Putting Child Kwashiorkor on the Map

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**Putting Kwashiorkor on the Map** started as a call for sharing data to give an idea of prevalence and raise the profile of kwashiorkor. In order to help fill data gaps and obtain a more comprehensive understanding of the global situation for kwashiorkor, Phase Two of the project was launched in September 2014 with funding assistance from UNICEF. A Kwashiorkor Mapping Core Group was established to manage the project outputs including data collection, interpretation and documentation. The aims of Phase Two are:

1. To refine and update the initial kwashiorkor map, provide a broad estimate of the numbers and location of cases of kwashiorkor and identify high burden countries/areas.

2. To strengthen the evidence base and support advocacy for inclusion of kwashiorkor in relevant methodology discussions at global level.

**Extent of the problem**

This report highlights the importance of kwashiorkor as a public health problem, as reflected by its prevalence and also by the proportion of SAM cases it represents in surveys. Kwashiorkor, an acute condition, and standard cross-sectional surveys are not adapted to assess the real importance of this problem. The high proportion of kwashiorkor reported among SAM children admitted for treatment in some areas where its prevalence is low shows the difficulty in assessing the extent of this problem. For example, the reported prevalence of oedema during the last ten years was less than 1% in most of the countries were data was available but when examining the estimate proportion of SAM cases with kwashiorkor, figures ranged between 50% in Malawi, to 32% in the Democratic Republic of Congo and just 1.6% in Pakistan. This suggests that Kwashiorkor is probably far more extensive than what cross-sectional surveys show. Certain types of studies, such as incidence studies or community studies with regular active case finding, may be better suited to more accurately describe the burden of oedema in countries.

**Distribution of kwashiorkor**

Despite its limitations, this report gives, for the first time, a representation of the geographic distribution of kwashiorkor, based on 2,515 datasets with information on more than 1,736,000 individual children collected from 55 countries during the time period 1992 to 2015. It shows that this form of malnutrition occurs most frequently in some parts of Africa, specifically around the equator. This is consistent with what has been reported for more than 40 years in West Africa. DRC is the highest burden country in the world with respect to oedema prevalence and surveys from a significant number of countries in Africa indicated that more than a third of SAM cases defined by MUAC <115mm or oedema had kwashiorkor, including Malawi, Rwanda, Zambia, Togo, and Cameroon. Notably, the data from Malawi estimated that half of all SAM cases had kwashiorkor. Once again, Malawi, DRC, Haiti and Zambia were found to have some of the highest rates of kwashiorkor admissions. Oedema prevalence was greatest in the youngest age groups (6-17 and 18-29 months) and no difference on prevalence was found among sexes but when SAM was defined by MUAC <115mm or oedema, the proportion of males with oedema among those with SAM was consistently higher than that of females.

**Association with background malnutrition and with mortality**

This report also highlights the high variation of malnutrition associated with oedema. Many oedematous children would not be classified as having SAM if only MUAC or WHZ were considered. Arguably, the interpretation of
nutritional status with WHZ is flawed in children with oedema due to weight increase caused by oedema, but this report shows that oedema cases often have low WHZ (the median WHZ score for children with oedema was -1.55 and for those without oedema, -0.62). MUAC measures also tended to fluctuate in generalised oedema.

MUAC is less sensitive to changes in hydration status and seems better for assessing the general nutritional status of children with oedema that does not extend up to the child’s upper arms (i.e., +++ oedema). This latter assumption is supported by the ROC curves in this report that describe the association between anthropometry and oedema, showing that MUAC more readily identifies children with oedema, compared to WHZ.

Mortality associated with kwashiorkor also varies across studies, with some reporting lower, identical or higher mortality compared to non-oedematous malnutrition. These discordant observations may be related to a different level of associated malnutrition. In children with SAM, the presence of oedema is considered as an aggravating factor associated with a higher risk of death as reported by a number of studies but some of the patterns analysed may be indicative of no association. However, the lack of actual and reliable data hinders the assessment and comparison of the mortality rates between the 3 types of SAM, as well as the identification of prognostic factors that could guide the treatment of these patients.

**Poor association between prevalence surveys and admission data**

Another important finding of this report is that standard cross-sectional surveys do not adequately reflect the clinical importance of kwashiorkor, since there appears to be a lack of a relationship between admission data and kwashiorkor prevalence obtained from surveys. The possible reasons for this discrepancy are many and should be explored. A possibly poorly adapted survey methodology with insufficient standardisation for collection of oedema data should be considered first. The recommendation of national protocols in terms of referral to inpatient care, the existence of community-based management of acute malnutrition in the country or the level of community mobilisation activities were not assessed in relation to each annual national admission dataset. It is therefore uncertain whether variations in the level of inpatient care for oedematous children were due to country policy or severity of cases.

It is possible that duration of oedematous malnutrition is not the same in different settings, in particular as a result of the very different degree of associated malnutrition. This may have an influence on the associated mortality and/or on the rapidity of recovery, both of which can have an influence on the probability of finding oedematous cases during a nutritional survey.

High variations of association with background malnutrition and with mortality and poor association between results of prevalence surveys and admission data are factors that could also be related to the shift in treatment with the introduction of community-based management of acute malnutrition (CMAM) around 2005, where oedema + or ++ (variation between agencies) moved from being treated only in an inpatient setting to being treated in an outpatient setting. Ideally inpatient admissions could be interpreted on a timescale in relation to the country protocols at that time, but given the historical data used, exact admission protocols at the time were not available.

**Data collection and standardization**

It is made clear throughout the report, that better collection methodologies on kwashiorkor data and improvements to the current survey reporting systems are needed. Additionally, a global database that includes admissions for oedema should be included in each country’s surveillance system.

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