New evidence on methods to assess vitamin A status: implications for the use of Uganda Demographic and Health Surveys vitamin A data

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9 March 2018

PURPOSE

This handout provides guidance on the use of the vitamin A data from the 2006, 2011, and 2016 Uganda Demographic and Health Surveys (DHS).

BACKGROUND

Vitamin A deficiency is a major public health problem that results in blindness, poor immune function, and in some cases death[1]. The prevalence of vitamin A deficiency varies substantially by setting, and population-based surveys like the DHS can be useful in establishing estimates of prevalence.

Blood specimens are required to establish vitamin A status. There are various biomarkers and methods used to assess vitamin A status. The method used to assess vitamin A deficiency is key to assuring valid results.

Uganda has been a pioneer in assessing vitamin A status in The Demographic and Health Surveys Program. The 2000-01 Uganda DHS used a dried blood spot-retinol method to assess vitamin A status, but this method required sending samples out of the country[2]. The 2006, 2011, and 2016 Uganda DHSs measured vitamin A status using a different method that was commercially available, and which is based on the determination of retinol-binding protein[3]. This method was selected for the possibility of being done in the country, and it was used with dried blood spot samples. After the completion of the 2016 Uganda DHS, issues were identified with this method of measuring vitamin A status[4].

USE OF VITAMIN A DATA AND FUTURE CONSIDERATIONS IN UGANDA

In light of recent evidence, the data on vitamin A status from the 2006, 2011, and 2016 Uganda DHS should be interpreted with extreme caution. A key lesson learned is that not all methods may be equally valid for assessing vitamin A status. The World Health Organisation and the Uganda Ministry of Health will provide guidance on preferred approaches in the future.

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[1] World Health Organisation. Vitamin A deficiency. http://www.who.int/nutrition/topics/vad/en/.

[2] Dried blood spot serum retinol using the high-pressure liquid chromatography method (Craft, N. E., T. Haitema, L. K. Brindle, S. Yamini, J. H. Humphrey, and K. P. West, Jr. 2000. Retinol analysis in dried blood spots by HPLC. *J Nutr* 130 (4):882-5. doi: 10.1093/jn/130.4.882). Serum retinol is the main circulating form of vitamin A and is the biomarker of choice for assessing vitamin A status in population-level surveys.

[3] Commercial retinol-binding protein enzyme immunoassay method (Hix, J., C. Martinez, I. Buchanan, J. Morgan, M. Tam, and A. Shankar. 2004. Development of a rapid enzyme immunoassay for the detection of retinol-binding protein. *Am J Clin Nutr* 79 (1):93-8. doi: 10.1093/ajcn/79.1.93). Retinol-binding protein is a carrier protein for retinol that has been used as a proxy biomarker to assess vitamin A status.

[4] Makerere University and US Centers for Disease Control. 2016-2017. Publication forthcoming.