with whom they interact. "The same inequalities that drive migration also tend to affect the health of concerned populations. Such inequalities include poverty, unemployment and poor access to basic social services" [1]. Migration health refers to the well-being of migrants, mobile populations, their families, and communities affected by migration [4]. Zimbabwe is a signatory to the World Health Organization (WHO) Resolution passed during the 61st World Health Assembly in May 2008, which calls for migrant sensitive health policies and practices among member states. The Zimbabwe National Health Strategy 2009 – 2013 recognised the emergence of unplanned peri-urban settlements and resettled farmers (internal migration) without social services as key demographic issues that were considered in the strategic plan [4].

Zimbabwe has experienced internal displacements due to among other causes, diamond mining and natural disasters including flooding and hailstorms. The majority of the IDPs inhabit land to which they have no legal rights, with limited opportunities to return to their place of origin, few incomes earning opportunities, and generally poor access to basic social services such as water and sanitation, health and education. Long term solutions to the needs of IDPs are essential to transition from dependence on humanitarian aid towards self-sufficiency and stability [1]. The country remains susceptible to natural and human induced disasters in future and there remains concern that IDPs residing in spontaneous subserviced settlements will be particularly vulnerable to drought, poverty and hunger as well as communicable diseases such as cholera and malaria. Only 20% of IDP's have the minimum acceptable sanitation facilities with about half of the IDP's practicing open defection. In addition, half of the IDPs' drinking water is from unsafe water sources such as unprotected shallow wells and open rivers [1]. According to a report by the MHTWG Zimbabwe 2013, the diseases commonly found among migrants include Acute Respiratory Infections (ARI), diarrhoea, malaria, Sexually Transmitted Infections (STIs), Tuberculosis (TB), Human Immuno Deficiency Virus/ Acquired Immuno Deficiency Syndrome (HIV/AIDS) and malnutrition [4].

In 2012/13, more than 20,000 individuals were adversely affected by natural disasters in Zimbabwe [1]. In February 2014 floods at Tokwe Mukosi forced the displacement of more than 4000 people (~2670 families) downstream and upstream of the flood basin to relocate to Chingwizi, Chisase and Masangula Relocation sites of Nuanetsi ranch, Mwenezi district, Zimbabwe. Chingwizi settlement is located in Nuanetsi ranch, Mwenezi district, south east of Masvingo province and bordering Chiredzi to the east, Chivi to the north, Masvingo to the north east, Beitbridge to the south and Mberengwa to the west. It covers about 1 339 657 hectares of land with an environment ideal for livestock production rather than crop farming. The district lies mainly in Natural Regions V and less in region IV. The lack of disaggregated health surveillance data means that the health needs of IDPs and migration-affected communities are commonly overlooked, thereby increasing their health vulnerability by reducing access to services and social care [6].

Relocation to Chingwizi left the affected in direct need of food, health services, water and sanitation facilities thereby increasing the risk of both acute and chronic malnutrition as well as contracting diseases. A rapid nutrition assessment in March 2014 revealed that less than 2% of children under-five years in Chingwizi camp, located in Nuanetsi ranch, were receiving a minimum acceptable diet (MAD). However, 68% of children outside the camp but in the same district (Mwenezi) had access to a MAD while in the IDPs' districts of origin (Chivi and Masvingo districts) access to MAD was 25.4% and 41% respectively during the same period.

In March 2014, the MOHCC started monitoring the nutritional status of under-fives in the camp, starting the first round in May 2014. In addition, children are also supplied with micronutrient supplements (commonly in the form of powders) during every round of the periodic assessments. Micronutrient powders (MNPs) improve the vitamin and mineral health of children. MNPs reduce anaemia and stunting among children. Each child was allocated 30 sachets of powders (each providing one serving) to mix with porridge every two days till the next distribution after two months. This study sought to analyse trends in morbidity and nutritional status of under-fives in Chingwizi, and to assess the degree of association of nutritional status and the health status of children in the area. This study would inform decision making and planning regarding the health of displaced communities. Long term solutions are essential to ensure that IDPs transition from dependence on humanitarian aid towards self-sufficiency and stability [1].

2. Methods

A secondary dataset analysis was conducted. Records of children under-five years who either received MNPs or had body measurements during the review period and had sufficient detail were analysed. Data were analyzed using Excel software and Stata. Graphs were generated to demonstrate the various trends in nutritional status and morbidity. Chi square test was used for significance testing. Permission to carry out the study was obtained from the Ministry of Health and Child Care, Masvingo province and the Health studies office. Since client records with names were reviewed, all information collected shall remain confidential and no names were included in the study.

3. Results

3.1. Demographic Characteristics

Cumulatively, 5361 children were assessed over four rounds, of which 331 records did not bear a sex label while a further 576 records were discarded due to insufficient anthropometric details (Age, Height/length, weight), giving 83% (4454) completeness in terms of data capturing. The majority of assessed children with complete data were girls, constituting 51.5% (2292). There were 2162 boys (48.5%). Refer to Table 1 in annex.

3.2. Acute Malnutrition

Figure 1 in the annex shows that trends in wasting declined from the first round (7.9%) through the fourth rounds (4.4%), and this decline was statistically significant among the older age groups. Wasting peaked in the second round of MNPs (14.8%). Disaggregation by sex category also showed that levels in wasting significantly declined over the four rounds, for both boys and girls, but boys were more wasted throughout the four rounds. There was a significant difference between trends for wasting among boys and girls.

3.3. Underweight

There was a decline in Underweight across the age-groups (from 15.1% to 12.3%) with the 24-59 age group reaching a significant peak in the second round (20.9%), when the other age-groups reached a low. Younger children (6-11 month) were least affected for the greater part of the period under review. Disaggregation by sex showed that underweight was gradually increasing in boys while gradually decreasing among girls. The increase in underweight among boys was marginally significant while the decrease among girls was not significant. See Figures 3 in annex. There were no significant changes in the stunting levels.

3.4. Morbidity

There was a significant decline in morbidity from the first (from 37.4%) through subsequent rounds of MNP distributions (to 31.9%). Illnesses peaked in the second round (69.8%) before sharply declining in subsequent rounds. The 12-23 months age group was most affected over the greater part of the period under review. Across sex categories, there was a significant decline in morbidity among both boys and girls over the four rounds. Refer to Figures 4.

3.5. Bivariate Analysis

Overall, under-nutrition was significantly associated with higher rates of morbidity (Underweight POR 1.27, χ^2 =7.0, p=0.008) and wasting (GAM) in particular, was 42% more likely to result in illness compared to the normal/standard nutritional status (χ^2 =8.5, p=0.004). Stunting was protective against morbidity (POR 0.87, χ^2 =4.50, p=0.034). Refer to Table 2. We did not proceed to conduct multivariate analysis (regression model building) since the variables are inter-related.

4. Discussion

Trends in wasting significantly declined from the first round through the fourth rounds, among girls, boys and the older age groups. There were no significant changes in the stunting levels. Underweight declined across the age-groups with the 24-59 age group reaching a significant peak in the second round, when the other age-groups reached a low. Boys were more malnourished throughout the four rounds. There was a significant decline in morbidity across both sexes from the first through subsequent rounds of MNP distributions. Illnesses peaked in the second round. Overall, malnutrition and particularly wasting was a significant risk factor for illness. To this end the peak in illnesses coincided with the peak in underweight. However, the association between stunting and morbidity defied biological plausibility as stunted children were less likely to be ill.

In comparison with global thresholds, wasting was notably in the high category (10%-14%) or worse for the 6-11-month age group during the first three rounds. By the fourth round wasting levels had declined in all age groups but only the 24-59-month age group reached low levels (<5%) in the last two rounds. [Wasting levels in Masvingo province are currently estimated at 2.8% [7] and these are lower to those at Chingwizi]. Average stunting levels were over 30% (high category) over three rounds, which is higher than the current provincial rate of 29.4% for Masvingo [7]. Despite a downward trend, underweight Chingwizi was higher compared to provincial levels across the four rounds (i.e. >10.9%).

Higher levels of malnutrition compared to the reference population in this study are consistent with longstanding evidence which points to an increase in malnutrition levels among IDPs when compared to the larger population. Gul et al [8] explained that this may be a result of many health crises such as lack of immunization of children against diseases, lack of shelter, poor personal hygiene and poor environmental sanitation and disease outbreaks. Gul et al further concluded that malnutrition increases among refugees and IDPs, and was more common in girls than in boys. However, in this study malnutrition was more common in boys. This is consistent with most data available in Zimbabwean records, notably the ZNNS [9], MICS [7a] and Multiple Indicator Monitoring Survey [7b]. The Food Security and Nutrition Analysis Post Deyr [10] in Somalia also reported higher levels of wasting (GAM), stunting and underweight in boys compared to girls. Higher rates of malnutrition in boys could be attributed to the physiological differences which predispose boys to increased nutritional needs [13, 14 & 15].

In line with findings at Chingwizi, children in the youngest age group (3 – 24 months) were most at risk of acute malnutrition (Adjusted OR 2.78 95% CI 1.26–6.15; p value=0.012) in a Ungandan study by Olwedo et al [11]. This could possibly be due to poor complementary feeding practices such as poor dietary diversification and inadequate amount of food provided per meal. The significant decline in the wasting and underweight trends may be attributed to food aid interventions, and particularly the MNPs which were distributed at every round. The evidence collected from various settings led Rah et al [12] to acknowledge that "… the differences in the root causes and baseline levels of stunting in each setting and the extent to which other interventions are implemented in parallel may explain the variations in findings" [12]. The significant decline in morbidity at Chingwizi is synonymous with significant decrease in diarrhoea episodes among children receiving MNP in Nepal [12]. In the evaluation by Rah et al, there was significant reduction in reported diarrhoea cases among children. They observed that although the reduction may be attributed to other on-going interventions at the camp, the additional zinc supplied from MNP may have been a protective factor. This explanation could well be extrapolated to the scenario at Chingwizi where besides MNPs, food supplementation, WASH and immunization interventions

were availed by Government and various stakeholders. The peak in illnesses and underweight in the second round may be explained by acknowledging that most families at Chingwizi were moved off the camp to their designated portions of land starting July 2014. This also resulted in withdrawal of humanitarian aid by most stakeholders. Of the remaining aid, food rations were also temporarily cut down during the second quarter of 2014.

The Food security and Nutrition Analysis Post [10 & 10b] acknowledge the synergistic effect of malnutrition and disease. The former reported higher morbidity amongst children with greater prevalence of acute malnutrition. However, the latter report cited a significant positive correlation between GAM-MUAC and morbidity ($r= 0.53$, $p<0.05$). The association between malnutrition and morbidity at Chingwizi is also explained by the vicious cycle of repeated infections, reduced nutrient intake and absorption, compromised immunity and deteriorating nutritional status. The awkward association between stunting and morbidity may possibly reflect discrepancies in data capturing or anthropometry or possibly warrant further research. The findings emphasize that it is crucial to prioritise nutrition interventions for the lower age groups, (6 to 23 months) who are growing and developing rapidly and are most vulnerable to malnutrition in IDPs and host communities alike. Besides nutrition interventions, it is also crucial to maintain and strengthen other leading life- saving interventions like immunization, water, sanitation and hygiene initiatives to guard against the cycle of malnutrition and infection.

5. Limitation

Incremental changes in the weights of some individual children may have not been realised due to the dynamic nature of the sample, i.e. the children that were given the MNPs were not the same throughout the four rounds. For instance, some children missed MNPs when the caregivers had to travel back to Chivi and Masvingo to care for their nutrition gardens.

6. Conclusion

The levels of malnutrition, particularly underweight and wasting declined from May 2014 to March 2015 among under-fives at Chingwizi. The rates were however, higher when compared to the larger population in the province. More boys than girls were affected by malnutrition at Chingwizi. Morbidity peaked in the second round of MNP distributions (July 2014) before significantly declining over subsequent rounds among both boys and girls. The MAD also significantly declined through subsequent rounds as food aid dwindled. Malnutrition, specifically GAM and underweight was associated with higher rates of under-five morbidity at Chingwizi. There is need for sustainable food security interventions.

7. Recommendations

In light of the high malnutrition levels at Chingwizi, in comparison to the larger population, there is need

- To improve food security by prioritizing subsidized drought resistant agricultural input (small grain) to the inhabitants in Chingwizi [Responsibility of the Government (Govt) through the Ministry of Agriculture, and Non-Governmental Organisations (NGOs)]
- To promote livestock production and income generating activities so as to improve food security in the long term (the setting is a naturally dry region: Govt & NGOs).
- For continued MNP distributions and possibly supplementary feeding for under-fives to prevent malnutrition (**DMO** through Nutritionist)
- To strengthen WASH activities by introducing community health clubs possibly integrated with the on-going CIYCF program (**DMO**)
- To ensure constant monitoring and supervision of the existing community health projects such as Growth monitoring, CIYCF and EPI (**DMO**)

7.1. Public Health Action Taken

- Community Infant and Young Child Training of 150 Community volunteers in Chingwizi and a further 150 volunteers in neighbouring Rutenga area, Mwenezi district was done
- Water, Sanitation and Hygiene (WASH) activities by International Organisation for Migration [at least 400 blair toilets constructed to date (against a target of 3000)]
- On-going active case finding of malnourished children (by MOHCC trained village health workers) and treatment of cases of acute malnutrition by MOHCC personnel

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8.1. Competing Interests

The authors declare that they have no competing interests.

8.2. Authors' Contributions

RTC: conception, design, acquisition, analysis and interpretation of data and drafting the manuscript. BK: conception, design, data collection, analysis, interpretation and reviewing of several drafts of the manuscript for important intellectual content. NTG, DB, MM, MT: conception, design, acquisition, analysis and interpretation of data and drafting the manuscript. All authors read and approved the final manuscript.

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Annexure 1

Characteristic		Frequency	Per cent (%)
Age group years	**Sex**		
6 -11 months	M	252	52.7
	F	226	47.3
	Total	478	
12 -23 months	M	452	45.0
	F	552	55.0
	Total	1004	
24 – 59 months	M	1458	49.1
	F	1514	50.9
Grand Total	Total	2972 **4454**	

Table 1: Demographic Characteristics of Study Population (n= 4454)

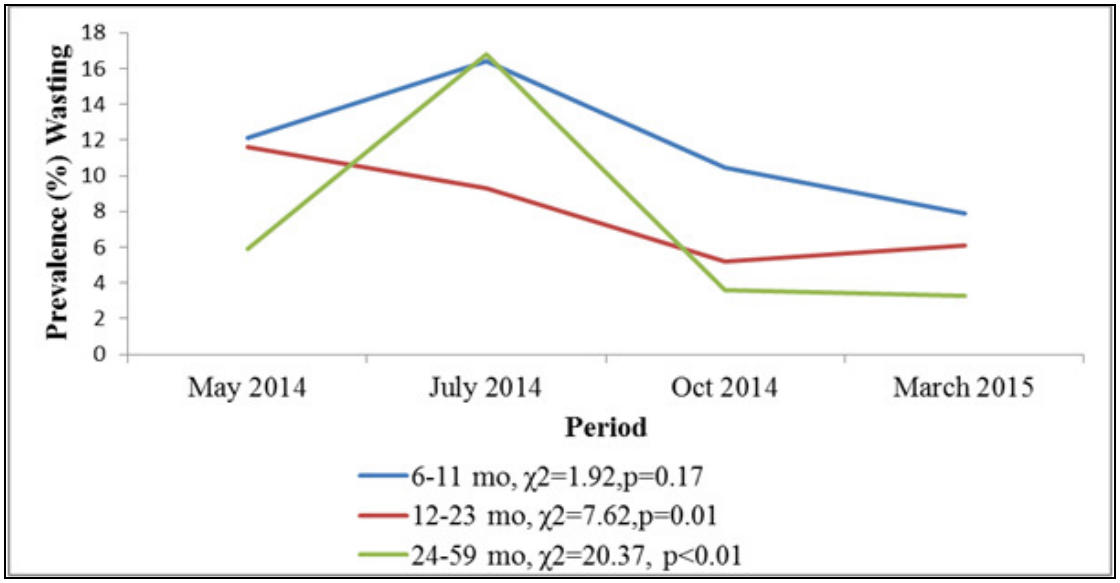

Figure 1: Global Acute Malnutrition Trends among Under-fives at Chingwizi by Age Group, 2014-2015

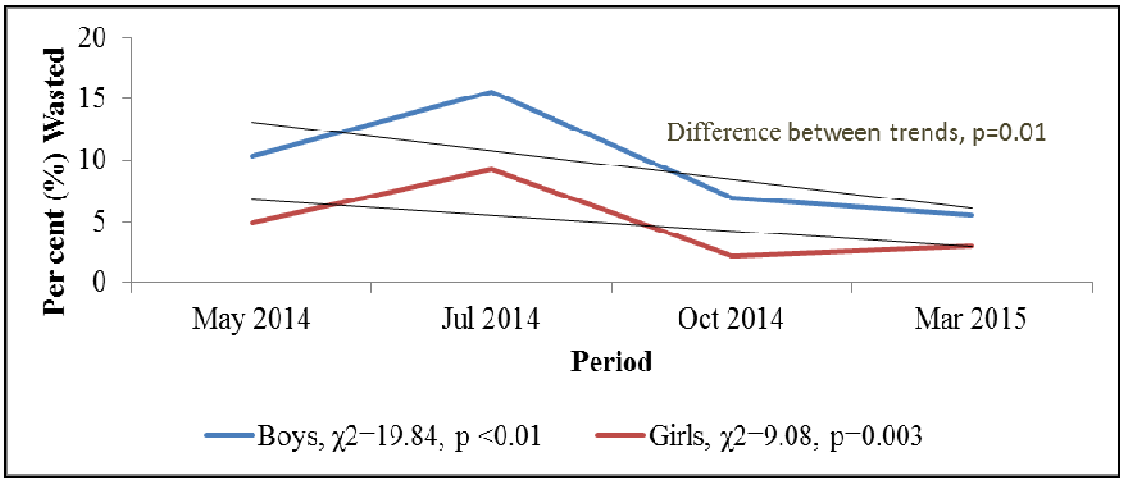

Figure 2: Global Acute Malnutrition trends among Under-fives at Chingwizi by Sex, 2014 -2015

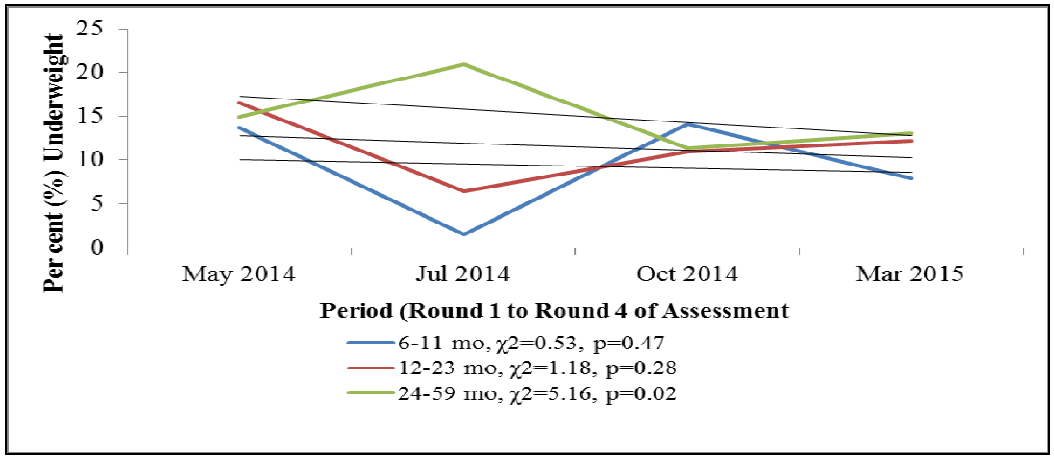

Figure 3: Trends in Underweight among Under-fives at Chingwizi, by Age group, 2014/15

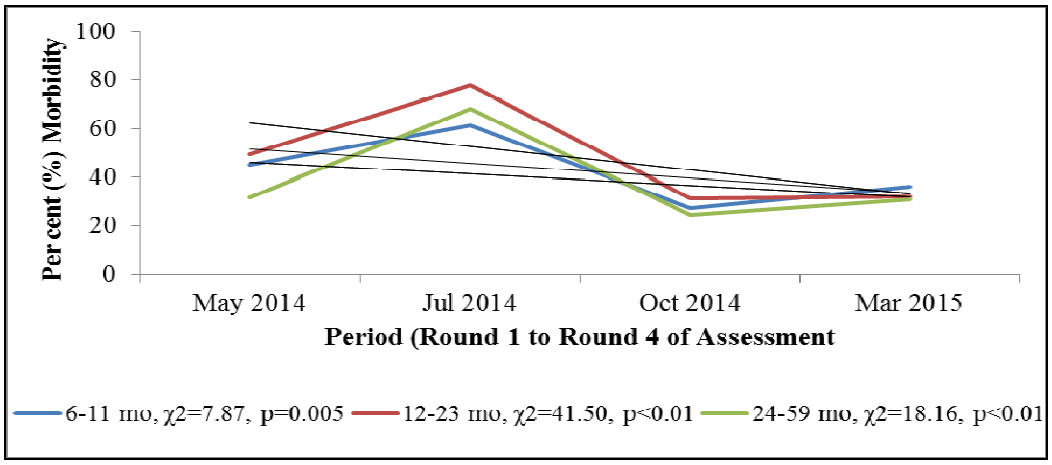

Figure 4: Trends in Morbidity among Under-fives at Chingwizi by Age Group, 2014-2015

Variable	Illness in last 2 weeks		POR	Chi square (χ^2)	p-value
	n (%)				
SAM	Ill	Not ill			
Cases	68 (47.9)	74 (52.1)	1.66	8.93	0.003
Non-cases	1656 (35.7)	2987 (64.3)			
MAM	Ill	Not ill			
Cases	42 (39.6)	64 (60.4)	1.17	0.61	0.436
Non-cases	1682 (36.0)	2997 (64.0)			
GAM	Ill	Not ill			
Cases	132 (43.9)	169 (56.1)	1.42	8.53	0.004
Non-Cases	1592 (35.5)	2892 (64.5)			
Stunting	Ill	Not ill			
Cases	442 (33.6)	872 (66.4)	0.87	4.50	0.034
Non-cases	1282 (36.9)	2189 (63.1)			
Underweight	Ill	Not ill			
Cases	241 (40.9)	348 (59.1)	1.27	6.96	0.008
Non-Cases	1483 (35.3)	2713 (64.7)			

Table 2: Association between Malnutrition and Morbidity at Chingwizi, 2015

** Key SAM –Severe Acute Malnutrition, MAM –Moderate Acute Malnutrition and GAM –Global Acute Malnutrition (SAM +MAM)*

Annexure 2

1. Definitions

1.1. Nutrition Indicators Assessed

1.1.1. Wasting

Refers to low weight for length/height and reflects recent or acute malnutrition. It is useful when exact ages are difficult to determine and it is appropriate for examining short term nutritional shocks brought about by for example, illness or drought (iadequate food intake, incorrect feeding practices, infections or usually, a combination of these). However, chronic under nutrition or illness can also cause this condition [21]. In emergency situations wasting or thinness in children under five years of age, combined with nutritional/bilateral oedema is used an indicator of acute malnutrition, reflecting overall severity of a crisis [22]. Weight for height is expressed using Z-scores (standard deviations from the reference median). Oedema is the presence of excessive amounts of fluid in the intracellular tissue. Fluid retention increases the child's weight, masking what may actually be very low eight [21]. Due to the strong relationship between oedema and mortality, a child with oedema (kwashiorkor) is rated severely malnourished regardless of wasting, stunting or underweight status. Mid Upper Arm Circumference (MUAC) can be used for rapid screening of acute malnutrition.

1.1.2. Stunting

This refers to low length/height for age, resulting in growth failure to achieve length/height as compared to a healthy, well-nourished child of the same age. It reflects chronic/long-term malnutrition and it is associated with protein energy malnutrition, frequent infection and sustained inappropriate feeding practices. For children below two years of age, the term is length for age while for those above two years of age the index is termed height for age [22]. Tallness is rarely a problem unless it is excessive and may reflect uncommon endocrine disorders [21].

1.1.3. Underweight

This is a composite measure of both chronic (stunting) and acute (wasting) malnutrition although it cannot distinguish between the two. It thus reflects the overall or average nutritional status. It is the recommended indicator to assess changes in the magnitude of malnutrition over time.

1.1.4. Moderate Malnutrition

Moderate malnutrition is defined as a weight-for-age between -3 and -2 z-scores below the median of the WHO child growth standards. It can be due to a low weight-for-height (wasting) or a low height-for-age (stunting) or to a combination of both. Similarly, moderate wasting and stunting are defined as a weight-for-height and height-for-age, respectively, between -3 and -2 z-scores [5].

1.1.5. Severe Malnutrition

Severe acute malnutrition is defined by a very low weight for height (below -3z scores of the median WHO growth standards), by visible severe wasting, or by the presence of nutritional oedema [5].

Global Acute Malnutrition: refers to less than -2 SD and thus constitutes both moderate and severe malnutrition and or nutritional oedema (bilateral pitting oedema).

Severity	Prevalence of (GAM)
Acceptable	< 5%
Poor	5-9%
Serious	10-14%
Critical	≥ 15%

Table 1: WHO Classification using rates of Global Acute Malnutrition (GAM)

	Global Acute Malnutrition (GAM): Children 6 -59 months	
	Moderate Malnutrition	Severe Malnutrition
Weight for length/height	Between -2 and -3 SD or 70th to 79th percentile	Less than -3 SD or below the 70th percentile
MUAC	Less than 12.5 cm	Less than 11cm
Nutritional Oedema	N/A	Bilateral

Table 2: Global Acute Malnutrition constitutes Moderate and Severe Malnutrition

Minimum Acceptable Diet (MAD) – this constitutes the minimum dietary diversity of four food groups also termed ('4-star diet') - [i.e. fruits and vegetables, animal source foods, legumes and staples/starches] and the recommended minimum meal frequency for the

age group). Breastfeeding children aged 6 to 8 months need solid, semi-solid foods, two times a day while those aged 9 to 23 months need them three times a day. Older children eat family foods starting at two years.

Infant Infant: A Child from birth up to 1 year

Young Child: A child from 12 months up to two years of age

Exclusive breastfeeding means the infant only receives breast milk without any additional food or drink, not even water from the time of birth up to 6 months of age.
To enable mothers to establish and sustain exclusive breastfeeding for 6 months, WHO and UNICEF recommend:

- Initiation of breastfeeding within the first hour of life
- Exclusive breastfeeding – that is the infant only receives breast milk without any additional food or drink, not even water
- Breastfeeding on demand – that is as often as the child wants, day and night
- No use of bottles, teats or pacifiers