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Evolution of acute malnutrition among children aged under five in the district of Korhogo, Côte d'Ivoire from January 2017 to August 2018

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Abstract
Northern Côte d'Ivoire, particularly the Korhogo health district, has the highest prevalence of acute malnutrition among children under 5 years of age. Several actions have been carried out in this area through the National Nutrition Program. Malnutrition data is collected as part of the Integrated Disease Surveillance and Response approach. The objective of our study is to make an acute malnutrition situation analysis in the health districts of Korhogo, from 2017 to 2018 and to assess the impact of the actions carried out on the data collected. Malnutrition's data was collected by extracting them from the general information system. The impact of the actions carried out made it possible to reduce the incidence of acute malnutrition from 2.48% in 2017 to 0.93% in 2018. No peak of Acute Malnutrition was observed during the lean season in 2018. The nutritional situation remains fragile, which is why routine surveillance should be extended to chronic malnutrition.

Keywords: GAM, MAM, SAM, under five years old, Korhogo, Côte d'Ivoire

1. Introduction

According to the WHO around 45% of deaths among children under 5 years of age are linked to undernutrition. These mostly occur in low- and middle-income countries. The developmental, economic, social, and medical impacts of the global burden of malnutrition are serious and lasting, for individuals and their families, for communities and for countries [1]

Undernutrition 'stunts' a country's economic growth by at least 8 % through losses directly related to lower productivity, losses through reduced cognition and losses due to lower school enrolment. This situation is no longer acceptable [2].

In June 2013, Côte d'Ivoire joined the global movement SUN (Scaling Up Nutrition) based on the principle of the right to food and good nutrition for all [3]. It has made the fight against malnutrition a national priority, demonstrating its commitment to the recommendations of the second International Conference of Nutrition (ICN2) in Rome [4] through the creation of the National Council for Nutrition ('Conseil National pour la Nutrition', CNN) in 2014. In 2015, like all member countries of the United Nations, Côte d'Ivoire adopted the sustainable development goals (SDGs), of which SDG 2 is: "End hunger, achieve food security and improved nutrition and promote sustainable agriculture".

A situational analysis in 2016 revealed that acute malnutrition in children under 5 years of age increased from 8% in 2012 to 6% in 2016. This situation is considered as 'severe' according to Humanitarian Response Plan's (HRP) nutritional intervention criteria [5]. It affects both boys and girls. For boys, the prevalence has gone from 9.2% in 2012 to 6.6% in 2016; whereas in the case of girls it has decreased from 6% in 2012 to 5.5% in 2016 [6, 7]. Taking into account regional data, the Centre-North region has the highest prevalence level (7.2%) in 2016. Conversely, the Northeast region has the lowest prevalence of wasting (5%) [8].

According to data from the Living Standards Survey ('Enquête de Niveau de Vie') conducted in 2015 [9], the national prevalence of food insecurity stood at 12.8%, with 4.2% of severe food insecurity and 8.6% moderate food insecurity. This prevalence of food security is above the acceptable threshold (5-10%) in Korhogo district (15.3%) where the prevalence of food insecurity is above the national average [10].

Several regions in northern Côte d'Ivoire are exposed to food insecurity as a result of the «gold rush». Indeed, gold panning threatens agricultural production through the absorption of arable land and agricultural labour. The public consultations and focus groups carried out also revealed that Korhogo, Odiénné and Séguéla, gold regions, are regions with low levels of subsistence farming production. Since then, several actions have been carried out in the Centre-North region, more precisely in the Korhogo district, through the National Nutrition Program ('Programme National de Nutrition', PNN) [10, 11].

The World Health Organization's Regional Office for Africa (WHO-AFRO) has proposed an IDSR approach (Integrated Disease Surveillance and Response) to improve health surveillance and response in the African region; this strategy involves communities and health facilities at all levels of the health system [12]. Thus, as part of this IDSR approach, data on malnutrition is collected. This is done in the health districts through a daily recording system by the

Epidemiological Surveillance Officers. The data collected immediately and weekly at the level of the notification sites is compiled and transmitted to the regional and central levels. To contribute to the functioning of the nutritional surveillance system, the PNN and the National Institute of Public Hygiene ('Institut National d'Hygiène Publique', INHP) provide specific support in the districts.

The objective of our study is to make a situation analysis of acute malnutrition in the health district of Korhogo, from January 2017 to August 2018 and to assess the impact of the actions carried out on the data collected.

2. Materials and Methods

Our study was carried out in September 2018 at the National Institute of Public Hygiene ('Institut National d'Hygiène Publique', INHP) with the collaboration of the National Nutrition Programme ("Programme National de Nutrition", PNN). We collected malnutrition data on the district of Korogho, which is in the North of Côte d'Ivoire (Figure 1), by extracting them from the General Information System ('Système d'Information General', SIG) via the DHIS2 software.

The study period covered January 2017 to August 2018. The variables studied are: Global Acute Malnutrition (GAM), Moderate Acute Malnutrition (MAM), Severe Acute Malnutrition (SAM).

Diagnostic criteria for MAM and SAM were either weight/height ratio (W/H) expressed in z-scores or arm circumference (AC).

- GAM is defined as

-the W/H z-score (weight/height ratio expressed in z-score): less than -2 of standard deviation (<-2 z-scores) from the median weight of the reference population, i.e. children of the same height (WHO child growth standards, 2006)

-the AC: <125 mm

- MAM is defined as

-the W/H z-score (weight/height ratio expressed in z-score): between -2 and -3 units of standard deviation (<-2 z-scores and ≥-3 z-score) from the median weight of the reference population, i.e. children of the same height (WHO child growth standards, 2006)

-the AC: <125 mm and ≥115 mm

- SAM is defined as

- the W/H z-score (weight/height ratio expressed in z-score): less than -3 units of standard deviation (<-3 Z scores) from the median weight of the reference population, i.e. children of the same height (WHO child growth standards, 2006)

- the AC: <115 mm.

-The presence of bilateral oedema of the lower limbs always corresponds to SAM regardless of the W/H index and the AC.

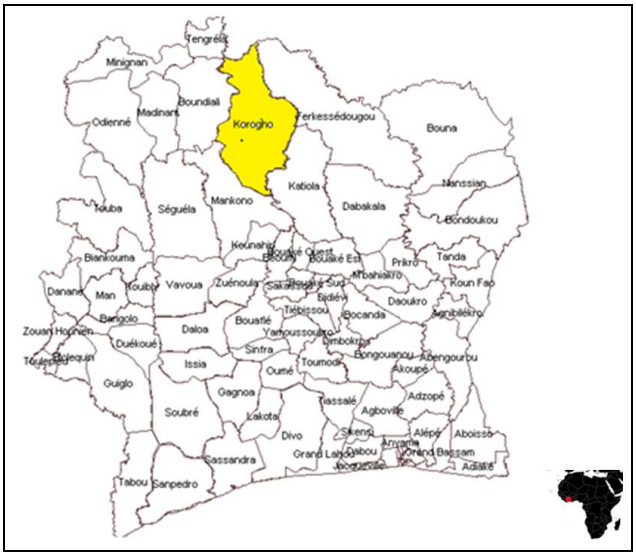

Fig 1: Map of Côte d'Ivoire showing Korogho's district localisation

The population of children under 5 years of age obtained from the Expanded Programme on Immunization ('Programme élargi de vaccination', PEV) is valid for a period of 5 years. This explains why the same population is used for the years 2017 and 2018.

We have calculated the incidence of MAM and SAM by calculating the ratio of notified cases to total population. Since it is the new cases that are notified each month, we are talking about incidence and not prevalence.

The GAM variable represents the whole of acute malnutrition cases; i.e. MAM and SAM cases.

We did not have access to the "gender" variable, which made it impossible to calculate the gender ratio.

Data analysis was performed using the EXCELL spreadsheet.

3. Results & Discussion

Due to its high-risk area status in regards to malnutrition, the Korhogo region has been the object of numerous interventions: Breastfeeding support, Nutrition education, Supplementation of child and mother, Prevention and treatment of severe malnutrition etc [13]. Indeed, the nutritional situation in the north has always been critical due to the Sahelian (desert) climate [14, 15]. The incidence of acute malnutrition has declined over the year; from 2.48% in 2017 to 0.93% in 2018 in the district of Korhogo (Table I).

Table 1: Incidence of GAM, MAM and SAM in children under 5 years of age during 2017 and 2018 in the Korhogo district, Côte d'Ivoire

Year	Population < 5 years old	GAM		MAM		SAM	
		N	Incidence %	N	Incidence %	N	Incidence %
2017	136 182	3371	2.48	2176	1.60	1195	0.88
2018	136 182	1263	0.93	643	0.48	617	0.45

N: Number of cases of malnutrition.

The incidence of GAM in 2018 was 2.66 times lower in 2018 than in 2017; the severity level going from "moderate" (2.48 % > 2.40) to "minor" (0.93% < 2.40) according to the HRP action threshold criteria [5]. The incidence of MAM was 1.95 times lower and the incidence of SAM was 3.5 times lower in 2018 than in 2017. In absolute values, the number of MAM cases in the same period was 150 times lower and the number of SAM cases was 4 times lower. However, as the 2018 data only cover the 8 months of the year, these results should be interpreted with caution.

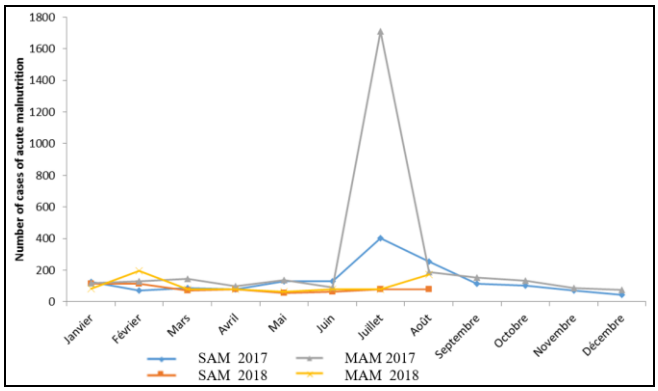

Fig 2: Monthly trend of Acute Malnutrition cases in the district of Korhogo in the years 2017-2018

The malnutrition peaks observed in July 2017 correspond to the lean season. The alert threshold was reached [8] leading to emergency interventions. In 2018, no peak in malnutrition was observed in the north. This is due to the many nutrition interventions that have been made in this area.

However, it is noted that actions have a much greater impact on moderate forms of malnutrition than on severe forms (Figure 2).

The values obtained in our studies are lower than those observed in the Multiple Indicator Cluster Survey, MICS 2016 surveys; (7.2%) [7]. Several hypotheses are possible: either this reduction is the result of the actions carried out in the field, or it is an under-evaluation of malnutrition cases. We will opt for the second hypothesis instead. Indeed, the presence of the malnutrition peak in July 2017 shows that the situation was not under control to the extent that a drastic decrease in malnutrition cases was observed. In addition to this some health centres do not report cases of malnutrition (either due to lack of equipment or negligence), and many cases of MAM do not come to the health centre for consultation. In the MICS surveys, however, all children in the selected zone are taken into account. We also used the ratio of the number of cases reported to the total population and not to the number of children received in health centres. This has contributed to reducing the rates we have achieved. However, this does not compromise the work of comparison that we have done between the 2017 and 2018 data, as the methodology for both years was the same.

Moreover, chronic malnutrition is not subject to epidemiological surveillance. In this context, we have reason to believe that the real situation of malnutrition is underestimated because it is known that the existence of chronic malnutrition biases the detection of acute malnutrition due to short height for age. According to the synthesis of the Lancet's studies on maternal and child nutrition, stunting has become the main indicator of child undernutrition because it has important consequences on health and development [2].

The 165 million children affected by stunting are already experiencing both cognitive development and physical capacities that are limited. This means that an entire generation will be shown to be less productive than it would have been if it had not suffered from stunted growth [16].

The advance of the desert poses another problem to be considered, which is that of the survival of wild food plants, which are a real source of nutritional supplements and currency in rural areas [17]. Many of them have played an important role in the survival of populations in the past, especially in times of war, drought and crop invasion by locusts. Many wild food species are now extinct or in short supply [18, 19]. The fact is that the nutritional situation remains a cause for concern despite the measures taken. Recent studies show the fragile equilibrium [11].

Nutritional epidemiological surveillance is more than indispensable in order to assess not only the nutritional situation in Côte d'Ivoire but also the impact and relevance of the actions carried out. However, the nutritional status should improve as in March 2019, the Regional Centre of Excellence against Hunger and Malnutrition (CERFAM) has been opened in the financial capital, Abidjan. The fruit of a partnership between the World Food Programme (WFP) and the Government, this research centre offers the countries of the West and Central Africa region an opportunity to share their knowledge and experience in the fight against hunger and malnutrition. The shared goal is to document, promote and share the region's good practice, aiming to integrate the nutrition dimension into such areas as family agriculture, the management of post-harvest losses, community resilience and social protection.

4. Conclusions

Several actions have been carried out. The impact of the actions carried out has been manifested by a decrease of wasting cases in the district of Korhogo. The nutritional situation remains fragile, which is why routine surveillance needs to be the object of priority actions. Child malnutrition has lifelong consequences for health, human potential, economic development, prosperity and equity. Countries will not be able to come out of poverty or to sustainably develop their economy until they make sure their population is appropriately nourished [16]. The nutritional situation remains fragile, which is why routine surveillance needs to be the object of priority actions and it is therefore necessary to make the choice to monitor chronic malnutrition.

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