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Gaps persist in Zambia's food fortification system, study suggests

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A study led by researchers at the Johns Hopkins Bloomberg School of Public Health found that most fortified sugar sold at retail outlets in one Zambian community did not contain the minimum amount of vitamin A required by the government. Only 11 percent of sugar tested met the required minimum concentration of vitamin A.

Food fortification of staples like sugar, milk and salt ensure that people get essential nutrients. Zambia has required sugar fortification since 1998 to address high levels of vitamin A deficiency, which increases the risk of mortality for children and pregnant women and can lead to blindness.

The study, which was conducted with the Zambian National Food and Nutrition Commission, found that sugar arrived at local retail outlets with low levels of vitamin A. Factors at these shops that could degrade the nutrient, such as long storage times or exposure to sunlight, did not significantly affect vitamin A levels. This suggests that there is poor compliance with fortification standards at the factory level, where vitamin A is added, or poor storage practices during regional distribution, or both.

The findings were published online in the *Food and Nutrition Bulletin*.

"A number of causes could be preventing Zambia's vitamin A sugar fortification from working. Our study was a first step in trying to pinpoint the cause or causes," says Amanda Palmer, senior author and an

assistant professor in the Bloomberg School's Department of International Health.

The study authors recommend a national-level assessment of food fortification efforts to evaluate vitamin A concentration levels in sugar at the factory level, at regional distribution hubs, and within key markets.

Despite years of fortification, the prevalence of vitamin A deficiency has remained high in Zambia, affecting roughly 40 percent of preschool-aged children. Other countries that have introduced similar sugar fortification mandates have experienced significant declines. In Guatemala, for example, sugar fortification has virtually eliminated vitamin A deficiency. In small amounts, sugar is an affordable commodity in Zambia. It is widely used to lightly sweeten tea and other beverages and foods commonly consumed by all age groups, which makes it an appropriate vehicle for food fortification.

Researchers conducted a census of sugar vendors in Mkushi District, located in central Zambia. They purchased at least two samples from each of the 145 vendors found in the community, for a total of 291 packages. Vendor type, location and sun exposure were recorded. All brands and package types sold were included.

Half of the samples were randomly selected and tested. Only 17 samples, 11.3 percent, met the required level of 10 mg of vitamin A per kilogram of sugar. There was a wide range of concentration levels in samples tested, ranging from 0.2 to 29.9 mg/kg. The median concentration was 3.1 mg/kg. At this concentration, sugar fortification is unlikely to provide any practical benefit.

"Our initial hypothesis was that exposure to sunlight while stored at local shops would be associated with lower levels of vitamin A concentration. We also expected to see lower concentrations of the vitamin at larger

vendors with big inventories that might sit for longer periods. Neither of those scenarios proved accurate," says Palmer. "Based on our results, the problem seems to occur before sugar ever reaches local markets. We, therefore, recommend a national-level assessment to further investigate."

The researchers caution that this is a small study in one location, and the results could be an anomaly. At the same time, they suggest that further evaluations are needed.

"A national assessment of fortified sugar is crucial, no matter the underlying cause, to eliminating vitamin A deficiency in Zambia," Palmer says.

More information: Matthew D. Greene et al. Retail Sugar From One Zambian Community Does Not Meet Statutory Requirements for Vitamin A Fortification, *Food and Nutrition Bulletin* (2017). DOI: 10.1177/0379572117733841

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