Strengthening Nutrition Surveillance in Uganda: What have we learned?

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ABSTRACT

Background: The World Health Assembly resolution of 2012 recommended a comprehensive implementation plan for maternal and child nutrition outlining six global targets on stunting, wasting, underweight, low birth weight, anaemia and exclusive breastfeeding to be achieved by 2025. Currently, many national nutrition surveillance systems are weak and need to be strengthened to be able to track these targets. This study aimed to understand whether the Accelerating Nutrition Improvements (ANI) project supported by the WHO in Uganda ANI improved the reporting of nutrition indicators in the District Health Information System-2 (DHIS2).

Methods: The project focused on six pilot districts in Eastern and Western Uganda. A series of processes including an analysis of the strengths and weaknesses of the DHIS2 and the Health Management Information System (HMIS) was undertaken. A nutrition report format with recommended indicators was developed and customized into DHIS2. Capacity building was supported for health workers on the HMIS/DHIS2 and data quality.

Results: Over a one year implementation period a >100% increase in reporting through the DHIS2 was noted for a number of indicators including the number of children assessed for nutrition status; folic acid uptake by pregnant women and infants breastfed within the first hour of birth. Other indicators that showed improvements included children assessed for length/height (82%); mothers who received maternal (51%) and infant feeding counselling (48%). A number of challenges including human resources, poor data quality and a lack of the required materials and tools existed.

Conclusions: The strengthening of nutrition surveillance has shown that reporting on nutrition indicators is possible and can be improved. However, data quality, human resource capacity and timely availability of the required tools need to be addressed.

INTRODUCTION

In May 2012, the 66th World Health Assembly (WHA) endorsed the Comprehensive Implementation Plan on Maternal, Infant and Young Child Nutrition (MIYCN). This resolution urged member states to improve nutrition outcomes with universal coverage of MIYCN interventions, relevant to the country context, in a multi-sectoral nature. The MIYCN Plan outlined six global nutrition targets: 40% reduction in childhood stunting; 50% reduction in anaemia in women of reproductive age; 30% reduction in low birth weight; no increase in childhood overweight; increased rate of exclusive breastfeeding up to at least 50%; and reduce or maintenance of childhood wasting to less than 5% to be met by 2025 [1,2].

The WHA indicators were selected on the basis of their epidemiological and public health relevance and reflected a universal agenda to address multiple interconnected forms of malnutrition across the lifecycle [2]. These are associated with five proposed actions to achieve the set targets [1]. These include creating a supportive environment for the implementation of policies including all the effective health interventions with an impact on nutrition in national nutrition plans; stimulation of development policies outside health sector that recognise and include nutrition; and provision of sufficient human and financial resources for the implementation and monitoring and evaluation of the implementation of policies and programs [1,3]. The WHA global nutrition targets were integrated into the second of the Post-2015 Sustainable Development Goals [3]. In addition, many countries recently signed the Declaration of the Second International Conference on Nutrition and committed themselves to taking action on nutrition on several fronts [4].

The National Health and Nutrition Surveillance Systems in Uganda

In Uganda, the most common method of surveillance for nutrition is through the five-yearly demographic and health surveys. These surveys measure and report on many key maternal and child nutrition and health indicators at national and regional but not district levels. In addition to periodic surveys, a more routine public surveillance system for nutrition and other health indicators is the District Health Information System-2 (DHIS2) and Health Management Information System (HMIS). Introduced in 2012, the DHIS2 is an integrated reporting system used by the Ministry of Health (MoH) and other stakeholders to collect nutrition and health information on a routine basis for planning and decision making at all levels of the health care system.

HMIS Reporting Mechanism in Uganda

The HMIS tools each containing a specific set of program information form the back-bone of the DHIS2 system. Contrary to earlier versions of reporting, the DHIS2 is web-based and was introduced to strengthen district based health reporting that was largely paper-based [5,6]. With the electronic system only up to the district level, health workers at the lower levels tally and compile reports for transmission to the district for electronic capture. The electronic captured data can then be accessed online by different departments within the MoH. With 100% coverage across all districts in the country, a major limitation of the DHIS2 is the lack of human resource for nutrition to ensure data quality and use. At the health facility level availability of anthropometric equipment and HMIS tools are important.

In response to this problem, the WHO in collaboration with Global Affairs Canada implemented the Accelerating Nutrition Improvements (ANI) project in Uganda [7]. The aim of the ANI project was to improve the nutrition surveillance system through strengthening of the HMIS/DHIS2 in order to track the nutrition targets and assess progress and coverage of the key nutrition interventions. Specifically, the WHO supported incorporation of nutrition indicators into the HMIS/DHIS2, and supported capacity buildings and mentorships of the health workers on the same. The project was implemented as a pilot in six districts of Iganga, Luuka and Namutumba in Eastern Uganda. From Western Uganda were the districts of Hoima, Masind and Kibaale.

The aim of this study was to present the documented process and experience of strengthening nutrition surveillance in Uganda to enable the reporting on the indicators for
tracking the WHA 2012 global nutrition targets. These experiences will help in understanding the lessons learnt and challenges over the implementation period.

**MATERIALS AND METHODS**

**Gap Assessment**

The initial step in the strengthening of nutrition surveillance was to review the current e-reporting system, the DHIS2, to identify its strengths and weaknesses. A technical team composed of staff from the MoH and the WHO held workshops where these were identified by level of health service delivery.

**Review of the HMIS Tools**

Based on the results of the gap assessment, the HMIS tools were reviewed to include data elements to track the global nutrition targets. The review was done by a technical team from the MoH, the WHO and other national stakeholders. In addition, where outdated, existing indicator definitions were updated according to the acceptable recommendations.

**Nutrition Report Format, Validation Rules & Customization into DHIS2**

From the review of HMIS tools, the missing data elements and other changes were captured in a nutrition report format. This together with the validation rules to ensure accurate entry of records were customized into the DHIS2.

**Orientation of Stakeholders**

National and other stakeholders were oriented to the revisions in the HMIS tools and the nutrition report format as a means to foster the understanding and rationale to monitor and track the WHA 2012 nutrition indicators.

**Roll-out & Training**

For each district, 5-day training workshops over a two-week period on the use of the DHIS2 and nutrition data quality demand and use (DQA) were done. These targeted district level staff included the district biostatisticians and nutrition focal persons. The first week of training was for DHIS2 and the other for DQA. At all health facilities, data managers were also trained in two-day workshops. In addition to focusing on the revisions in the nutrition data elements, these trainings also focused on nutrition status assessment and interpretation using WHO recommendations [8].

**Health Facility Mentorships**

In order to ensure that the trained health managers were accurately collecting and reporting data using the nutrition report format, health facility based mentorships were carried out in each of the ANI districts. For each district these covered all the health facilities that existed in the DHIS2. The mentoring consisted of a review of the data they had collected for accuracy and consistency and qualitative discussions to understand the strengths and challenges experienced.

**Indicator Data Extraction from the DHIS2**

In order to assess if there were any improvements made in reporting on nutrition data, we compared reporting rates for stunting over the immediate period after the capacity building was undertaken (July 2015 to March 2016) to that of the quarter April to June 2016. Reporting rate was defined as the proportion of health facilities that reported on stunting divided by the total number expected from the same district. Stunting was the preferred indicator because contrary to others the data elements were comparable across quarters. In addition, we compared the health service coverage indicators for different maternal and young child nutrition over the same period.

**RESULTS**

**Strengths and Weaknesses of the DHIS2**

The strengths and weaknesses are outlined in Table 1. The DHIS2 system was existent in all districts. In addition, each district had focal persons conversant with its use. At each health facility there was a data manager in charge of the paper-based HMIS. Although data managers existed for each health facility, they had limited capacity to do nutrition status assessment and
Table 1. Strengths and Weaknesses of the DHIS2

<table>
<thead>
<tr>
<th>Level of Health Service Delivery</th>
<th>Strengths</th>
<th>Weaknesses</th>
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</thead>
<tbody>
<tr>
<td>National</td>
<td>• HMIS/DHIS2 functional in all districts</td>
<td>• Nutrition data elements for tracking anemia and exclusive breastfeeding in the general population missing</td>
</tr>
<tr>
<td></td>
<td>• Capacity exists to conduct nutrition surveys</td>
<td>• Limited numbers of nutrition skilled data managers</td>
</tr>
<tr>
<td></td>
<td>• Nutrition surveillance operational in hunger-prone regions</td>
<td>• Poor nutrition data flow and dissemination</td>
</tr>
<tr>
<td>District</td>
<td>• HMIS/DHIS2 functional in all districts</td>
<td>• Lack of skilled nutrition managers</td>
</tr>
<tr>
<td></td>
<td>• Capacity for HMIS/DHIS2 exists</td>
<td>• Low priority for nutrition</td>
</tr>
<tr>
<td></td>
<td>• Potential for integration of nutrition services exists and available at some contact points</td>
<td>• Lack of nutrition status assessment equipment and z-score charts</td>
</tr>
<tr>
<td>Health Facility</td>
<td>• A records assistant present for each health facility</td>
<td>• Limited capacity for nutrition status assessment and classification</td>
</tr>
<tr>
<td></td>
<td>• Potential for integration of nutrition services exists and available at some contact points</td>
<td>• Nutrition assessment seen as a “burden”</td>
</tr>
<tr>
<td>Community</td>
<td>• Community health workers available to support nutrition status assessment</td>
<td>• Lack of nutrition equipment and tools</td>
</tr>
</tbody>
</table>

interpretation. In addition, there was a low priority for nutrition indicators. Other limitations at the health facility level included a lack of anthropometric equipment and z-score charts for use in interpreting nutrition status assessment results. At the community, volunteer health care workers existed but these were also not skilled to do nutrition status assessment. There was also a lack of anthropometric equipment and z-score charts.

Review of the HMIS Tools

As shown in Table 2, the review of the HMIS tools revealed that out of the six global nutrition targets most of the indicators already existed but only needed stratification by severity and age categories that facilitate the identification of vulnerable groups. For example, the age categorization for stunting, wasting and overweight was broken down as 0-23 and 24-59 months. In addition, these were edited to report using z-scores. The maternal indicator for anaemia (Hb<11g/dl) was added in addition to the number of women attending the fourth antenatal visit. The indicators for low birth weight and exclusive breastfeeding remained unchanged.

Capacity Building, Mentorships & Support Supervision

A total of 18 district health team members comprising of nutrition focal persons and biostatisticians were trained on DHIS2. At the health facility level, a total of 288 health managers were trained on the revised HMIS tools and the assessment, classification and interpretation of nutrition status. A total of 977 health care workers were mentored on the same at their respective health facilities across the six ANI districts.

Data Reporting & Feedback

For all health facilities, there were deviations in data reported. For example, there were cases
where the proportions of children with severe acute malnutrition were higher than those with moderate acute malnutrition. Other examples included deviations in what was reported in the DHIS2 compared with the actual registers at the health facilities. In some cases some data elements were not filled. Examples included missing weights, heights and ages of children some registers. Qualitative data on challenges to nutrition data collection and reporting included a low level of commitment for nutrition status assessment among staff; lack of anthropometric equipment, HMIS tools and z-score charts. The health workers were limited in their skills in the use and interpretation of z-scores. There was lack of equipment to measure haemoglobin. Four out of the six districts lacked a technical person for nutrition. All health facilities mentioned they did not use the data collected. In most cases the health facility managers were not conversant with the interpretation and application of the summary results from nutrition status assessment. For all the six ANI districts, except during the mentorships supported by the WHO, there was no feedback on the data collected.

**Reporting Rates for Stunting**

A comparison between the period of July 2015 to March 2016 (pre-training) and April to June 2016 (post-training) showed an improvement in the reporting rates for stunting across all districts as shown in Figure 1. In the Eastern ANI districts, Iganga had the lowest pre-training reporting rate

### Table 2. Review of the HMIS Tools

<table>
<thead>
<tr>
<th>WHA 2012 Nutrition Indicators</th>
<th>Data Elements Available</th>
<th>Revisions Made</th>
</tr>
</thead>
</table>
| Childhood stunting             | • Number of clients assessed for stunting total  
                              | • Number of children 6-59 months stunted      | • Age categorization revised to 0-23 and 24-59 months  
                              |                                                  | • Specified the reporting units as z-scores  
                              |                                                  | • Reporting to specify severity i.e., not stunted, severely and moderately stunted |
| Anaemia among women            | • Number of pregnant women  
                              | receiving iron/folate on 1st visit             | • Added the following:  
                              |                                                  | • Number of pregnant women getting folic acid at 4th visit  
                              |                                                  | • Number of pregnant women with Hb <11g/dl at 1st and 4th visit |
| of reproductive age            |                         |               |
| Low birth weight               | • Number of children born with low birth weight (<2.5kg) | • No change made |
| Childhood overweight           | • Number of children 6 months and 6-59 months overweight | • Age categorization revised to 0-23 and 24-59 months  
                              |                                                  | • Broken down to capture those overweight and not overweight  
                              |                                                  | • Specified the reporting units as z-scores |
| Exclusive breastfeeding in the | • Proportion of HIV exposed children who are exclusively breastfed | • No change made |
| first 6 months                 |                         |               |
| Childhood wasting              | • Number of children 6 months and 6-59 months who are wasted  
                              | • Number of children with severe acute malnutrition (SAM) with and without oedema | • Age categorization revised to 0-23 and 24-59 months  
                              |                                                  | • Specified the reporting units as z-scores  
                              |                                                  | • Reporting to specify severity i.e., not wasted, severely and moderately wasted |

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of 3.5%, which increased to 15.8% after the training. Luuka’s rate increased to 12.1% compared to 9.3% pre-training. The Western district of Kibaale has a reporting rate of 5.1% up from 0% pre-training.

**Maternal & Young Child Service Coverage Indicators**

There was >100% increase for the number of children 0-59 months assessed for nutrition status with MUAC; iron/folic acid uptake at fourth antenatal visit and the number of infants initiated to breastfeeding within the first hour of birth. Other selected indicators also showed different percentage increases as shown in Table 3.

**DISCUSSION**

Our experience shows that the strengthening of nutrition surveillance has improved the reporting of nutrition data in the DHIS2. Similar to others [5,6], capacity building improved the reporting of selected health service coverage indicators. The support supervisions and mentorships that followed the training should have been the key in creating the improvement in reporting. Health facility based mentoring is important because it enables the actual physical review of the data collection tools and interaction of the persons in charge of the process. In addition, this also allows training of other health facility care workers who are likely to be missed otherwise [6]. Setting of recommendations tailored to the actual health facility needs also may support improvement in reporting.

Specific to reporting rates on the WHA indicator for stunting, our analysis showed a modest improvement. Challenges for reporting on this and other indicators included limitations of HMIS tools and anthropometric equipments. A limitation of HMIS tools is not new and has also been reported by others as a major factor hindering reporting [6,9]. In addition, there was also limited interest in health care workers in nutrition status assessment and reporting. Whilst the limited interest of health care workers in this respect may have multiple reasons, data from supportive supervisions and mentorships noted that some of the health workers have looked at it as an extra work while some had not yet adequately grasped how to carry out nutrition status assessment and its interpretation. Low health worker interest was also reported by others who also recommended to put in place practical incentives for data collection, compilation and reporting at the facility level, given that planning and setting targets have at times been done without necessarily using data, hence may see no need [9]. Although we note an improvement in the reporting rates of stunting
Table 3. Maternal and Young Child Service Coverage Indicators in the DHIS2 from the Six ANI Districts, Uganda

<table>
<thead>
<tr>
<th>Coverage Indicators</th>
<th>Pre-Training (July to Dec 2015)</th>
<th>Post-Training (Jan to June 2016)</th>
<th>% Increase</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of clients (children 0-59 months) who received nutrition assessment using length/height</td>
<td>2,211</td>
<td>4,028</td>
<td>82.2</td>
</tr>
<tr>
<td>No. of clients (children 0-59 months) who received nutrition assessment in using color coded MUAC tapes</td>
<td>5,225</td>
<td>11,134</td>
<td>113.1</td>
</tr>
<tr>
<td>No. of pregnant and lactating women who received maternal nutrition counselling</td>
<td>22,263</td>
<td>33,561</td>
<td>50.7</td>
</tr>
<tr>
<td>No. of pregnant and lactating women who received infant feeding counselling</td>
<td>22,382</td>
<td>33,026</td>
<td>47.6</td>
</tr>
<tr>
<td>No. of pregnant women attendance at antenatal visit 1</td>
<td>51,263</td>
<td>59,007</td>
<td>15.1</td>
</tr>
<tr>
<td>Iron/Folic acid uptake at antenatal visit 1</td>
<td>42,379</td>
<td>42,986</td>
<td>1.4</td>
</tr>
<tr>
<td>Iron/Folic acid uptake at antenatal visit 4</td>
<td>98</td>
<td>3,231</td>
<td>3196.9</td>
</tr>
<tr>
<td>No. babies initiating breast feeding within the first hour after birth</td>
<td>10,231</td>
<td>20,959</td>
<td>104.9</td>
</tr>
</tbody>
</table>

and the coverage of other health indicators, mentorship reports showed that in some cases health facilities submitted data with inaccurate records, a similar experience reported elsewhere [5,6,9]. Inaccuracies in records could be attributed to the largely paper-based system that still exists at the lower health facility levels. Currently for nearly all districts in Uganda, electronic data management and analysis is only up to the district level, calling for a need to scale it up to the health sub-district levels, and possibly other lower level health facilities. This scale up should provide a quick way not only to have data readily available but also reduce on the inaccuracies. It should also enable providing of quick feedback between different levels. It should, however, be noted that computer use at lower level health facilities is limited and would require a huge investment to purchase computer units for all health facilities in Uganda, connect them to the Internet and train all health workers to use them.

While one of the most important aspects of routine data may be to ensure quick feedback and data utilization, our findings indicate that there was no feedback to the respective levels of health service delivery including from the MoH central. Although this may be a quick judgment to make in this short period of implementation, we believe this was greatly attributed to limited technical capacity for nutrition data analysis at these levels. Limited human resources for health information in Uganda have also been reported by others as a major challenge [10]. Moreover, some districts do not have nutritionists as focal persons for nutrition work. The lack of technical capacity to analyze, interpret and translate nutrition data into usable information will greatly impede on nutrition programming as it would be difficult to assess if interventions are effective and needs to be addressed. Previous analysis and use of HMIS data for measles was, for example, able to determine trends of measles cases over time and the impact of under-five immunization campaigns on the routine immunization coverage rates on the trends were able to help in identifying vulnerable groups and formed the basis for the 5-year measles control strategy by the MoH [11]. Collecting data that is not used may breed fatigue among those involved in data collection and compilation as they will not appreciate the efforts put in [9].
CONCLUSIONS

Although there are bottlenecks, the strengthening of nutrition surveillance in the six ANI districts has shown that reporting for nutrition indicators is possible and can be improved. However, data quality and their use need to be strengthened. Challenges like human resource capacity, timely availability of HMIS tools and anthropometric equipments need to be addressed to have timely and high quality data.

AUTHORS’ CONTRIBUTIONS

FMT contributed to the design of the work, the collection, analysis, interpretation of the data, and drafting the manuscript. HB made contributions to the design of the work, the analysis and interpretation of the data and reviewing of the manuscript. Both authors have read and approved the final manuscript.

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CONFLICT OF INTEREST

Authors have declared that no competing interests exist.

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