Over the last two decades, there has been remarkable progress towards eliminating iodine deficiency disorders (IDD) as evidenced by decreases in goiter and improvements in iodine status, attributed to the scale-up of national salt iodization programs. However, the current metrics employed to track IDD programs do not capture the full extent of their success.

To address this and other emerging programmatic challenges, UNICEF and IGN convened an expert Technical Working Group Meeting on 17–18 December 2015 in New York. Important lessons emerging from this meeting have been captured in the new UNICEF “Guidance on the Monitoring of Salt Iodization Programmes and Determination of Population Iodine Status”. This document aims to guide program managers to address common shortcomings in the interpretation of data and implementation of national IDD control programs. Some of these lessons reinforce key recommendations made in the 2007 WHO/UNICEF/IGN Guide (1), which remains a valuable resource for program managers. However, there is also new information and updates which may affect how programs are implemented and are likely to inform future versions of the Guide. Below is a summary of the document’s most important lessons and recommendations.

1. As resources allow, the adequacy of iodine intakes should be investigated among different subsets of the population, especially among groups vulnerable to deficiency.

The goal of IDD programs is to sustainably achieve optimal iodine status among all population groups. The impact of salt iodization is best assessed through the measurement of the population median urinary iodine concentrations (mUIC). Traditionally, the mUIC has been assessed through national school-based surveys to estimate the iodine status of the general population. However, national surveys are not designed to detect disparities in iodine intake among different population subgroups, such as those defined by geographic region or urban/rural residence, socio-economic status, or programmatic criteria (e.g., by sources of salt, packaged/unpackaged salt, level of iodization). A stratified analysis would reveal any discrepancies masked by a national estimate, to help identify remaining challenge areas and inform adjustments to salt iodization programs.

In addition, the mUIC among school-age children may not reflect the iodine status among pregnant women, whose iodine requirements are greater. In this context, household-based surveys may also enable better data collection on iodine status of pregnant or non-pregnant women. As an additional limitation, there is a lack of consensus on the optimal mUIC range for non-pregnant women of reproductive age. The 2007 WHO/UNICEF/IGN Guide (1) proposes a range of 100–199 μg/L; however, the scientific basis for this recommendation is weak (2). Research is currently ongoing to better define the optimal mUIC range for non-pregnant women of reproductive age.
2. Rapid test kits (RTKs) should only be used to differentiate between non-iodized and iodized salt.

RTKs can distinguish between iodized and non-iodized salt. However, their ability to measure the iodine level in quantitative terms, and to distinguish between salt iodine levels below and above certain cut-off levels, is questionable (even when the RTK packaging suggests otherwise) (3). Given this limitation, RTKs should only be used to present the percentage of non-iodized versus iodized salt. To accurately estimate the percentage of inadequately iodized, adequately iodized, or excessively iodized salt, titration or other validated quantitative assessment tools are necessary (4).

3. The ‘adequate’ range of iodine intake among school-age children can be widened from 100–199 μg/L to 100–299 μg/L.

According to the 2007 WHO/UNICEF/IGN Guide for Program Managers (1), a mUIC in the range 100–199 μg/L indicates ‘adequate’ iodine intake, and the range of 200–299 μg/L indicates ‘more than adequate’ iodine intake among school-age children. The presence of a mUIC in the ‘more than adequate’ range has raised concerns about the potentially adverse effects of high iodine intake on normal thyroid function. However, a 2013 study assessing thyroid function and iodine status found that the mUIC range of 100–299 μg/L was not associated with any thyroid dysfunction (5). As a result, the acceptable range of ‘adequate’ iodine intake among school-age children can be widened to 100–299 μg/L. There is no data to indicate, however, that this widened range can be applied to other groups such as women of reproductive age. The interpretation of a mUIC of ≥300 μg/L as ‘excessive iodine intake’ remains unchanged.

4. With currently available methods, the mUIC can only be used to define population iodine status and not to quantify the proportion of the population with iodine deficiency or iodine excess.

The mUIC is a good indicator of iodine intakes in a population, but not in individuals. A common mistake is to assume that all individuals with a spot UIC <100 μg/L are iodine deficient. Dietary iodine intake and, therefore, UIC are highly variable from day to day, even among individuals whose average iodine intake is sufficient to maintain normal thyroid function. As a result, there will be days when an iodine-sufficient individual will have a UIC of <100 μg/L or ≥300 μg/L. In other words, in populations whose average dietary iodine intake is sufficient, there will always be values <100 μg/L; however, these values do not describe the prevalence of iodine deficiency in the population. As an example, a mUIC of 122 μg/L obtained from a survey in school-age children identifies a population that has no iodine deficiency. While a proportion of children in that survey would have UIC values <100 μg/L, it would be incorrect to label that percentage of children as ‘deficient’. Likewise, those children in the population with UIC scores of ≥300 μg/L cannot be labeled as having ‘excessive’ iodine intakes (Figure 1).

At the same time, there has been no change to the guideline that no more than 20% of samples should be <50 μg/L (1). The proportion of UIC values <50 μg/L should continue to be reported, together with the median UIC, preferably presented with a measure of uncertainty to account for the sampling error (such as ‘bootstrap’ 95% CIs).
5. National salt iodization programs should monitor the use of iodized salt in processed foods.

Global experience has demonstrated that universal iodization of food grade salt is the most equitable, effective, and sustainable strategy to ensure optimal iodine nutrition for all population groups. However, many countries have focused on ensuring that only household salt is adequately iodized. This is because iodine in the diet was previously assumed to come predominantly from household iodized salt. Recent evidence suggests that an increasing amount of iodized salt is consumed through processed foods (6), which may help explain iodine deficiency in some settings where household iodized salt coverage is low (7). In addition to measuring iodine content in household salt, program managers should evaluate whether major processed foods are manufactured with iodized salt. In selected cases, the iodine contained in drinking water may also need to be assessed.

Changing context of salt iodization and iodine nutrition programs

Program managers should also consider the growing importance of reducing salt intake to prevent non-communicable diseases, and the need to align the salt iodization and salt reduction strategies (8). As an increasing number of countries begin to align their sodium and iodine monitoring and evaluation systems, it would be ideal to be able to measure both UIC and urinary sodium concentrations from the same spot samples. However, the use of spot urine samples is not as useful in characterizing population sodium intakes as it is for iodine. A better tool is the collection of 24-hr urine samples, but its feasibility in survey settings is generally low, and the validity of predictive equations using spot urinary sodium concentrations to predict mean 24-h sodium excretion is limited (9). This limited utility should be recognized until relevant methods are refined.

References


Use of data to evaluate program effectiveness

Data from national surveys should be interpreted in conjunction with complementary data that: (i) provides qualitative information on the program; (ii) facilitates the interpretation of survey data; and (iii) enables verification of survey data. Combined, this data can identify the need for strategic changes and help address programmatic weaknesses. As applicable, program managers may consider collecting data from the following areas:

Salt industry:

(i) % of salt (iodized and non-iodized) that is imported versus domestically produced; (ii) % of salt processed by large, medium and small enterprises; (iii) % of food-grade salt used for food processing; (iv) locations and brands of domestic salt producers/processors (including iodization and packaging/re-packing); (v) salt distribution chains; and (vi) types of salt produced for different markets. This data can help explain survey results. For example, household coverage of iodized salt is often lower in areas of domestic salt farming, especially among poorer households, because these families are more likely to access salt directly from the point of production, prior to any iodization or packaging. In addition, small-scale producers often produce cheaper, lower-quality iodized (or non-iodized) salt.

Processed foods:

Data is needed to identify which processed food manufacturers use iodized salt, and the extent to which these manufacturers verify the iodine content of the salt used.

Regulatory monitoring:

Regulatory monitoring data from import, production, and market levels are an important source of information. If there is a legal requirement to use iodized salt in the manufacturing of processed foods, a system should be in place to assess the extent of that compliance.