









































No 16(17.3) 76(82.6) 92(73.6)

---

Source: computed from SPSS, version 22

From the table 4.9, households which self-reported to take one meal per day were 1.15 more likely to have a child with relapse of acute malnutrition than households which have two meals per day (AOR=1.15,95% CI=0.4-1.9). Strong association for number handwashing events and relapse of acute malnutrition has been found. The greater number of handwashing events the less the chance of having a case of relapse of acute malnutrition. Households whose members are taken above 31 minutes to the source of drinking water have been found to be at 1.12 times risk to have a child with relapse of malnutrition than those using less than 30 minutes to the source of drinking water.

HHs whose source of drinking water is spring had 4 times more chances to have relapse of malnutrition than families those which get water from taps (AOR=4.1, 95% CI=0.2-6.9) and 1.2 times more chance compared to HHs whose drinking water source is lake or swamp (AOR=1.2, 95% CI=0.5-3.2). Children who were given specific meals were 2 times less likely to develop relapse of acute malnutrition than those who were not given specific meals.

**Table 4. 10. Multivariate analysis parent’s demographics and Relapse cases**

(n=125)

Variable name	Odds ratio (OR)	95% CI	P-value
<b>Father’s occupation</b>			
No occupation	1.33	0.3-4.9	0.66
Agriculture (base)			
Full time job	0.74	0.1-2.4	0.58
Part time job	1.0	0.3-3.1	0.94
<b>Mother’s occupation</b>			
No occupation (base)			
Agriculture	0.83	0.2-2.6	0.76
Part time job	0.33	0.7-1.4	0.14
<b>Ubudehe Category</b>			
Category 1	1.8	0.5-5	0.30
Category 2	0.8	0.2-2.5	0.77
Category 3(base)			
<b>Religion</b>			

Islam (base)			
None	0.4	0.04-4.0	0.4
Catholic	0.9	0.3-2.8	0.9
Protestant	0.8	0.2-3.1	0.8
<b>Under five years children</b>			
One (base)			
Two	0.8	0.3-2.2	0.7
Three	1.2	0.3-4.6	0.7
Four	0		
<b>Mother's age at delivery</b>			
<20 (base)			
21-25	2.5	0.4-15	0.3
26-30	0.9	0.1-5.7	0.9
>31	1.2	0.2-6.5	0.7

Source: computed from SPSS, version 22

As shown in this table 4.10, children whose fathers were jobless were 1.3 times more likely to have a relapse of acute malnutrition than those whose fathers were farmers (AOR=1.3, 95% CI=0.3-4.9). Children whose fathers had a full-time job were 1.3 times less likely to have a relapse of acute malnutrition than those whose fathers were farmers. Children whose mothers were engaged in agriculture were 1.2 times less likely to relapse to acute malnutrition than those whose mothers had no occupation. Households in Ubudehe Category 1 are 1.8 times more likely to have a relapse of acute malnutrition than those in Ubudehe Category 3 (AOR=1.8, 95% CI=0.5-5). Children in families where there were three children aged under five years were 1.2 times more likely to have a relapse of acute malnutrition than children in families where there was one child aged under five (AOR=1.2, 95% CI=0.3-4.6).

## 5. Summary, conclusions and recommendations

The study aimed at determining factors associated with relapse of acute malnutrition among children under five years old who had had acute malnutrition and had been discharged from malnutrition treatment programmes in two years prior to data collection in Bugesera district. It looked at the prevalence of relapse of acute malnutrition among children aged under five, sought to determine maternal and child factors associated with relapse of acute malnutrition and socio-economic factors associated with the condition.

### **5.1.1. Prevalence of relapse of acute malnutrition**

Prevalence of relapse of acute malnutrition among children aged under five was found to be at 21% in Bugesera District as 26 of the 125 caretakers of children reported that their children had more than one episode of acute malnutrition.

### **5.2.2. Maternal and child related factors associated with relapse of acute malnutrition among under five years old children of Bugesera District**

Handwashing habit of the mother was found as a maternal factor associated with relapse of acute malnutrition since it is statistically significant ( $p=0.001$ ). Children whose mothers washed hands more frequently than others, less likely had a relapse of acute malnutrition. This finding is in line with findings from another study conducted in Ethiopia (Abitew et al., 2020). Admission to malnutrition treatment programs at a MUAC measure ranging from 11.5 to 12.4 centimetres is a child related factor associated with relapse of acute malnutrition ( $p=0.00$ ). Basing on coloring of the MUAC, this MUAC measure range is the yellow MUAC. According to the protocol of treating acutely malnourished children, children admitted having a MUAC measure ranging between 11.5 and 12.4 cm are not treated using Ready-To-Use Therapeutic Foods. The foods are used for children having a MUAC measure of 11.4 centimeters and less (Health, 2018). This implies difficulty for those children in achieving stable MUAC after discharge.

### **5.2.3. Socio-economic factors associated with relapse of acute malnutrition among under five years old children of Bugesera District**

The socio-economic factors found to be associated with relapse of acute malnutrition are drinking water from springs ( $p=0.03$ ), being from a family categorized in Ubudehe category one (indexed as the poorest according to Ubudehe structure in Rwanda) (AOR=1.3, 95% CI), having a father without an occupation (AOR=1.8, 95% CI), being from a family which has three children aged under five years (AOR=1.2, 95% CI), and having one meal per day was found to be another factor of relapse of acute malnutrition as households which self-reported to take one meal per day had their children relapsed (AOR=1.15, 95% CI=0.4-1.9).

## **5.2. Conclusions**

The prevalence of relapse of acute malnutrition among under five years old children in Bugesera District is 21%. Maternal and child factors of relapse of acute malnutrition are poor handwashing habit of the mother or caretaker, admitting malnourished children to treatment programs at a 11.5 to 12.4 centimetres Mid Upper Arm Circumference. Socio-economic factors of relapse of acute

malnutrition are using spring water for drinking, joblessness of fathers, belonging to households in Ubudehe category One, being from a family where there are at least three children aged under five and taking only one meal per day. Limitations were that some parents did not remember all the events of acute malnutrition their children had. This was overcome by using a data collection tool made of close-ended questions with pre-established options of responses. Another limitation is that the study being conducted in only one District among the thirty that compose the country, findings cannot be generalized for the whole country.

### **5.3. Recommendations**

Bugesera District authorities are recommended to strengthen mobilization on hand hygiene among caregivers of children aged under five years, on the use of safe water for drinking, and on child spacing through the use of family planning services. Job creation should also be strengthened to help family members get occupations and economically empower poor families, hence help them graduate from Ubudehe category one and empower them to afford more than one meal per day. The Ministry of health is recommended to include the use of Ready-To-Use Therapeutic Foods among methods of treatment of moderate acute malnutrition to help children moderate acute malnutrition achieve and maintain a stable MUAC upon treatment.

## **REFERENCES**

- Abitew, D. B. (2020). Predictors of relapse of acute malnutrition following exit from community-based management program in Amhara region, Northwest Ethiopia: An unmatched case-control study. *PLoS ONE*, 15(4), 1–17.  
<https://doi.org/10.1371/journal.pone.0231524> last accessed 14/02/2021.
- Adair, L. S. (2013). Associations of linear growth and relative weight gain during early life with adult health and human capital in countries of low and middle income: findings from five birth cohort studies. DOI:[https://doi.org/10.1016/S0140-6736\(13\)60103-8](https://doi.org/10.1016/S0140-6736(13)60103-8).
- Akparibo, R. (2017). Recovery, relapse and episodes of default in the management of acute malnutrition in children in humanitarian emergencies: A systematic review. Humanitarian Evidence Programme. <https://fic.tufts.edu/assets/Acute-Malnutrition-Systematic-Review.pdf> LAST accessed on 15/02/2021.

- Asres, G. (2011). Nutritional assessment of Ethiopian Beta-Israel children: a cross-sectional survey. *Breastfeed Med.* 2011 Aug;6(4):171-6. doi: 10.1089/bfm.2011.0016.
- Banerjee, C. (2016). Follow-up status of children with SAM treated with RUTF in peri-urban and rural Northern Bangladesh. <https://www.enonline.net/fex/50/samfollowupbangladesh> last accessed on 15/02/2021.
- Bhadoria, A. S. (2017). Prevalence of severe acute malnutrition and associated sociodemographic factors among children aged 6 months–5 years in rural population of Northern India: A population-based survey. DOI: 10.4103/jfmpe.jfmpe\_421\_16 last accessed 15/2/2021.
- Bhandari, N. (2016). Efficacy of three feeding regimens for home-based management of children with uncomplicated severe acute malnutrition: a randomised trial in India. <http://dx.doi.org/10.1136/bmjgh-2016-000144>.
- Binagwaho, A. (2011). Underdiagnosis of malnutrition in infants and young children in Rwanda: Implications for attainment of the Millennium Development Goal to end poverty and hunger. *International Journal for Equity in Health* DOI: 10.1186/1475-9276-10-61 .
- Black, R. E. (2013). the Maternal and Child Nutrition Study Group. Maternal and child undernutrition and overweight in low-income and middle-income countries. doi:10.1016/S0140-6736(13)60937-X.
- Bloss, E. (2004). Prevalence and Predictors of Underweight, Stunting, and Wasting among Children Aged 5 and Under in Western Kenya. DOI: 10.1093/tropej/50.5.260.
- Bugesera District. (2019). Bugesera District Bi-Annual Nutrition Bulletin. [http://www.bugesera.gov.rw/fileadmin/\\_migrated/content\\_uploads/Bulletin\\_corrected\\_NEW1.pdf](http://www.bugesera.gov.rw/fileadmin/_migrated/content_uploads/Bulletin_corrected_NEW1.pdf) last accessed 14/2/2021.
- Burza, S. (2016). Seasonal effect and long-term nutritional status following exit from a Community-Based Management of Severe Acute Malnutrition program in Bihar, India. <https://doi.org/10.1038/ejcn.2015.140>.
- Buzigi, E. (2018). Trends of Child Wasting and Stunting in Uganda from 1995 to 2016, and Progress Towards 65TH World Health Assembly Global Nutrition Targets. DOI: 10.11648/j.jfns.20180604.11.
- Chang, C. Y. (2013). Children Successfully Treated for Moderate Acute Malnutrition Remain at Risk for Malnutrition and Death in the Subsequent Year after Recovery . <https://doi.org/10.3945/jn.112.168047>.
- Dandona, L. (2019). The burden of child and maternal malnutrition and trends in its indicators in the states of India: the Global Burden of Disease Study 1990–2017. Gurugram 122002, National Capital Region, India: Lancet Child Adolesc Health <https://doi.org/10.1016/>.

- Demissie, S. (2013). Magnitude and Factors Associated with Malnutrition in Children 6-59 Months of Age in Pastoral Community of Dollo Ado District, Somali Region, Ethiopia. DOI: 10.11648/j.sjph.20130104.12.
- Desalegne Amare, A. N. (2016). Prevalence of Undernutrition and Its Associated Factors among Children below Five Years of Age in Bure Town, West Gojjam Zone, Amhara National Regional State, Northwest Ethiopia. Hindawi Publishing Corporation <http://dx.doi.org/10.1155/2016/7145708>.
- Dipasquale, V. (2020). Acute Malnutrition in Children: Pathophysiology, Clinical Effects and Treatment. doi: 10.3390/nu12082413 last accessed 15/2/2021.
- Dodos, J. (2018). Individual and household risk factors of severe acute malnutrition among under-five children in Mao, Chad: a matched case-control study. <https://archpublichealth.biomedcentral.com/articles/10.1186/s13690-018-0281-5> last accessed on 15/2/2021.
- Dop, M. C. (2016). Malnutrition, definition, causes, indicators for assessment from a « Public Nutrition » perspective. Montpellier, France: available at <http://www.masterhdfs.org/masterHDFS/wp-content/uploads/2014/05/malnutriton-dop-part-I.pdf> last accessed on 10 April 2020.
- Ellen, S. (2020). Slovin's Formula Sampling Techniques. available at <https://sciencing.com/slovins-formula-sampling-techniques-5475547.html> last accessed on 1/07/2021.
- Fink, G. (2011). The effect of water and sanitation on child health: evidence from the demographic and health surveys 1986–2007. *Int J Epidemiol.*40:1196–204. doi:10.1093/ije/dyr102.
- Frozanfar, M. K. (2015). Acute malnutrition among under-five children in Faryab, Afghanistan: prevalence and causes. <https://pubmed.ncbi.nlm.nih.gov/27019527/> last accessed 15/02/2021.
- Gachau, S. (2018). Prevalence, outcome and quality of care among children hospitalized with severe acute malnutrition in Kenyan hospitals: A multi-site observational study *PLoS ONE* 13(5): e0197607. <https://doi.org/10.1371/journal.pone.0197607> last accessed 15/2/2021.
- Gebre, A. (2019). Prevalence of Malnutrition and Associated Factors among Under-Five Children in Pastoral Communities of Afar Regional State, Northeast Ethiopia: A Community-Based Cross-Sectional Study. *Journal of Nutrition and Metabolism* <https://doi.org/10.1155/2019/9187609>.
- Gebre, A. (2019). Prevalence of Malnutrition and Associated Factors among Under-Five Children in Pastoral Communities of Afar Regional State, Northeast Ethiopia: A



Community-Based Cross-Sectional Study. *Journal of Nutrition and Metabolism*  
<https://doi.org/10.1155/2019/9187609>.

Grellety, E. (2017). Effects of unconditional cash transfers on the outcome of treatment for severe acute malnutrition (SAM): a cluster-randomised trial in the Democratic Republic of the Congo. <https://doi.org/10.1186/s12916-017-0848-y> accessed 15/2/2021.

Hoddinott, J. (2013). The economic rationale for investing in stunting reduction. <https://doi.org/10.1111/mcn.12080>.

Indi, T. (2015). Extending Supplementary Feeding for Children Younger Than 5 Years With Moderate Acute Malnutrition Leads to Lower Relapse Rates. doi: 10.1097/MPG.0000000000000639.

Kebede Mengistu, K. A. (2013). Prevalence of Malnutrition and Associated Factors Among Children Aged 6-59 Months at Hidabu Abote District, North Shewa, Oromia Regional State. *Journal of Nutritional Disorders & Therapy* DOI: 10.4172/2161-0509.1000T1-001.

Koletzko, B. (2017). *Pediatric nutrition in practice: 2nd revised edition*. doi: 10.4103/0971-5916.211683 last accessed 15/2/2021.

Kramer, M. S. (2012). Optimal duration of exclusive breastfeeding. *Cochrane Database Syst Rev*. 2012 Aug 15;(8):CD003517. doi: 10.1002/14651858.CD003517.

Krebs, N. F. (2011). Complementary Feeding Study Group. Meat consumption is associated with less stunting among toddlers in four diverse low-income settings. *Food Nutr Bull*. 2011;32:185–91.

Kumi-Kyereme, A. (2016). Household wealth, residential status and the incidence of diarrhoea among children under-five years in Ghana. <https://doi.org/10.1016/j.jegh.2015.05.001> last accessed 15/02/2021.

Legason, I. D. (2018). Prevalence of acute malnutrition among children ages 6-59 months: Results from a baseline nutrition survey in North-Western Uganda. DOI: 10.35841/nutrition-human-health.2.1.7-12 last accessed on 15/02/2015.

Maninder, S. S. (2016). *Methodology Series Module 3: Cross-sectional Studies*. doi: 10.4103/0019-5154.182410 last accessed on 14/07/2021.

Maust, A. (2015). Severe and Moderate Acute Malnutrition Can Be Successfully Managed with an Integrated Protocol in Sierra Leone. <https://doi.org/10.3945/jn.115.214957> last accessed 15/2/2015.

Mehta, N. (2013). Defining pediatric malnutrition: a paradigm shift toward etiology-related definitions. <https://connects.catalyst.harvard.edu/Profiles/display/25905296> last accessed 15/2/2021.

- Mengistu. (2013). Prevalence of Malnutrition and Associated Factors Among Children Aged 6-59 Months at Hidabu Abote District, North Shewa, Oromia Regional State. *Journal of Nutritional Disorders & Therapy* DOI: 10.4172/2161-0509.1000T1-001.
- Mengistu. (2013). Prevalence of Malnutrition and Associated Factors Among Children Aged 6-59 Months at Hidabu Abote District, North Shewa, Oromia Regional State. *J Nutr Disorders Ther* T1: 001. doi:10.4172/2161-0509.T1-001.
- Mohammadinia, S. P. (2012). The Prevalence of Malnutrition among Children under 5 Years old Referred to Health Centers in Iranshahr during 2010-2011. Iranshahr, Iran.: Zahedan University of Medical Sciences.
- National Institute of Statistics of Rwanda, N. (2016). Rwanda Demographic and Health Survey 2014-15. Rockville, Maryland, USA: NISR, MOH, and ICF International. available at <https://dhsprogram.com/pubs/pdf/FR316/FR316.pdf> accessed on 23/4/2020.
- Nkurunziza, S. (2017). Determinants of stunting and severe stunting among Burundian children aged 6-23 months: evidence from a national cross-sectional household survey, 2014. doi: 10.1186/s12887-017-0929-2.
- Ojofeitimi, E. O. (2003). A Study on Under Five Nutritional Status and its Determinants in a Semi-Rural Community of Ile-Ife, Osun State, Nigeria. Doi: 10.1177/026010600301700103.
- Onyango, A. W. (2013). Complementary feeding and attained linear growth among 6–23-month-old children. *Public Health Nutr.*;19:1–9. doi:10.1017/S1368980013002401.
- Özaltın, E. (2010). Association of maternal stature with offspring mortality, underweight, and stunting in low- to middle-income countries. *JAMA* doi: 10.1001/jama.2010.450.
- RDHS. (2016). Rwanda Demographic and Health Survey. Available from. <https://dhsprogram.com/pubs/pdf/FR316/FR316.pdf> Accessed on 12th February 2021.
- RDHS. (2016). Rwanda Demographic and Health Survey. Available from. <https://dhsprogram.com/pubs/pdf/FR316/FR316.pdf> Accessed on 14th February 2021.
- RDHS. (2016). Rwanda Demographic and Health Survey. Available from. <https://dhsprogram.com/pubs/pdf/FR316/FR316.pdf> Accessed on 18th February 2020.
- Saha, K. K. (2008). Appropriate infant feeding practices result in better growth of infants and young children in rural Bangladesh. *The American journal of clinical nutrition*.
- Siddiqi, N. (2011). Malnutrition of Under-Five Children: Evidence from Bangladesh. *Asian Journal of Medical Sciences* 2: 113-118. 5 <https://doi.org/10.3126/ajms.v2i2.3662>.
- Somassè, Y. E. (2015). Relapses from acute malnutrition and related factors in a community-based management programme in Burkina Faso. DOI: 10.1111/mcn.12197 last accessed 14/02/2021.

- SphereAssociation. (2018). *The Sphere Handbook: Humanitarian Charter and Minimum Standards in Humanitarian Response*, fourth edition, Geneva, Switzerland, <https://spherestandards.org/wp-content/uploads/Sphere-Handbook-2018-EN.pdf> last accessed 14/02/2021.
- Stephenson, K. B. (2019). Development of Acute Malnutrition Despite Nutritional Supplementation in Malawi. *68(5)*, 734–737. <https://doi.org/10.1097/MPG.0000000000002241> last accessed 14/2/2021.
- Stobaugh. (2018). Household-level factors associated with relapse following discharge from treatment for moderate acute malnutrition. 1039–1046. <https://doi.org/10.1017/S0007114518000363> last accessed 14/2/2021.
- Stobaugh. (2018). Relapse after severe acute malnutrition: A systematic literature review and secondary data analysis. DOI: 10.1111/mcn.12702 last accessed on 15/02/2021.
- Sunguya, B. F. (2019). Trends in prevalence and determinants of stunting in Tanzania: an analysis of Tanzania demographic health surveys (1991–2016). *Nutritional Journal* <https://nutritionj.biomedcentral.com/articles/10.1186/s12937-019-0505-8> last accessed on 19/4/2020.
- Tadesse, E. (2018). An integrated community-based outpatient therapeutic feeding programme for severe acute malnutrition in rural Southern Ethiopia: Recovery, fatality, and nutritional status after discharge. DOI: 10.1111/mcn.12519 last accessed on 15/2/2021.
- Tadesse, E. (2018). An integrated community-based outpatient therapeutic feeding programme for severe acute malnutrition in rural Southern Ethiopia: Recovery, fatality, and nutritional status after discharge." *Maternal & child nutrition* 14(2): e12519. doi: 10.1111/mcn.12519. Epub 2017 Oct 10. LAST accessed 14/2/2021.
- Victora, C. G. (2010). Worldwide timing of growth faltering: revisiting implications for interventions. *Pediatrics*. 2010 Mar;125(3):e473-80. doi: 10.1542/peds.2009-1519.
- WFP. (2018). World Food Program/ Rwanda country strategic plan (2019–2023). <https://docs.wfp.org/api/documents/53e2deb348c64401aeebda0cd5525df4/download/> last accessed 14/2/2021.
- WHO. (2007). A Joint Statement by the World Health Organization, the World Food Programme, the United Nations System Standing Committee on Nutrition and the United Nations Children’s Fund. [https://www.who.int/maternal\\_child\\_adolescent/documents/a91065/en/](https://www.who.int/maternal_child_adolescent/documents/a91065/en/) LAST ACCESSED ON 14/02/2021.
- WHO. (2013). *Nutrition: Guideline: updates on the management of severe acute malnutrition in infants and children*, World Health Organization; 2013. Available from: [http://apps.who.int/iris/bitstream/10665/95584/1/9789241506328\\_eng.pdf?ua=1](http://apps.who.int/iris/bitstream/10665/95584/1/9789241506328_eng.pdf?ua=1). Last accessed 15/2/2021.

WHO. (2018). 2018 Global Nutrition Report.

<https://www.who.int/nutrition/globalnutritionreport/en/#:~:text=The%202018%20Global%20Nutrition%20Report,unprecedented%20opportunity%20to%20do%20so>. Last accessed 14/02/2021.

Wolde, T. (2016). Prevalence of Acute Malnutrition (Wasting) and Associated Factors Among Preschool Children Aged 36-60 Months at Hawassa zuria, South Ethiopia: a community based cross sectional study. <http://dx.doi.org/10.4172/2155-9600.1000466>.

World Health Organization, W. (2014). Global nutrition targets 2025: stunting policy brief (WHO/NMH/NHD/14.3). Geneva: World Health Organization: Available at [https://www.who.int/nutrition/publications/globaltargets2025\\_policybrief\\_stunting/en/](https://www.who.int/nutrition/publications/globaltargets2025_policybrief_stunting/en/) accessed on 8/5/2020.

