

## SHORT REPORT: DOCUMENTATION OF IODINE DEFICIENCY IN HAITIAN SCHOOLCHILDREN: IMPLICATION FOR LYMPHATIC FILARIASIS ELIMINATION IN HAITI

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**Abstract.** In this study we documented unexpected moderate-to-severe iodine deficiency in Haitian schoolchildren although they live in a coastal community where presumably they have access to iodine-containing seafood. This fact combined with the lack of an iodized salt supply and endemic lymphatic filariasis makes community distribution of diethylcarbamazine-fortified, iodized salt an attractive strategy for elimination of lymphatic filariasis and iodine deficiency disorders in this area of Haiti. Combining lymphatic filariasis elimination with other public health interventions is one strategy to increase its public health benefit and maximize the impact of limited public health resources.

### REPORT

Lymphatic filariasis (LF), which is primarily caused by infection with the filarial parasite *Wuchereria bancrofti*, affects 120 million persons worldwide and an estimated 40 million of them have lymphedema, elephantiasis, or scrotal hydrocele.<sup>1,2</sup> Mass drug treatment has been shown to be effective in reducing transmission and has even resulted in elimination of the infection in specific areas. As a result, in 1997, The World Health Assembly called for the global elimination of LF as a public health problem.<sup>1</sup>

Prior to the global effort to iodize salt supplies, over one billion persons were at risk of iodine deficiency disorders (IDD) resulting in goiter, mental retardation, and growth deficits.<sup>3</sup> Efforts to eliminate IDD have dramatically reduced these numbers although many countries, such as Haiti, still do not iodize their salt supplies. Integration of treatment for LF and IDD is a logical strategy to increase the impact of scarce public health resources.

Incorporating the heat-stable antifilarial drug diethylcarbamazine (DEC) into the common salt supply has been utilized in China to eliminate transmission of LF and appears to be an attractive adjunct to the mass distribution of antifilarial drugs.<sup>4</sup> In LF-endemic countries, integrating DEC fortification with salt iodization programs would appear to be an effective use of limited health care resources. As part of a larger study to determine the antifilarial efficacy of combined drug therapy,<sup>5,6</sup> we investigated whether iodine deficiency was present in a coastal LF-endemic community that lacked an iodized salt supply.

This study was approved by the Centers for Disease Control and Prevention (Atlanta, GA) and the Hospital Sainte Croix (Leogane, Haiti) institutional review boards. The study took place in January 1996 in the coastal town of Leogane, Haiti (population ~ 15,000). A single school was selected for sample collection and, after receiving informed consent from parents and children, samples were obtained from all available students in grades 1–4 (ages 5–11 years). Fresh urine samples were collected (n = 165), and stored at –20°C. Blood spots were collected (n = 181), dried on filter paper, and stored at –20°C. Urinary iodine (UI) and whole blood thyroid stimulating hormone (TSH) analyses were performed at the Program Against Micronutrient Malnutrition

(PAMM) Laboratory (Atlanta, GA) using previously described methods.<sup>7,8</sup>

Figures 1 and 2 show the results of UI and TSH testing. The median value for UI (38.8 µg/L) is consistent with the World Health Organization (WHO) criteria for moderate iodine deficiency (median = 20–49 µg/L).<sup>9</sup> The majority (78.5%) of TSH values are greater than 5 mU/L, which is consistent with severe iodine deficiency according to WHO guidelines for neonates.<sup>9</sup> Although the specificity of TSH levels in school-age children and adults is less certain than in neonates,<sup>9</sup> in this setting and school age group, both UI and TSH testing results document moderate-to-severe iodine deficiency.

The Leogane area is one of the most intense areas of transmission for LF in the western hemisphere with ~ 50% prevalence of infection in the adult population.<sup>10</sup> The finding that children in this area also suffer from moderate-to-severe iodine deficiency, despite living in a coastal plain where they presumably have access to iodine-containing seafood, makes community distribution of DEC-iodized salt an attractive strategy for simultaneously addressing LF and IDD. These findings warrant pilot testing the use of DEC-iodized salt as a public health tool for LF and IDD elimination in Haiti to

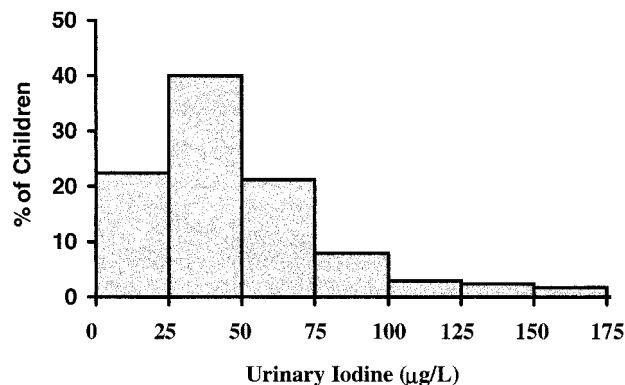


FIGURE 1. Urinary iodine (UI) levels in Haitian schoolchildren (n = 165). World Health Organization criteria for a significant health problem with urinary iodine in school-aged children:<sup>9</sup> Mild = median of 50–99 µg/L; moderate = median of 20–49 µg/L; and severe = median of < 20 µg/L. In the Haitian schoolchildren tested, the median UI value was 38.8 µg/L.

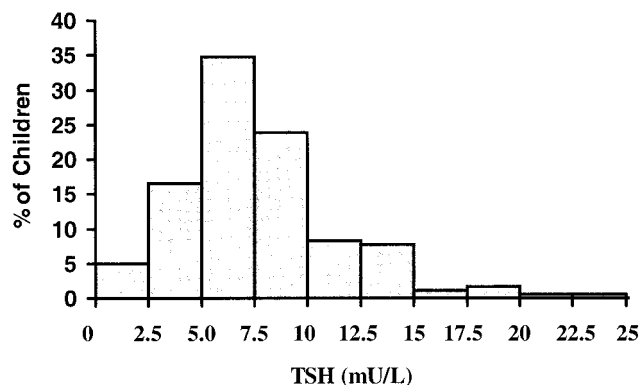


FIGURE 2. Whole blood thyroid stimulating hormone (TSH) levels in Haitian schoolchildren (n = 181). World Health Organization criteria for a significant health problem with TSH in neonates:<sup>9</sup> prevalence of TSH values > 5 mU/L whole blood in the population, mild = 3.0–19.9%, moderate = 20.0–39.9%, and severe =  $\geq$  40.0%. In the Haitian schoolchildren tested, 78.5% had TSH values > 5 mU/L.

aid in determining how this strategy can be utilized in lieu of, or in conjunction with, proposed LF mass chemotherapy programs. Using these strategies could extend the benefits and public health impact of the global LF elimination effort.

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