論文の内容の要旨

論文題目　Analysis of the nutritional status of children under age 5 years: a case study of Namibia
(5 歳未満児の栄養状態解析：ナミビア共和国における事例研究)

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Background

The world is faced with a grave nutrition situation, and Namibia is no exception. Accurate nutrition data, monitoring and surveillance efforts are necessary for proper policymaking and nutrition interventions. Child undernutrition burden is determined by the child's nutritional status and derived from their anthropometric measurements. However, anthropometric measurements are prone to measurement errors, which can have a detrimental effect on the development of public health policies, and the ensuing planning and implementation of public health interventions. While Namibia has high reported prevalence of undernutrition among children under age five, the poor quality of child anthropometric measurements in the country may affect national trends, vulnerable groups and high-risk regions that are prioritized based on undernutrition burden. This study comprised of two parts. Part 1 identified the prevalence and trends of child undernutrition in stunting, wasting, and underweight in Namibia. Part 2 conducted a comparative analysis of three prevalence estimates methods of undernutrition (WHO flags, SMART flags, and PROBIT method) in Namibia from the 2016 national data.

Methods

This study conducted a secondary analysis using child nutrition data from the Namibia Demographic and Health Surveys (NDHS) and the 2016 Namibia Household Income Expenditure Survey (NHIES). In Part 1, data from NDHS (1992, 2000, 2006, and 2013) surveys and 2016 NHIES was used for the total prevalence of children under age five who were stunted, wasted, and underweight and to plot the trend of the nutritional status in Namibia from 1992 to 2016. Part 2 used three different methods to estimate the child stunting and wasting prevalence in Namibia: WHO Child Growth Standard flags, Standardized Monitoring and Assessment of Relief and Transitions (SMART) flags, and PROBIT method. Analysis with WHO flags and SMART flags was performed in IBM SPSS Statistics for Windows, Version 24.0 (IBM Corp., Armonk, NY, USA), and PROBIT was calculated in Microsoft Excel Spreadsheet (Microsoft, Redwood, Washington, USA). The regional prevalence maps according to the prevalence thresholds were created using ArcGIS (ArcGIS 10.7, Esri, Berkeley, CA, USA).

Results

Part 1 had three major findings from the analysis of the nutritional status of children under age 5 from the 2016 NHIES and the nutritional trends across 1992 to 2016. First, the 2016 NHIES data showed a national undernutrition proportion of 30.3% stunted children, 11.2% wasted children, and 19.6% underweight children under age 5. Second, the country progress in child undernutrition from 1992 to 2016 across the different surveys was significant for stunting (p-trend = 0.01) and wasting (p-trend <0.01), but not underweight (p-trend = 0.12). Finally, the 2016 NHIES found a high percentage (9%) of biologically implausible child measurements.

From the Part 2 findings, the study showed that different analysis methods can result in varying stunting and wasting prevalence of Namibia's under age 5 children when using a national survey with poor quality child anthropometry. The biggest difference across the three methods was the calculated estimates. The WHO flags most often reported the largest prevalence out of the three analysis methods, and PROBIT resulted in the smallest prevalence. When the data was adjusted with WHO flags, SMART flags, and PROBIT, the national stunting prevalence was 30.3%, 29.0%, and 20.9% in 2016, respectively; and the national wasting prevalence was 11.2%, 8.7%, and 4.2%. The trends in nutritional status from 1992 to 2016 confirmed similar improving trends until 2013 across WHO flags, SMART flags and PROBIT methods, while PROBIT showed smaller increases in stunting and wasting prevalence (2.5 and 0.6 percentage points) compared to WHO flags (6.6 and 5.0 percentage points), SMART flags (7.8 and 2.4%) from 2013 to 2016. One of the most notable results of this study was among the undernutrition status of the ethno-linguistic groups. Namibia's San ethnic group, compared to other language groups, had the highest prevalence of stunting with WHO flags (68.2%), SMART flags (63.1%), and PROBIT (72.9%). The results highlighted the regions with high stunting prevalence differed by analysis method. By using the WHO flags, nearly all regions were classified as 'high' or 'very high' stunting prevalence, whereas with the SMART flags had fewer 'high' level regions and PROBIT method with even less.

Conclusion

This study identified the prevalence, trends, target areas and subgroups of the child population that are at increased risk of undernutrition. High child stunting prevalence remains an important public health issue in Namibia, as well as child wasting in some regions and among some ethno-linguistic groups, especially among the San ethno-linguistic group is a critical issue. This study found that surveys with poor data quality of child anthropometry can lead to various interpretations of trends and targeting based on the analysis method. Whether the poor quality data stems from random or systematic measurement errors, it can result in large discrepancies of prevalence, which can mislead national nutritional policies and inefficiently use resources. Therefore, this study has contributed valuable new evidence on ways to analyze surveys with poor child anthropometry data on a national level for low- and middle- income countries.

Study implications and recommendations

The findings from this study have important implications on planning policies and nutrition interventions in low- and middle-income countries. The prevalence estimates derived from poor quality data should also be adjusted with the multiple analysis method for stunted and wasted children in the Namibian context and similar low- and middle- income countries with poor data quality in child anthropometry. After comparing the WHO flags, SMART flags, and PROBIT methods, different estimate methods are recommended for undernutrition, depending on the situation.

It should be noted that regions should not be targeted based on prevalence from WHO flags alone when poor data quality is evident because data quality may vary from region to region. Using the SMART flags or PROBIT method when poor quality anthropometry is suspected may help to bring out regional differences that can be used for prioritization. Also based on the findings, the findings on the San acted as a sound example for the importance of comparing prevalence with different methods. PROBIT method may be preferred over WHO flags for identifying the vulnerable group in situations where the sample size is less than 150, such as the San.

Varying caseload estimates affects the way that the government would plan treatment for malnourished children through its policies and services. Therefore, a cost-effective public health intervention, especially in a low-resource country, cannot be implemented appropriately. If the only available national data has suspected poor quality child anthropometry, the data for severe acute malnutrition should be analyzed with multiple methods for comparison. However, when urgent nutrition intervention is necessary, the PROBIT method provides a practical alternative. This is because it is low-resource and time-saving since the prevalence can be re-calculated using simple spreadsheet software and the mean z-score; there is no need to re-analyze the raw data.

This study recommends the continued efforts to address high child stunting nationwide, as well as the continuation of efforts to screen for and treat acute undernutrition, especially in areas with high poverty. The findings also encourage the government to urgently review and adjust food aid and social assistance for the children of vulnerable households, like the San group. This minority group should be prioritized for nutritional intervention by the government and development partners. Also, future national surveys should incorporate clear measurement protocols. When collecting anthropometric data, the method in how the child measurements should be consistent with what is recommended by WHO/UNICEF. Finally, surveys should have adequate training and supervision during data collection to avoid reducing the quality of measurements.