# Abstract Title: Sensors for micronutrient diagnostics in resource-limited settings: a systematic review

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## Abstract (300 word limit)

Micronutrient malnutrition or hidden hunger afflict more than 2 billion people worldwide, undermining current progress in economic development and health. Although countrywide food fortification programs in afflicted regions are present, many of these programs, which are often a partnership between a government-led quality assurance agency and food processing business, lack simple, easy to use instruments necessary to monitor and evaluate compliance. The WHO has developed general guidelines for design and development of analytical tools in low-resource settings known as ASSURED (Affordable, Sensitive, Specific, User-friendly, Rapid and Robust, Equipment-free, and Deliverable to end-users). The current work has developed a quality assessment tool for micronutrient sensors of food matrices consisting of 16 questions pertaining to the aforementioned criteria as well as their accuracy and validation. This study systematically reviewed existing micronutrient sensors for their adherence to these criteria. Keyword searches were conducted in Web of Science, PubMed, and Scopus. Of the 2,365 retrieved studies, 43 sensors from 44 studies were included based on inclusion/exclusion criteria in the systematic review. n=21 sensors met at least 50% of the proposed qualifications for implementation in low-resource settings for nutritional intervention monitoring. It was found that improvements to current sensors are necessary in terms of accuracy, use of standards, sample preparation, simplicity, equipment, implementation, and validation against the gold standard assay for successful implementation in subsistence marketplaces. This quality assessment tool for micronutrient sensors and their application to resource-limited settings can be used as a guide and assessment for future developments in food sensors.

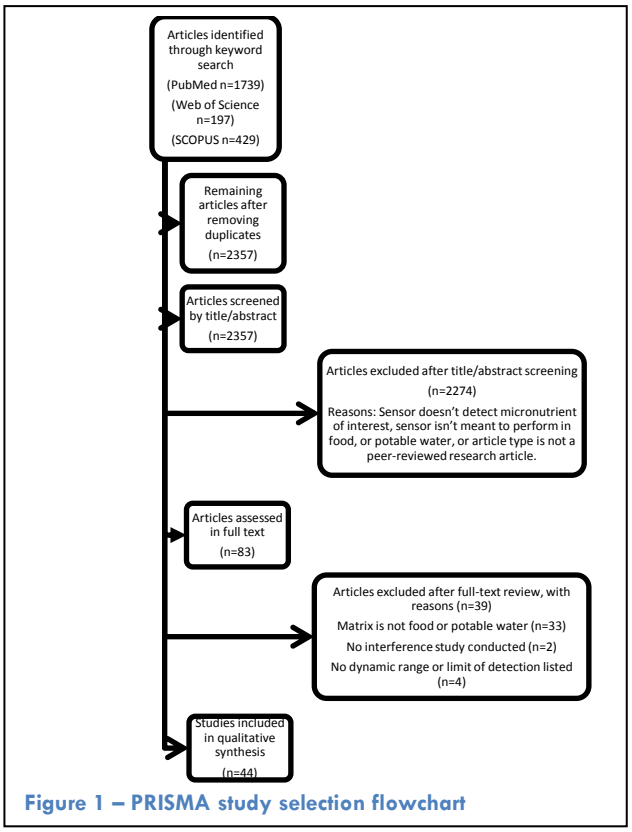



Figure 1 – PRISMA study selection flowchart

## List of Recent Publications if any (Maximum 5)

**1. Waller, A.W.,** Weiss, N.M., Decato, D.A., Phillips, J.A. (2017). Structural and energetic properties of haloacetonitrile–$GeF_4$ complexes." *Journal of Molecular Structure*, 1130, 984-993.

**2.** Weiss, N.W., **Waller, A.W.,** & Phillips, J.A. (2016). Infrared Spectrum of $CH_3CN$-HCl in Solid Neon, and Modeling Matrix Effects in $CH_3CN$-HCl and $H_3N$-HCl. *Journal of Molecular Structure*, *1105*, 341-349.



## Biography (150 word limit)

Anna Waller, native of Minnesota, graduated from the University of Wisconsin-Eau Claire with a Bachelor of Science degree in chemistry, Spanish, and Latin American Studies. Her previous work in physical chemistry has led to two publications in the *Journal of Molecular Structure*. Currently, her interests have shifted to sustainable technological solutions to food insecurity and she is a PhD student of Food Science and Human Nutrition under the advising of Dr. Juan E. Andrade at the University of Illinois, Urbana-Champaign. Her work analyzes micronutrient biosensors for rapid, low-cost nutrition diagnostics in resource-limited settings. She aims to apply and validate an optical biosensor to accurately measure Vitamin A in breast milk to determine the nutritional status of lactating mothers and her infants. By developing a rapid and inexpensive point-of-care measuring tool for Vitamin A, Anna wishes to contribute to the progress of identifying where specific micronutrient deficiencies manifest globally.

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Session name/ number: Food Security: The Rising Crisis and its Management
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## Notes/Comments