Somalia's groundwater is surprisingly high in iodine

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Iodine-rich groundwater may lead to high iodine intakes in Somali women

Somalia lies at the northeast tip of Africa and currently comprises the semiautonomous zones of the Northwest Zone (Somaliland), Northeast Zone (Puntland) and the war-ravaged South Central Zone. Since 1991, Somalia has lacked an effective central government. A high and persistent level of internal conflict and incursions by foreign governments has contributed to a series of health and nutrition crises (1).

Until recently, little was known about the iodine nutrition of the Somali population. It was generally assumed that iodine deficiency was a public health problem in Somalia due to the limited access to iodized salt. To address this a national survey of micronutrient status was carried out in 2009 by the FAO and the University College London, in collaboration with UNICEF, the World Food Program and WHO.

A national 2-stage, stratified household cluster survey was conducted in 2009 in the Northwest, Northeast, and South Central Zones of Somalia. Urinary iodine concentration (UIC) was determined in samples from women (aged 15–45 y) and children (aged 6–11 y), and examination for visible goiter was performed in the Northwest and South Central Zones. A 24-h household food-frequency questionnaire was conducted, and salt samples were tested for iodization.

Results

The median UICs for nonpregnant women (n=617) and children (n=756) were 329 and 416 μg/L, respectively, indicating excessive iodine intake (>300 μg/L). The prevalence of visible goiter was <4%. To assess exposure to iodized salt, samples from >2300 households were tested by using rapid test kits. The overall coverage of salt iodization was low at 7.7%, and where it did occur a large proportion was inadequately iodized, with concentrations <15 mg/kg *(Figure 1)*. Household salt iodization was only recorded with any frequency in the South Central Zone, where 6.7% of samples were fortified at concentrations ≥15 mg/kg and 5.4% of samples were fortified at concentrations <15 mg/kg. In this zone, exposure to iodized salt was associated with a significantly increased median UIC in women (770 vs. 281 μg/L) and in SAC (1260 vs. 366 μg/L). The 4 clusters where salt iodization exceeded 20% coverage were all located adjacent to the Kenyan border in the area of El Wak.

Because exposure to iodized salt could not explain the occurrence of the excess UICs, we next analyzed the association between iodine intake and the main source of household drinking water for sources utilized by at least 50 households. *Figure 2* shows the main household water source ordered by water source, with surface water sources followed by shallow dug wells, deeper drilled boreholes, tanker/cart, and berkad (a water storage construction widely used in Somalia). The data show the relation between the main source of household water and the UIC of household members. Consumption of water sources of unknown origin, that is, water stored in berkads or from donkey carts or tankers, was associated with an intermediate UIC. A comparison of UICs of individuals from households that used water from boreholes against those that used any other main water source revealed a higher iodine intake in children (569 vs. 385 μg/L) and in women (430 vs. 282 μg/L).

Evidence that water can be an important contributor to total iodine intake comes from studies in Denmark, South Africa, China, and refugee populations in Algeria (2-6). Although iodine intake from water sources may be important in preventing deficiency, it may also contribute to excessive intakes. Further work is required to investigate the geochemistry and safety of groundwater sources in Somalia and the impact on population health.

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FIGURE 1 **Proportion of households in Somalia possessing iodized salt (n = 2345). NEZ, Northeast Zone; NWZ, Northwest Zone; SCZ, South Central Zone** *(From: Kassim et al. 2014).*

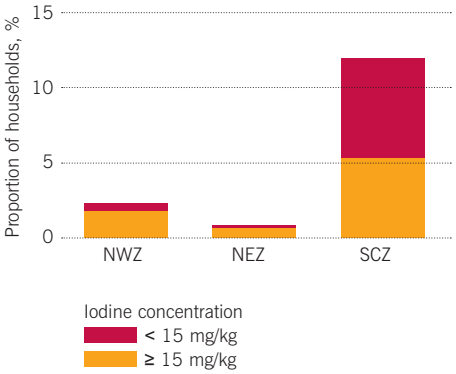

FIGURE 2 **Median (IQR) UICs in women (n = 617) and school-age children (SAC) (n = 756) in Somalia by main household water source. The dashed reference line indicates the WHO cutoff above which median UIC is excessive** *(From: Kassim et al. 2014).*