Universal salt iodization (USI) was adopted in Madagascar in 1995 within the framework of a worldwide policy to eliminate iodine deficiency disorders. To combat high rates of goiter among the Malagasy population, the legislation prescribed that crystal salt sold in bulk packaging (25–60 kg sacks) must contain a minimum of 50 ppm (or mg/kg) of iodine, and in salt sold in consumer packs (250 g), the iodine concentration must be at least 30 ppm. A national multi-sectoral committee for IDD was established in the 1990s under the leadership of the Ministry of Public Health and includes the ministries of Commerce, Agriculture, Scientific Research, Interior, and Justice, multilateral partners such as UNICEF, WHO, USAID, and World Bank, as well as salt producers. By 2009, about 72% of households had iodized salt, and about 56% had salt that was adequately iodized (1). In parallel, the prevalence of goiter dropped from 42.5% in 1992 to 6% in 2001, and 3.4% in 2004 (2, 3).

However, the 2009–2013 political crisis, associated donor sanctions, government budget cuts and subsequent deterioration of public programs have led to a degradation of the salt industry and a reduction in the coverage of USI. In July 2013, the committee for the elimination of iodine deficiency was reactivated under the coordination of the National Nutrition Office.

In Madagascar, edible salt production is sufficient to meet the domestic demand. There are three main sources of salt: one large-scale producer in the north, producing 40–50% of the domestic salt using industrial iodization processes, about eight medium-scale enterprises in the mid-western region, which supplies 30–35% of the salt in Madagascar, and over 100 small producers in the south, who supply the remaining 20–25% of the salt. Salt from the medium and small-scale producers might not be adequately iodized (2), and there is no registration or licensing system which would permit the monitoring of iodization levels across the country.

Assessing the impact of the salt iodization program

To assess the national salt iodization program almost two decades after the promulgation of the salt iodization legislation in Madagascar, the first nationally representative survey of iodine status was conducted from November 2015 to January 2016. The survey assessed the iodine status in women of reproductive age (WRA, 15–49 years) and the availability of iodized salt in households. This was a stratified two-stage cluster survey. Three strata were selected based on the household coverage with iodized salt reported previously (1: less than 20%; 2: from 20% to 60%; and 3: more than 60%) (Figure 1).

In total, 1,721 women from 1,287 households were included in the final analysis. The sample was composed of 1,131 (62.4%) non‐pregnant non-lactating women, 170 (10.7%) pregnant women, and 438 (26.9%) lactating women. Approximately 19.4% of the women surveyed never received a school education, and 29.4% were educated above elementary school level. The proportion of women having income-generating activities was 82.7%.


Young women in Madagascar have alarmingly low iodine intakes

![Figure 1](image-url)
Low iodine intakes are a public health concern

The median UIC in non-pregnant non-lactating women was 47 μg/L (IQR, 16–93 μg/L), and 53 μg/L (IQR, 9–89 μg/L) in pregnant women, denoting moderate iodine deficiency. The median UIC varied significantly with household wealth (p < 0.001), from 21 μg/L in the poorest quintile to 62 μg/L in the wealthiest quintile. The median UIC of women from households that used adequately iodized salt was 72 μg/L (IQR, 32–149 μg/L) compared with only 50 μg/L (IQR, 16–105 μg/L) in households with inadequately iodized salt. This may suggest that iodized salt is an important source of dietary iodine in Madagascar.

Low coverage with adequately iodized salt

The median iodine concentration in household salt was 10 mg/kg (IQR, 6.3–15.8 mg/kg), below the recommended level of ≥15 mg/kg. Consequently, the proportion of households with salt that was iodized adequately was only 26.2% (95% CI, 22.1, 31.0).

The availability of adequately iodized salt was lower than previously reported (1), which may reflect the low accuracy of rapid test kits (RTKs) compared with titration methods to assess iodization levels in salt. Strata 1 and 2, which are mainly supplied by medium and small producers with low capacity to iodize salt, had a lower proportion of households with adequately iodized salt than Stratum 3, which is supplied by the large-scale salt producer in the north (Table 1).

Coarse salt was used in 87.1% of households, fine salt in 12.8% of households, and rock salt in 0.1% of households. Women in most households (92.8%) reported purchasing their salt from a local market or grocery store, and the remaining 7.2% purchased their table salt from a street vendor or received it from a neighbor. More than a half of all households (59.7%) kept their salt in covered containers, 39.1% kept it in its original packaging, and 1.2% kept it wrapped in paper. Salt kept in its original packaging had on average less iodine than salt kept in covered containers.

Wealth may improve access to iodized salt

The survey data revealed that 56.8% of those who purchased their salt in grocery stores were from the two wealthiest categories. A higher household wealth index score might represent more diverse food choices. Additionally, there was inequity in access to adequately iodized salt, with 41% of the wealthiest households having adequately iodized salt versus only 7% of the poorest households, which echoes the findings of other studies (4).

Conclusions and recommendations

The new national survey shows that the population of Madagascar faces moderate iodine deficiency, which can be linked to a low proportion of households with access to adequately iodized salt. The country has not yet achieved USI, and efforts are needed to revitalize the USI program especially to reduce the inequity and improve access to adequately iodized salt. To sustain effective USI in the long term, it is important to set up a system that coordinates and monitors the production of high-quality iodized salt. To this end, it is important to develop regulatory capacity to monitor salt production, and improve iodization capacity among small- to medium-scale salt producers. Such a strategy may include technical assistance with expertise in iodization best practices, building capacity in iodization technology, establishment of a clear quality control mechanism for salt at production point. In parallel, the monitoring and control of iodized salt during production, sale and consumption must be strengthened. Finally, a public campaign should promote the benefits of using iodized salt in schools, workplaces and the community involving the media as well as community nutrition workers and leaders.

References