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Reference

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Title: Exploring Variations in Hemoglobin Concentration and Measurement—the HEMoglobin MEasurement (HEME) Working Group

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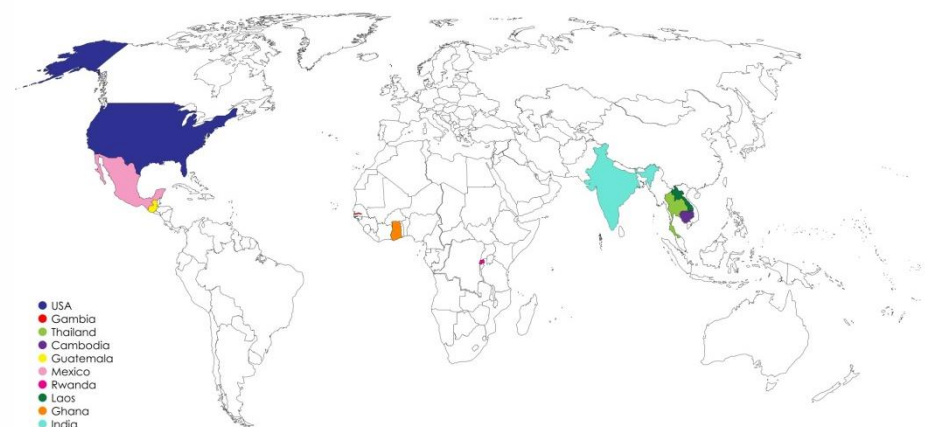
Background and Objectives:

Measuring hemoglobin concentration is common practice for monitoring and evaluating anemia reduction programs, but the accuracy of those measurements varies widely. The primary aim of this research is to explore variations in hemoglobin measurement to improve the accuracy and quality of hemoglobin measurement across contexts.

Methods:

Data were identified from different population groups to assess precision, agreement, and measures of clinical validity to diagnose anemia in:

- children ages 6–59 months
- pregnant women
- non-pregnant women ages 18–45 years.



We identified data from 11 studies conducted in Asia, Africa, and the Americas (Table 1). Data include hemoglobin measurements from multiple devices (hematology autoanalyzers and HemoCue devices) in different settings (laboratory and field).

Table 1: Data identified for the pooled analysis of hemoglobin measurement

Country	Total N	Women n	Pregnant n	Children n	Blood collection site	Hemoglobin measurement methods
Cambodia	450	420	30	N/A	capillary & venous	Sysmex Xt1800i & HemoCue Hb 201+
Cambodia	809	809	N/A	N/A	capillary & venous	Sysmex XN 1000 & HemoCue Hb 301
Cambodia	327	327	N/A	N/A	capillary & venous	Sysmex XP 100 & HemoCue Hb 301
Laos PDR/Thailand	983	N/A	N/A	983	capillary & venous	Mindray 3000 Plus & Sysmex XT-1800i & HemoCue Hb 301
India	1837	1837	N/A	N/A	capillary & venous	HemoCue Hb 201+
Ghana	240	N/A	N/A	N/A	capillary & venous	2ABX Pentra 60 & HemoCue Hb 201+
Republic of the Gambia	905	N/A	498	407	capillary & venous	HemoCue Hb 301 & Medonix M20M GP
Rwanda	264	N/A	N/A	264	capillary & venous	Sysmex Kn21 & HemoCue Hb 201+
Mexico	148	N/A	N/A	148	capillary & venous	HemoCue Hb 201+
Guatemala	2414	1629	99	686	capillary	HemoCue Hb 301
United States of America ¹	25	N/A	N/A	N/A	venous	HemoCue Hb 301 & HemoCue Hb 201+

¹Data collected in a laboratory setting. N/A – Not Applicable

Results:

Priority research topics generated include: factors influencing hemoglobin concentration, specifically capillary versus venous blood samples; type of analyzer; different models of the HemoCue devices; collection methods; and effect of sex, age, and climate.



Conclusions:

This multi-investigator, multi-country research collaboration is the first of its kind to study variations in hemoglobin measurement. The findings from the study will contribute to the World Health Organization (WHO) review of its global guidelines for hemoglobin thresholds used to define anemia at the individual and population level.

Keywords:

hemoglobin measurement, anemia, women, children, pooled analyses

Conflict of Interest:

The authors declare no conflicts of interest.

Further Collaborators:

Heme Working Group members: Donnie Whitehead, Zugu Mei, Sonja Hess, Crystal Karakochuk, Sam Newton, Elizabeth Abu-Haydar, Ignacio Mendez Gomez-Humaran, Dora Ines Mazariegos Cordero, Megan Parker, Rita Wegmüller, Lynnette Neufeld, Teemar Fisseha.



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