

Noninvasive Technology for Anemia Detection

Health need

Globally, anemia continues to be a serious problem with far-reaching consequences for health as well as social and economic development. It is estimated that iron-deficiency anemia affects 42 percent of children under age 5 and 53 percent of children from 5 to 14 years of age. The majority of the 56 million pregnant women and 468 million non-pregnant women worldwide affected by anemia live in sub-Saharan Africa and Southeast Asia. Anemia places women at risk for poor pregnancy outcomes including increased risk of maternal and perinatal mortality and morbidity, preterm births, and low birth weight. Anemia in children is associated with impaired cognitive performance, motor development, and language development. Effective screening programs for anemia have been hampered by the lack of a simple, safe, accurate, affordable hemoglobin (Hb) testing tool. Commonly used methods to screen for anemia require a blood draw, placing patients and health workers at risk of infection from contact with blood and sharps.

Technology solution

PATH is advancing an accurate, noninvasive anemia screening device that could be used in low-resource settings at the point of care by minimally trained health workers. A noninvasive device that can be shown to be reliable, robust, and affordable would reduce the risk of infection for patients and health workers, eliminate the need for reusable supplies and the disposal of hazardous waste, and reduce costs. Another advantage of this technology is that Hb readings are displayed on a screen in less than a minute. This could provide evidence to support immediate treatment for children and pregnant women at high risk. We are collaborating with the Masimo Corporation (Irvine, CA), the developer of two United States Food and Drug Administration-approved noninvasive, portable, and simple-to-use Hb measurement devices.

Current status and results

User assessments conducted in 2012 demonstrated the utility and acceptability of this noninvasive approach to Hb measurement and revealed the need for appropriate business models for scale-up in low-resource settings. Cost analyses of existing screening practices and market assessments for noninvasive anemia screening devices were conducted in Ghana, India, Kenya, South Africa, and Uganda to develop sustainable approaches to integrate the device into existing maternal, child, and nutrition country programs. Currently, PATH is conducting a clinical study in conjunction with the Kintampo Health Research Centre in Ghana to validate the performance of the devices. Next, an operational feasibility study will determine how the product would be used for clinical management in primary health clinics. In addition, we are exploring options to reduce the cost of noninvasive devices for low-resource settings through production in South Africa.



Noninvasive anemia device.

The World Health Organization has ranked iron-deficiency anemia as the third leading cause of disability adjusted life years lost for females from 15 to 44 years of age.

De Benoist B, McLean E, Egli I, Cogswell M, eds. *WHO and CDC Worldwide Prevalence of Anaemia 1993–2005*. Geneva: World Health Organization; 2008.

Availability

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