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Fortification of salt with iodine and iron in India

Dear Sir:

We would like to point out some issues in the interesting article by Andersson et al (1) that was recently published in the Journal.

Their efficacy study was conducted from March 2006 through February 2007 (page 1380). But, in India, most schools are closed during the months of April and May for summer vacation. It is likely that children would have visited other houses (of relatives) and consumed different food during the summer vacation in this period. Whether this was considered in the analysis of the study needs clarification.

According to the article title, this study was performed in southern India; however, it included only 6 schools in 18 villages in Bangalore. Here the prevalence of anemia in the study population aged between 5 and 18 y was 12.3%, which is much lower than the prevalence of anemia reported in southern states in India (2). This could indicate a sampling bias.

The details of random allocation in the efficacy study were not clearly mentioned, especially with regard to how children living in the same household were randomly assigned to the same group (page 1380).

In Andersson et al's Table 4, hemoglobin concentrations in the IS (iodized salt) group increased from 12.4 g/L at baseline to 12.7 g/L at 5 mo and then to 13.0 g/L at 10 mo. This is in conflict with the findings presented in their Figure 2A, which shows that the prevalence of anemia in the IS group increased from 13.2% at 5 mo to 14.5% at 10 mo. It is not clear how this could happen.

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Reply to SLR Shankar et al

Dear Sir:

We thank Shankar et al for their letter and appreciate the opportunity to respond to their comments on our study of dual fortification of salt (DFS) with iron and iodine in India (1).

As Shankar et al point out, one of the main challenges with community-based efficacy trials of fortified foods is to ensure high compliance. The present study was household-based, with a study design close to that of an effectiveness study (2). We monitored children's salt consumption in monthly home visits by asking the head of the household about their child's absence from the household and any other change in consumption of the study salt. During the school holiday in April and May, 12 children left their household for >1 wk. Children moving to neighboring households within the study area ($n = 7$) were supplied with their assigned study salt in the new household. Children who left the study area ($n = 5$) were excluded from the study and were counted in the overall reported dropout rate. Absence from the household on occasional days was considered an acceptable variation within the study frame.

Shankar et al also point out that the anemia prevalence in schoolchildren in the rural study area was lower than that reported for preschool children and women of reproductive age in southern India (4). The anemia prevalence of 12.3% is in agreement with other studies in schoolchildren in urban areas of Bangalore (3) and with more recent studies in and around Bangalore (S Muthayya, unpublished observations, 2008). The difference has been ascribed to regular antihelminthic treatment and vitamin A supplementation supplied to children through the successful school health program run by the government of Karnataka, which aims to control anemia (3, 5). Nevertheless, the prevalence of iron deficiency remains high in schoolchildren in both urban and rural areas of Bangalore, and anemia due to iron deficiency persists. The study was designed to measure the efficacy of DFS in combination with deworming and vitamin A supplementation in a setting with no malaria and to evaluate iron fortification as a potential part of an integrated anemia strategy in India (5). Iron-deficient children with and without anemia identified in the screening were enrolled.

The DFS was distributed and consumed in the households. Children living in the same household were assigned to the same intervention group to facilitate the household use of the intervention salt. All children eligible for study participation were visited in their homes, and information about siblings and other household members was collected. All households with one or more eligible children were assigned a specific number, and children were randomly assigned to an intervention group at the household level.

The total number of anemic children in the IS (iodized salt) group was 29 at baseline, 19 at 5 mo, and 19 at 10 mo. As percentages of the total number of participating children at each respective time point (for *n*, *see* Table 4 of our article), the anemia prevalence was 19.2% at baseline, 13.2% at 5 mo, and 14.5% at 10 mo. Of the 29 anemic children at baseline, 15 remained anemic at 5 mo, and 12 remained anemic at 10 mo. The overall mean hemoglobin concentration increased significantly in the IS group over 10 mo ($P < 0.001$). The fact that children with borderline hemoglobin concentrations at baseline both improved and deteriorated over the 10 mo explains