

Prevalence and Inequality of Malnutrition among Children Aged 6-59 Months in Kenge; Democratic Republic of Congo; 2022

Bernard-Kennedy Nkongolo^{1*}; Steve Botomba²; Marc Bosonkie²; Benito Kazenza²; Nono Mangaza¹, Nelly Kabena¹, Damien Nahimana³, Jean Baptiste Mayavanga⁴, Mala Ali Mapatano⁵ and Marie-Claire Muyer⁵

¹MD, MPH Student, School of Public Health, University of Kinshasa, Democratic Republic of Congo

²MD, MPH, Ph.D. Student, School of Public Health, University of Kinshasa, Democratic Republic of Congo

³DU in Demography and Nutrition, National Program of Nutrition, Ministry of health, Democratic Republic of Congo.

⁴DU Statistician and Economist, National Program of Nutrition, Ministry of health, Democratic Republic of Congo

⁵MD, MPH, PhD, School of Public Health, University of Kinshasa, Democratic Republic of Congo

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Abstract

Introduction: Disparities in different forms of malnutrition remain in several regions and within provinces in the DRC, given the high number of children experiencing food insecurity. This study aims to determine the prevalence of different forms of malnutrition as well as the distribution of inequalities of these different forms of malnutrition among children aged 6-59 months.

Methodology: We have analyzed secondary data from the National Nutrition Program obtained from a cross-sectional study conducted in 784 children aged 6-59 months in Kenge in 2022. A two-stage sampling was applied first selecting randomly 50 villages and subsequently 25 households in each village. Nutritional status was assessed based on Z-score. Chi-square test was performed with Stata version 16.0 to determine the prevalence of malnutrition as well as the existing association.

Results: Of 784 children, more than half were male (51.4%). The prevalence of global acute malnutrition (wasting) was 11.3%: CI_{95%} 9; 13, including 2.6% with severe acute malnutrition. Stunting was found in 44.6: CI_{95%} 41; 48, Underweight was 29.7% with CI (26; 33). Underweight and stunting were statistically associated with age and sex. Wasting was more frequent in Bitari and Kolokoso villages, while stunting was more observed in Fangulu, Bitari and Tonga, and underweight was more frequent in Dunda Factory Camp and Suana. These differences can be explained by socio-economic and socio-ecological variations as well as by the inadequacy of health structures for malnutrition cases management.

Conclusion: Malnutrition in Kenge presents disparities depending on the form and the location. Taking into account socio-ecological demographic factors, remains an effective solution to combat malnutrition in Kenge.

Keywords: Prevalence, inequalities, malnutrition, children aged 6-59 months, DRC

Introduction

Malnutrition remains a public health problem in the Democratic Republic of Congo (DRC). According to the MICS 2017-2018 survey, nearly one in two children aged 0-59 months suffer from stunting (41.8%), including 20.8% in severe form; nearly four in 10 children are affected by underweight (23.1%) with 7.1% in severe form; seven children out of 10 (6.5%) suffer from wasting with 2% in the severe form; (1). In Kenge territory, this prevalence remains unknown.

Malnourished children are more likely to die from common childhood illnesses and develop irreversible cognitive impairment.

Those who survive often suffer from recurrent illnesses and stunted growth. This impacts their performance and also the economic development of the country (2).

These prevalences are high, and exhibit strong disparities in the different forms of malnutrition by province and within each province. These disparities were accentuated by the recent Covid-19 pandemic given its restrictions of movement, limiting adequate households access to food. (3, 4). Despite the efforts made by the Government, Kenge is far from producing enough food and depends heavily on neighbors to meet the needs of the population. This situation remains the same throughout Kenge territory. In addition, the rise in the prices of foods and the context of insecurity account for the increase in the number of households experiencing

*Corresponding author's Phone: +243810953918

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malnutrition, particularly affecting children under five (2, 5).

The territory of Kenge is in the province of Kwango, one of the provinces most affected by malnutrition in the DRC with a prevalence of stunting estimated at 45.6% in 2014 (6) and 54.6% in 2018 (1) and wasting of 9.3% (ref). According to the Nutritional Monitoring, Food Safety and Early Warning (SNSAP), in the first quarter of 2021, Kenge presented 8% of children with upper arm circumference less than 125mm, 1% had edema and 1% had low birth weight but in the third quarter of 2023, we observed 10% children with a MUAC less than 125 mm.

Road infrastructure in Kenge is characterized by its insufficiency and/or poor condition. In 2016, 84% in Kwango of roads were in poor condition, 11% in passable condition, and only 5% in good condition. This province continues to be classified among the poorest in the DRC, with very low human development and poor access to basic services (7). The prevalence of malnutrition shows variations within the province and even at the territorial level. In the Kenge territory, several children under 5 years old have a critical nutritional state but the prevalence within this territory, even at the health zone level, is not known and sometimes inequalities of different forms of malnutrition are observed inside the territory of Kenge.

This study aims to determine the prevalence as well as inequalities of different forms of malnutrition among children aged 6-59 months in the Kenge territory in 2022.

Materials and Method

This study is based on secondary data taken from the National Nutrition Program (PRONANUT RDC). This is a cross-sectional study carried out among children aged 6-59 months living in the Kenge territory in February 2022. Kenge territory is located in Kwango province, in DRC, with dilapidated road infrastructure, a poor population with an undiversified diet (7)

The sample size in the primary study was 784 children. The statistical units corresponding to the various levels of sampling are villages at the first level and households at the second level. In total, 50 villages out of 67 were selected randomly and 25 households were selected per village after listing, of which 784 children were retained. The survey was carried out using a two-stage cluster survey of selected households using the Standardized Monitoring and Assessment for Relief and Transition approach (SMART) (8).

In addition to the main component based on the anthropometry of children aged 6-59 months by taking weight, height and upper arm circumference, certain additional variables were collected including the age and sex of these children, as well as the Children's health data by searching for cough, diarrhea and malaria over the past two weeks. The weight of the children was measured using SECCA type electronic scales and the weight was expressed in kg, the height of the children was measured

using wooden measuring rods (UNICEF) (in a lying position to children whose height was less than 87 cm and in a standing position for children with a height greater than or equal to 87 cm), the upper arm circumference was taken using the MUAC tape graduated in mm for children.

Quantitative data were collected using a household questionnaire using tablets and sent directly to the National Program of Nutrition server. The assessment of nutritional status was made on the basis of Z-Score calculated using the Emergency Nutrition Assessment (ENA) software, version of January 11, 2020, with Z-score less than or equal to -2 for Underweight measured by the weight-for-age index), stunting measured by the height-for-age index), wasting measured by weight-for-height index) with Z-score less than or equal to -2 for global Acute Malnutrition (GAM) and Z-score less than or equal to -3 for Severe Acute Malnutrition (SAM).

Data were analyzed in this secondary study with STATA version 16.0 software. Descriptive statistics were used to describe subjects' age, sex, weight, height, associated illnesses over the past two weeks as well as determining the frequency of global and severe acute malnutrition, insufficiency weight and growth retardation in the study environment. The chi-square test was used to determine the relationship between different forms of malnutrition with age, gender, different villages as well as diseases over the past two weeks. The different forms of malnutrition were classified according to the World Health Organization threshold. The graphs were generated using equiplot.

The main study protocol was submitted and approved by the ethics committee of the Ministry of Health. The samples were taken with the free and informed verbal consent of the parents of each child, after a brief explanation of the objective of the study. The data was analyzed anonymously to preserve human dignity.

Results

The results were presented in the form of tables and figures following sociodemographic characteristics, anthropometric measurements, and the prevalence of different forms of malnutrition as well as the different villages in the Kenge territory.

Sociodemographic and anthropometric characteristics of the subjects

Out of 784 children surveyed, 403 were male (51.4%). The median age was 27.5 months with 6 months as the minimum age and 59 months as the maximum age, the age group between 24-59 months was more affected. The median weight was 10.8 kg with a minimum of 4.6 kg and a maximum of 22.5 kg. The median height was 85 cm with a minimum of 58.3 cm and a maximum of 110.2 cm. The median upper arm circumference was 139 mm with 110 mm and 179 mm respectively the minimum and maximum.

Prevalence of malnutrition among surveyed children

We present the prevalence of malnutrition in Kenge territory in Table I below.

Considering the results obtained in this Table I, out of 784 children surveyed, one in ten children presented with global acute malnutrition, including 2.6% of children with

severe acute malnutrition; four out of ten children were stunted and almost three out of ten children were underweight.

The prevalence of malnutrition according to sociodemographic characteristics in Kenge territory are presented in Table II below.

Table I. Prevalence of different forms of malnutrition in the Kenge territory

Indicators	Prevalence in n and (%)	95% CI
Global Acute Malnutrition	89(11.4)	9-13
Severe Acute Malnutrition	20(2.6)	1-3
Underweight	233(29.7)	26-33
Growth retardation	350(44.6)	41-48

Table II. Prevalence of malnutrition according to sociodemographic characteristics

Features	Underweight		Stunting		Global Acute Malnutrition (GAM)		Severe Acute Malnutrition (SAM)	
	n	%	n	%	n	%	n	%
Age grouped in months								
6-11 months	37	26.2	54	38.3	12	8.5	3	2.1
12-23 months	39	21.9	72	40.0	23	12.9	3	1.7
24-59 months	157	33.9	224	48.4	54	11.8	14	3.1
Total	233	29.7*	350	44.6*	89	11.4**	20	2.6
Chi-square	p= 0.006		p= 0.034		p= 0.441		p= 0.575	
Sex								
Female	90	23.6	149	39.1	41	10.8	6	1.6
male	143	35.5	201	49.9	48	11.9	14	3.5
Total	233	29.7	350	44.6	89	11.4	20	2.6
Chi-square	p= 0.001		p= 0.002		p= 0.603		p= 0.091	

*Prevalence of underweight

** Prevalence of stunting

***Prevalence of Global Acute Malnutrition

It appears from this table II, that children whose age varies between 24-59 months are more affected by malnutrition with three children out of ten who are affected by underweight, almost half of the children in this group had the stunting, nearly 9 out of ten children had GAM. Underweight and stunting were statistically associated with age. The male sex was more affected with a third of boys who were underweight, almost half of the boys had stunting, more than half of the children who had global acute malnutrition were boys. Gender is statistically associated with underweight and stunting

We present the prevalence of malnutrition and history of illness among respondents in Kenge territory in Table III below.

Table III. Prevalence of malnutrition and history of illness among respondents

Background	Stunting		Wasting (GAM)		SAM	
	n	%	n	%	n	%
Presence of cough						
no	331	45.2	84	11.5	17	2.3
yes	19	37.3	5	9.8	3	5.9
Total	350	44.6	89	11.4	20	2.6
Chi-square	p=0.269		p=0.716		p=0.119	
Presence of Malaria						
no	338	44.5	86	11.3	18	2.4
yes	12	50.0	3	12.5	2	8.3
Total	350	44.6	89	11.4	20	2.6
Chi-square	p=0.596		p=0.859		p=0.068	
Presence of diarrhea						
yes	12	48.0	5	20.0	0	0.0
no	338	44.5	84	11.1	20	2.6
Total	350	44.6	89	11.4	20	2.6
Chi-square	p=0.736		p=0.167		p=0.411	

This Table III demonstrates that no history of illness is statistically associated with malnutrition.

In the figure below, we present the prevalence of different forms of malnutrition in the different villages.

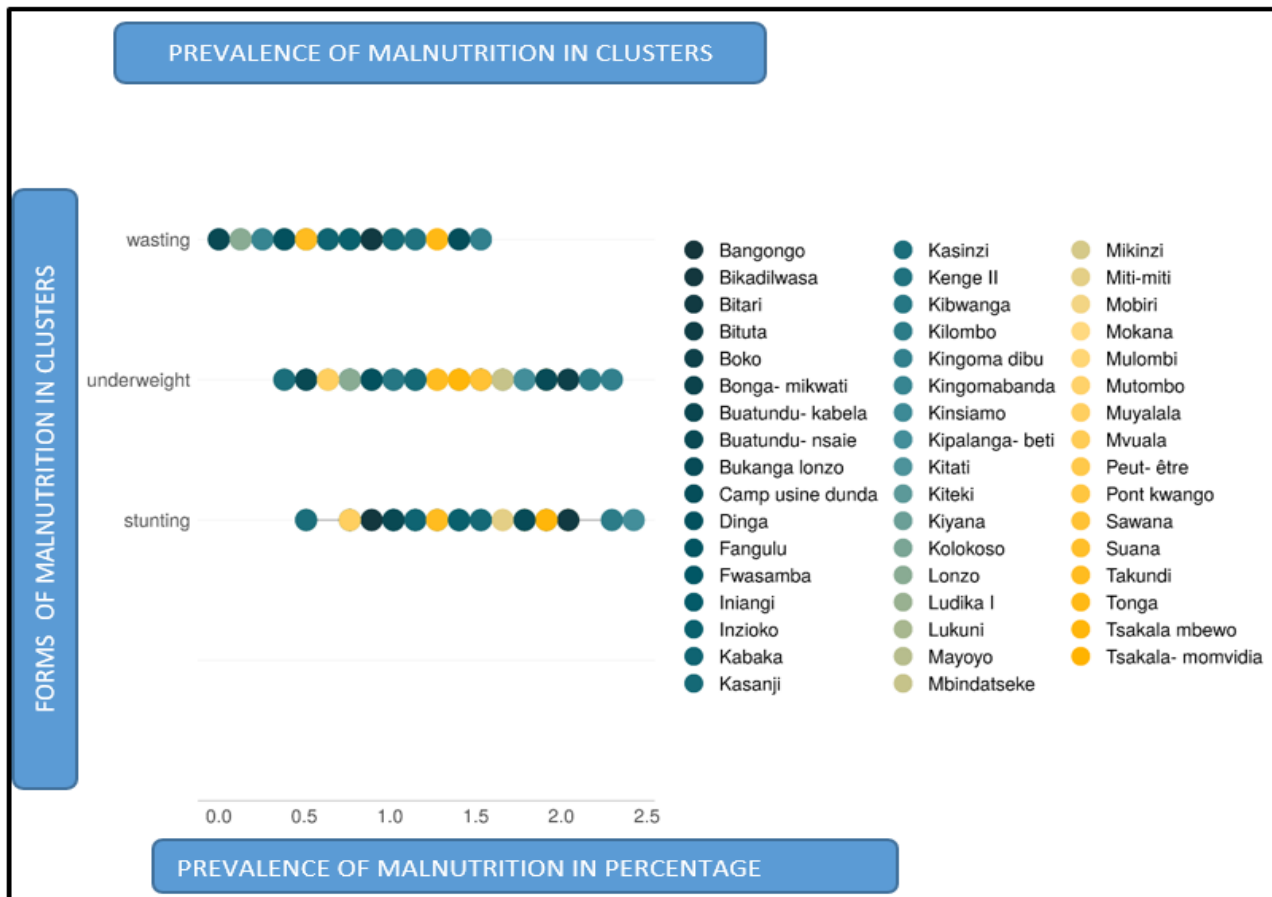


Figure I. Prevalence of malnutrition according to villages in Kenge territory

This figure I shows that overall, 45% of villages had stunting, 30% had underweight and 11% had global acute malnutrition. In isolation, wasting was more frequent in Bitari at 27.8% and in Kolokoso with 25.0%, stunting was more observed at 85.7% in Fangulu and 72.2% in Bitari and Tonga, underweight was more frequent at 64.3% in Dunda Factory Camp and 63.6% in Suana.

Discussion

It appears from this research that out of 784 children aged 6 to 59 months surveyed in the Kenge territory, more than half were male (51.40%). The prevalence of global acute malnutrition was 11.35% (an alert situation according to the WHO) with 95% CI (9; 13), of which 2.6% (nutritional emergency situation) of children presented severe malnutrition. Stunting was more common in 44.64% (above the emergency threshold), with CI-95% (41; 48) and Underweight was 29.71% (a situation of 'alert) with CI-95% (26; 33). Underweight and stunting were statistically associated with age and sex.

Given these results, we believe that malnutrition remains a major concern in the Kenge territory. These results relate to those found in the 2018 MICS survey

which found 54.6% chronic malnutrition (above the 40% threshold) and 9.3% acute malnutrition (above the 5% threshold) in Kwango. According to the EDS survey (6), 43% of children aged 0-59 months suffer from chronic malnutrition and one in five (23%) in the severe form; 8% suffer from acute malnutrition and 3% in the severe form; 23% are underweight and 7% in the severe form.

Considering the prevalence of malnutrition in Kenge and the variation in the figures according to the different forms of malnutrition, in comparison to the results of MICS and EDS which present a high prevalence, this could be explained by the fact that the EDS and MICS had used the age range of 0-59 months and reported this prevalence across the entire Kwango province and the country. And if we considered separately the prevalence of EDS and MICS by Zone and province, ours could be high due to the fact that nutritional care almost does not exist in this environment, sometimes there is he breakdown of care inputs and the living conditions of households continue to deteriorate further, as demonstrated by the 2019 ACF survey. Repeated customary conflicts leading to massive displacements of the population continue to influence this ordeal among the population, particularly children under 24-59 months. This requires a nutritional

policy based on multi-sectoral strategies, oriented towards specific age groups most affected with a view to reducing this burden and thus reducing infant mortality and boosting local development.

The results of this research are also similar to those found by Aimée Mudekereza Musimwa *et al* (9) who found in Lubumbashi, severe underweight in 42.9% of children and 22.1% with moderate underweight, 76.1% of patients with chronic malnutrition and 17.5% of children with acute malnutrition. According to Fentaw R, Ayalneh (10, 25, 24) on 180 households among children aged 6-59 months, the results revealed that the prevalence of stunting with a rate of 67.8%; wasting with a rate of 12.8% and underweight of 46.1% and Diouf S and al (11, 25) assessing the prevalence of malnutrition and the risk factors associated with it had found the wasting of 8% of children and stunted growth 34.7%, 12.7% of children present an association of wasting and stunted growth. Acute malnutrition predominated in the age group of 7 to 47 months and its peak is located between 12 and 23 months (17.4%); chronic malnutrition, for its part, is notable between the age of 7 and 11 months with a rate of 20.5% and affects almost half of children over 12 months.

The 2014 EDS with regard to sex observes a difference against the male sex, i.e. a prevalence of underweight of 25% for male children compared to a prevalence of 20% for female children. But in the study by Hallgeir Kismul (12), the prevalence of stunting was much higher among boys than girls, which confirms the results found in this research. No scientific explanation supports this association between sex and the occurrence of malnutrition. This could involve in-depth research to find evidence on the role of sex in the occurrence of malnutrition in children aged 6-59 months.

The notion of illnesses in the last two weeks not having the influence on the occurrence of malnutrition as proven in this study, could be explained by the late diagnosis of malnutrition profoundly altering the nutritional state of children thus leading to a confusion between cause and effect in the occurrence of malnutrition. These results differ from those found by Costa KAZADI(13) who worked on the prevalence of HIV and the occurrence of malnutrition among children aged 6-59 months in Lubumbashi revealing stunting, underweight and wasting; which were associated with advanced HIV infection.

Malnutrition can be a direct consequence of infection which can be bacterial, viral, parasitic or fungal and of precarious living conditions. In infected subjects presenting one or more nutritional deficiencies, there was a deterioration of clinical signs and progression of the disease altering the nutritional status of the subjects, Dreyfuss (14). This could not have a clinical manifestation that beyond two weeks, which could require a future nutritional assessment in the same children who have been affected by a certain infection which could have an influence on the nutritional status if no preventive

measures are not implemented artwork. We believe that every child who has developed any infection should be followed from the diagnosis of the infection until recovery while assessing the nutritional status which can deteriorate as the disease develops in the body. The different nutritional units should take this aspect into account in the monitoring and evaluation of children during preschool consultation sessions.

Considering the distribution of malnutrition within the territory of Kenge and taking the villages as a whole, it is therefore difficult to compare the prevalence of different forms of malnutrition between villages since the study is not causal. However, it should be noted that these gaps can also result from the socio-economic disparities of these different villages, from different factors involved in food insecurity and also from the inadequacy of structures for managing cases of malnutrition in these villages affected. The inaccessibility of agricultural roads, insufficient agricultural production and the weakness of the local economy could be the basis of these disparities and variations in malnutrition in the different villages constituting the Kenge territory.

Limits and Strengths of study

Considering that this study used secondary data, we believe that it provided necessary data on the nutritional status of children aged 6-59 months as well as the distribution of different forms of malnutrition in the Kenge territory. This study draws its strength from its high sample size, representative whose results and analyzes are satisfactory and can be generalized throughout the population of the Kenge territory, even in the province. However, the constraints linked to the lack of certain information adequate to this study, in particular the outcome of the diagnosed children, the socio-demographic and food security data of the children's parents, did not make it possible to find explanations for certain results.

In the future, we wish to approach this same research and direct it towards the causal aspects in particular food security, eating habits, socio-ecological characteristics as well as the different morbidity factors influencing this nutritional state. This could help in better distribution and geographical distribution of resources during nutritional interventions implemented by the National Nutrition Program as well as the various partners working in nutrition. Future researchers will be able to use the results of this study to improve the nutritional status of children under 5 years old in their region and in Kenge in particular. We believe that taking all these factors into account will be of paramount importance in the monitoring and evaluation of the nutritional status of children as well as in the implementation of appropriate and well-directed interventions.

Conclusion

Children aged 24-59 months were more affected by different forms of malnutrition, particularly boys with

stunting. The prevalence of global acute malnutrition (wasting) was in an alert situation, that of SAM was in a nutritional emergency situation, stunting was above the emergency threshold and underweight was in an alert situation in Kenge territory. Malnutrition was statistically associated with age and sex. We noted that there was an uneven geographical distribution of different forms of malnutrition within the territory and in each village.

The results found in this study can help the National Nutrition Program and other researchers in raising awareness and identifying other factors of food insecurity, dietary behaviors that may be the subject of health promotion projects and nutritional education to help reduce mortality linked to malnutrition in Kenge. A community diagnosis based on a multidisciplinary approach and future causal studies will be able to highlight the different factors on which the different strategies to combat malnutrition in the Kenge territory should be oriented as well as their geographical distribution. Taking into account socio-ecological factors, the specific age of the child as well as their sex remains an effective solution to guide the different strategies to combat stunted growth and underweight.

References

- [1] INS, Multiple Indicator Cluster Survey (2017-2018), survey results report, Kin, Democratic Republic of Congo.
- [2] World Bank (2018), The State of Social Safety Nets 2018. Washington, DC
- [3] Labored et al, (2020), Project: covid-19 Food trade policy tracker. Washington, Available from: <https://www.ifpri.org/project/covid-19-food-trade-policy-tracker>, accessed 2022 December 19
- [4] Falkendal T et al, (2021), Grain export restrictions during Covid-19 risk food insecurity in many low - and middle-income countries. *Nat Food* [web]. 2021; 2(1):11-4. Available from: <https://dx.doi.org/10.1038/s43016-020-00211-7>, accessed 2023 February 20
- [5] UNICEF DRC (2021) Smart type territorial and zonal surveys in the provinces of Kwango and Tshuapa in the DR Congo.
- [6] Demographic and Health Survey (EDS –DRC 2013-2014)
- [7] Action Against Hunger (ACF)(2011), Final project study Improvement of diet and eradication of food poisoning called Konzo in Kwango, in DRC
- [8] National Nutrition Program DRC (2022), Final Report of territorial and zonal Smart-type nutritional surveys in the provinces of Kwango and Tshuapa, in the DRC.
- [9] Aimée Mudekereza Musimwa1, Gray Wakamb Kanteng1 (2015)'Variation of albuminemia during protein-energy malnutrition in a Congolese urban-rural area', 8688, pp.1–6. doi:10.11604/pamj.2015.20.299.5794.
- [10] Fentaw R, Ayalneh B, Degnet A(2013). Prevalence of child malnutrition in agro-pastoral households in Afar Regional State of Ethiopia. *Nutr Res Pract.* 2013 Apr;7(2):122-31. PubMed | Google Scholar
- [11] Diouf S, Diallo A, Camara B, Diagne I, Tall A et al (2000). Protein-calorie malnutrition in children under 5 years of age in rural Senegal (Khombole). *Med Afr Black.* 2000;47(5):225-228
- [12] Hallgeir Kismul1, Pawan Acharya, Mala Ali Mapatano and Anne Hatløy (2018), Determinants of childhood stunting in the Democratic Republic of Congo: further analysis of Demographic and Health Survey 2013–14, *BMC Public Health*; 18:74 DOI 10.1186/s12889-017-4621-0
- [13] Costa Kazadi Mwadianvita et al (2014), Nutritional status of children aged 6 to 59 months infected with HIV but not treated with ARVs in Lubumbashi, *Panafrican Medical journal*
- [14] Dreyfuss I, Gernard I, Donna S, David J (2017). Determinants of low birth weight among HIV-infected pregnant women in Tanzania. *Am J Clin* 74(6):814–26.

PubMed

- [15] Multiple Indicator Cluster Survey (MICS –RDC 2017-2018)
- [16] WHO GUIDELINES (2021), Evidence-based nutrition guidelines for the prevention and management of malnutrition
- [17] Aimée Mudekereza Musimwa1, & Gray Wakamb Kanteng1, Hermann Tamubango Kitoko1, ONL 1Département (2016) 'Clinical signs encountered in malnourished children in a mining environment: case of the city of Lubumbashi and its surroundings', 8688, pp. 1–8. doi:10.11604/pamj.2016.24.67.9146.
- [18] Aimée Mudekereza Musimwa1, ONL (2016) 'Trace elements in the serum of malnourished and well-nourished children living in Lubumbashi and Kawama in the context of a mining pollution environment', 8688, pp. 1–8. doi:10.11604/pamj.2016.24.11.9236.
- [19] CK et al. (2014) 'Nutritional status of children aged 6 to 59 months infected with HIV but not treated with ARVs in Lubumbashi', 8688, pp. 1–8. doi:10.11604/pamj.2014.19.7.3932.
- [20] Nguefack et al, (2015) Hospital management of severe acute malnutrition in children with local preparations alternatives to F-75 and F-100: results and challenges, *Panafrican Medical journal*
- [21] DK et al. (2013) 'Clinical and biological aspects of pediatric anemia in an urban district hospital in Cameroon', 8688, pp. 1–6. doi:10.11604/pamj.2013.16.91.3307.Mwadianvita, Integrated food security classification. DR Congo: IPC Snapshot July 2020- June 2021
- [22] Kandala, N. et al. (2011) 'Malnutrition among children under the age of five in the Democratic Republic of Congo (DRC): does geographic location matter?', *BMC Public Health* , 11(1), p. 261. doi:10.1186/1471-2458-11-261.Parkash,
- [23] Oscar. et al. (2018) 'Assessment of malnutrition in patients with liver cirrhosis using protein calorie malnutrition (PCM) score verses bio -electrical impedance analysis (BIA)', *BMC Research Notes* , pp. 1–5. doi:10.1186/s13104-018-3640-y.
- [24] Richard Mbusa Kambale1,2,& Joe Bwija Kasengi1,2, JMK (2016) 'Infectious profile and mortality of children aged 0 to 5 years admitted for severe acute malnutrition: retrospective cohort study at the Nutritional and Therapeutic Center of Bukavu, Republic Democratic Republic of Congo', 8688, pp. 1–8. doi:10.11604/pamj.2016.23.139.8370.
- [25] Wembonyama, SO and Luboya, ON (2018) 'Development of a predictive score of severe acute malnutrition among children under 5 years of age', 8688, pp. 1–8. doi:10.11604/pamj.2018.29.185.13713.
- [26] Guidelines for the management of the severely malnourished. Available at: [http:// www.google.com/urlmotherchildnutrition.org2Fresourcesmcn-guidelines-for-the-management-of-the-severely-malnourished.pdf](http://www.google.com/urlmotherchildnutrition.org2Fresourcesmcn-guidelines-for-the-management-of-the-severely-malnourished.pdf).

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