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Letter to the Editor

Is the strength of association between indicators of dietary quality and the nutritional status of children being underestimated?

To the Editors,

The World Health Organization's infant and young child feeding (IYCF) indicators were developed to fill multiple needs: to facilitate the assessment and comparison of IYCF practices across settings, to identify populations at risk and to evaluate the impact of interventions and measure progress towards achieving targets (World Health Organization 2008). Understanding the relationships between these indicators and child anthropometric outcomes, as described in a recently published paper in Maternal & Child Nutrition (Jones *et al*. 2014), is relevant to many of these objectives because an important goal of many IYCF interventions is to improve growth.

Two of the IYCF indicators aim to measure the quality of complementary foods: (1) minimum diet diversity (MDD), defined as the proportion of children 6–23 months of age who received food from four or more food groups and (2) the proportion of children who consume iron rich foods (World Health Organization 2008). Both of these indicators currently use a 24-h recall instrument, which is the standard approach for dietary assessment used by the Demographic and Health Surveys, the main source of data for most analyses of IYCF indicators and child anthropometric outcomes to date. The use of a short recall period helps to minimise potential recall bias, but the trade off for this is the introduction of random within-person error in the estimation of usual diet (Willett 2013) since certain foods (particularly animal source foods such as meat, fish and dairy products) are infrequently consumed in less developed countries.

If uncorrected, random within-person error increases the variance around an estimate (Beaton 1994). This has two practical implications for the use of these indicators. The first is that the proportion of children classified as having a deficient usual diet will tend to be overestimated – although the mean number of food groups consumed will tend not to be affected by this type of error (Willett 2013). The second is that random within-person error also tends to attenuate relative risks estimated between an exposure and an outcome towards one (effectively decreasing statistical power). We suggest that this second consequence could explain the finding in the paper by Jones *et al*. (2014) that only in India (where the sample size exceeded 10 000 people) was there a statistically significant relationship between MDD and child stunting, even though the effect estimates in most settings consistently portrayed an inverse relationship between MDD and stunting risk.

It is possible to correct for random within-person measurement error if replicate measures of dietary intake are available, and a macro in SAS (SAS Institute, Inc., Cary, NC, USA) exists for this purpose (Rosner *et al*. 1992; Logan & Spiegelman 2004). This solution does require collecting information on dietary diversity on at least a subset of the population for at least one additional day, ideally during a different season and food pattern period from the first recall. This may increase the cost of surveys, but may also reduce the sample size needed for the overall study. It may also be possible to get a more accurate estimate of normal MDD by using a longer recall period. However, this solution may also be associated with systematic or random error associated with the ability of respondents to recall intake over a longer time period (Willett 2013). Further studies exploring the implications of each solution in different contexts may be helpful to better understand the true relationship between indicators of diet quality and child anthropometric indicators and to further improve the usefulness of these indicators.

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Andrew Thorne-Lyman*, Donna Spiegelman[†‡§] and Wafaie W. Fawzi[†§¶]
*Center on Globalization and Sustainable Development, The Earth Institute, Columbia University, New York, USA, [†]Department of Epidemiology, Harvard School of Public Health, Boston, Massachusetts, USA, [‡]Department of Biostatistics, Harvard School of Public Health, Boston, Massachusetts, USA, [§]Department of Nutrition, Harvard School of Public Health, Boston, Massachusetts, USA, and [¶]Department of Global Health and Population, Harvard School of Public Health, Boston, Massachusetts, USA
athorne-lyman@ei.columbia.edu

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