National Salt Iodization Survey, Bangladesh 2015

Centre for Nutrition and Food Security, International Centre for Diarrhoeal Disease Research, Bangladesh (icddr,b)

SUMMARY REPORT

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Overview

Background and Rationale

Iodine deficiency is the single greatest cause of preventable mental impairment globally and also causes many other adverse effects on growth and development due to inadequate thyroid hormone production (1, 2). These iodine deficiency disorders (IDD) can be effectively and inexpensively prevented by iodizing all salt for human and animal consumption (known as Universal Salt Iodization, USI) (1). The Government of Bangladesh passed a law in 1989 making it mandatory for all edible salt to be iodized (3, 4), one of the first countries to do so globally. A 1993 survey showing the severity of IDD as a public health problem across most of Bangladesh prompted enactment of an additional regulation. Following this, salt iodization became widely practised by the salt industry, with regulation by the Government (Bangladesh Small and Cottage Industries Corporation, BSCIC, under the Ministry of Industry) and with technical and financial support from a range of international agencies particularly, UNICEF, Micronutrient Initiative (MI), the Indian Coalition for Control of Iodine Deficiency Disorders and the Global Alliance for Improved Nutrition (GAIN).

Two national surveys assessing household coverage of iodized salt have shown that household use of iodized salt (≥5ppm) and adequately iodized salt (≥15ppm) had remained relatively constant since 2004; from 81% in 2004-05 to 80.3% in 2011-12 for salt with any iodine, and from 51% in 2004-05 to 57% in 2011-12 for adequately iodized salt (3, 5). Despite sustaining this considerable progress, improving the quality of salt iodization beyond these levels and ensuring equitable access remains a major issue in Bangladesh and ensuring access to adequately iodized, packaged salt is a challenge. There is lack of programme data on factors associated with lower access to adequately iodized salt and, in particular, about the use of iodized salt in areas designated by the Control of Iodine Deficiency Disorders project (CIDD project established by BSCIC) as “rural low performing” areas in Bangladesh. These are generally hard-to-reach districts with lower socioeconomic status and thus lower buying capacity of the population, known to have lower access to adequately iodized salt. Many of these areas are in border regions and in traditionally small scale salt producing coastal areas.

The salt iodization survey in Bangladesh 2015 was therefore proposed and designed primarily to provide representative estimates of the use of adequately iodized salt and associated factors by 3 strata/domains: Urban and slum (combined as one stratum), Rural-other, and Rural-low-performing areas.

Survey Objectives

The overall objective was to provide data to inform the IDD elimination programme and guide future strategic direction, particularly for low performing areas. The main survey aims as agreed by the national Technical Advisory Committee (TAC), made up of key Government bodies and supporting agencies, were:

1. To estimate current household coverage of adequately iodized salt nationally and by the three strata and assess whether any progress had been made by national, urban and rural areas over the last decade;
2. To assess the type (packaged/open) and iodine content of salt sold by retailers in each of the strata;
3. To update information on the level of awareness and knowledge of the population both at household and retailer level regarding iodine deficiency and iodized salt, and to assess salt purchasing practices in Bangladesh;
4. To use the information above specifically to generate representative information for the rural low performing areas, as programme and baseline information from which to monitor progress.

Additional indicators were included to generate a multi-dimensional poverty score, indicating the level of household vulnerability/deprivation, to assess whether adequately iodized salt is reaching the most deprived households.

The 2011 survey had indicated that iodine status among school age children and women of reproductive age was adequate at the national level, 145.7µg/l and 122.6µg/l respectively, however results showed a high level of association between household salt iodine content and urinary iodine. Based on this association and resource constraints, urinary iodine was not included in the 2015 survey. In addition, the national Technical Advisory Committee advised that there were no centrally processed foods likely to be contributing significantly to salt intake and, therefore,
collection of information about consumption of such products (to assess other potential sources of iodized salt) was not included.

**Survey Design**

The survey was conducted as strata-level representative cross-sectional cluster survey. The target sample was 1,512 household interviews (target respondent was the person mainly responsible for food preparation) and household salt samples, and 756 retailer interviews, aiming for 756 packet and 756 open salt samples. The sample was taken from 126 primary sampling units (PSUs) divided equally between, and designed to be representative of, the three strata. Twelve households were selected using systematic selection from each PSU. Six retailers were selected based on convenience sampling of retailers identified in the PSU mapping, aiming to cover the widest geographic range within the PSU and to be a mixture of shops and market stalls. Replacement households were used which ensured the target sample for households and retailers was achieved. Salt samples were tested using quantitative titration methodology (1) with external assurance of quality.

The final dataset was weighted at the stratum level to account for the probability of household selection and an additional weight was applied for all national estimates to account for the different proportion of the national population within each stratum.

The survey was conducted between January and April 2015 by field teams from icddr,b. The process was supervised and quality controlled by senior icddr,b staff. The study was approved by the Institutional Review Board of icddr,b.

**Key Findings**

Quantitative salt iodine data from the 2015 survey show that nationally, the percent household coverage for adequately iodized salt has decreased (non-significantly) to 50.5% since 2011, the percent household coverage for salt with any iodine has decreased from 80 percent in 2011 to 65 percent in 2015. A higher percent of urban households were found to be using adequately iodized salt (68.9%), particularly when compared with the rural low performing areas where coverage was very low (25.1%).

Household access to packet salt (found to be generally well-iodized) versus open salt (found to be non- or poorly-iodized) was found to be the factor most significantly associated with salt iodine content nationally and in all strata separately. Open salt was more readily available at retail outlets in rural other (47.6%) and rural low performing (42.9%) areas than in urban areas (23.8%). In addition, about a third of respondents in rural low performing areas reported sourcing salt from non-formal retailers, either hawkers or directly from the point of production.

The 2011 survey demonstrated a high level of association between household salt iodine content and urinary iodine, indicating iodine deficiency among the populations of both women and children in households were the salt iodine content was < 15ppm. Based on this and the very low household coverage of adequately iodized salt in low performing areas, the 2015 survey results suggest that a large proportion of the population in these areas of Bangladesh are at high risk of iodine deficiency.

**Summary Recommendations:**

An innovative review of USI-related strategy and policies is recommended to improve the quality of iodization of all salt produced in Bangladesh. Results from the rural low performing areas provide valuable new information on the extent and possible causes of the serious problem in these areas, and should be the basis for future programming focus. There is an urgent need to update and strengthen the salt law, including clear guidance on enforcement of regulations for violating the law. In addition, temporary and/or replacement strategies are recommended to improve access to quality iodized salt and/or to alternative interventions for iodine supplementation.
Results - Household Survey

Characteristics of the survey population

- Rural areas tended to have a higher percent of deprived households (higher MPI score) than urban areas and, within the rural population, a higher percent of households in rural low performing areas were deprived than in rural other.

<table>
<thead>
<tr>
<th>Variable</th>
<th>National N = 1512</th>
<th>Urban and Slum N = 504</th>
<th>Rural Other N = 504</th>
<th>Rural Low Performing N = 504</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Household level</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Percent of respondents women aged 15-49 years*</td>
<td>91.9%</td>
<td>92.8%</td>
<td>91.8%</td>
<td>91.8%</td>
</tr>
<tr>
<td>Household size (# people)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1-2</td>
<td>8.3%</td>
<td>7.5%</td>
<td>8.3%</td>
<td>9.1%</td>
</tr>
<tr>
<td>3-5</td>
<td>64.0%</td>
<td>67.9%</td>
<td>61.9%</td>
<td>62.3%</td>
</tr>
<tr>
<td>6+</td>
<td>27.7%</td>
<td>24.6%</td>
<td>29.8%</td>
<td>28.5%</td>
</tr>
<tr>
<td>MPI score</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>High (deprived)</td>
<td>44.0%</td>
<td>25.0%</td>
<td>44.4%</td>
<td>62.3%</td>
</tr>
<tr>
<td>Low (non-deprived)</td>
<td>56.0%</td>
<td>75.0%</td>
<td>55.6%</td>
<td>37.7%</td>
</tr>
<tr>
<td><strong>Respondent level</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean age (years)</td>
<td>32.7</td>
<td>32.0</td>
<td>33.2</td>
<td>32.3</td>
</tr>
<tr>
<td>Years of education</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>25.3%</td>
<td>19.4%</td>
<td>27.2%</td>
<td>29.4%</td>
</tr>
<tr>
<td>&lt;5</td>
<td>26.5%</td>
<td>25.4%</td>
<td>25.8%</td>
<td>28.2%</td>
</tr>
<tr>
<td>5-10</td>
<td>37.7%</td>
<td>39.7%</td>
<td>38.7%</td>
<td>34.7%</td>
</tr>
<tr>
<td>&gt;10</td>
<td>10.5%</td>
<td>15.5%</td>
<td>8.3%</td>
<td>7.7%</td>
</tr>
</tbody>
</table>

*Nationally 8.4% of respondents were women aged 50 and over and 0.2% were men

All further tables are based on weighted estimates.

Weighted numbers by strata: urban 381, rural other 757, rural low performing 374
Household Coverage Iodized Salt

- At national, urban and rural levels, a (non-significant) trend towards decreased household coverage with adequately iodized salt observed since 2011 (when national coverage was 58%) and a significant decrease in coverage with salt containing at least some iodine (national coverage in 2011 was 80%).

- Use of adequately iodized salt highly associated with salt type (packaged/open), access to different types was found to be highly associated with coverage among households in rural low performing areas and in more deprived areas (high MPI).

- The median ppm for household salt found to have at least some added iodine ranged from 14.5ppm in rural low performing areas to 31.3 and 32.2ppm in rural other and urban/slum areas respectively.

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Figure 1. Household Coverage Iodized Salt in Bangladesh by Residence, Programme Performance, Household Vulnerability to Poverty (MPI) and Type of Salt Used (packaged/open)

- Three quarters of open salt has no added iodine.
- Households vulnerable to poverty (high MPI) are less likely to use adequately iodized salt.
- Rural populations less likely to use adequately iodized salt than urban.
- Only a quarter of households in rural low performing areas are using adequately iodized salt.
- Nationally, half the population has access to adequately iodized salt, with around one third at high risk of iodine deficiency through the use of non-iodized salt.

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1 Regression analyses showed that salt packaging was the factor most influencing salt iodine content, nationally and in all strata.
Knowledge and awareness related to iodine deficiency and iodized salt

- A lower percent of respondents in rural low performing and in vulnerable households reported to have never heard of iodine deficiency and iodized salt than respondents from other households.

- The most commonly reported consequence of iodine deficiency was goitre (30% of respondents), while 43% reported that although they had heard of iodine deficiency, they did not know of the consequences.

- Reported knowledge of iodine deficiency and iodized salt was associated with higher use of adequately iodized salt in the household (55% of households where the respondent reported having heard about either of these factors and about a third of households where the respondent reported being unaware of iodine deficiency (36%) or iodized salt (30%))

- Among respondents who had heard of iodine deficiency and said they knew a method to prevent it (37% of the national sample), most reported that using iodized salt was the best method of prevention 84% (rural low performing) to 90% (urban and slum).

Respondents in urban and rural other strata tended to have similar sources of information about iodized salt: television (66-68%), followed by around 20-25% responding to have heard/also heard from each of health workers, friends/neighbours or relatives. In the rural low performing population the main sources of information were health workers (39%), then television and friends/neighbours (25-27%).

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2 There is a high degree of overlap between these two variables of low performing areas and households with high MPI (vulnerable to poverty)
Household salt purchasing practices

- The percent of respondents reporting to use packaged salt appears to have remained about the same since 2011 (76% in 2011)
- Open salt is much more widely used in rural low performing areas and in more vulnerable households.
- Open salt is much less likely to be iodized (26%) or adequately iodized (4%) (see Fig 1)

More vulnerable households (high MPI score) were about twice as likely to use open salt and also more likely to source salt from non-formal retail channels*.

Over half of all households in rural low performing areas were using open salt and approximately a third used salt from non-formal retail outlets, in many cases reporting to obtain it from the point of production*.

The percent of households using packaged vs open salt was approximately the same for households in urban and in rural other areas. However salt in rural other areas households was less likely to have come from retail shops and more likely to have come from a market

*Salt from non-formal retail channels such as the point of production often means it will have by-passed any...
# Results - Retailer Survey

**Characteristics of the survey population**

- Three quarters of retailers in urban and slum areas sold packaged salt only
- Almost half of retailers in rural low performing and rural other areas sold open as well as packaged salt.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Urban and Slum N = 252</th>
<th>Rural Other N = 252</th>
<th>Rural Low Performing N = 252</th>
</tr>
</thead>
<tbody>
<tr>
<td>Owner of retail outlet</td>
<td>90.5%</td>
<td>90.9%</td>
<td>88.1%</td>
</tr>
<tr>
<td>Education</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;Primary complete</td>
<td>25.8%</td>
<td>26.2%</td>
<td>31.7%</td>
</tr>
<tr>
<td>&lt; Secondary complete</td>
<td>43.3%</td>
<td>43.5%</td>
<td>48.4%</td>
</tr>
<tr>
<td>Secondary/Higher</td>
<td>31.0%</td>
<td>29.3%</td>
<td>19.9%</td>
</tr>
<tr>
<td>Type salt stocked*</td>
<td>Packaged only</td>
<td>75.8%</td>
<td>52.4%</td>
</tr>
<tr>
<td></td>
<td>Both packaged and open</td>
<td>23.8%</td>
<td>47.6%</td>
</tr>
<tr>
<td>Source of salt**</td>
<td>Wholesaler</td>
<td>29.5%</td>
<td>41.7%</td>
</tr>
<tr>
<td></td>
<td>Market</td>
<td>68.9%</td>
<td>58.3%</td>
</tr>
<tr>
<td>Number salt samples</td>
<td>Packaged</td>
<td>251</td>
<td>248</td>
</tr>
<tr>
<td></td>
<td>Open</td>
<td>64</td>
<td>119</td>
</tr>
</tbody>
</table>

* Remaining 0.3-0.4% sold open salt only
** Remaining 0.3-2.0% purchased salt from the point of production
Retailer knowledge and awareness

- Knowledge of iodized salt was high across all strata.
- Knowledge of the salt law and enforcement consequences was low across all strata.
- For all questions related to iodized salt and the salt law, retailers in the rural low performing areas tended to have slightly higher knowledge.

*Only asked where retailers reported that they had
Iodine content of packet and open salt

- Two-thirds to three quarters of all packaged salt was adequately iodized to the national standard for production (20ppm)
- The median ppm for packaged salt found to have at least some added iodine ranged from 32.0 to 34.7ppm
- In contrast, around 80% of open salt in the two rural areas had no added iodine (the sample size for open salt in urban areas too low to be representative).
- The median ppm for open salt ranged found to have at least some added iodine from 5.2 to 6.3 ppm.

### Discussion Points

The National Salt Iodization Survey, Bangladesh 2015, reports for the first time on household coverage of iodized salt, retailer availability and associated knowledge and purchasing practices specifically for the CIDD-designated rural low performing areas. The results will provide an evidence-base to strengthen strategies and to monitor progress.

Quantitative salt iodine data from surveys in 2004-5, 2011 and 2015 show that nationally, household use of adequately iodized salt has been sustained at around 50 to 58 percent for the past 10 years, with another 15-30 percent of households accessing salt with at least some iodine. Although the percent household coverage for adequately iodized salt has not changed significantly since 2011, the percent household coverage for salt with any iodine has decreased in both urban and rural areas and, consequently, at the national level: from 80 percent in 2011 to 65 percent in 2015.

Urban areas of Bangladesh have always reported higher access to adequately iodized salt with closer to 70 percent coverage, including in the slum areas where the only salt available at retailers was packaged salt (2011 NNS). The 2015 survey data support this to a certain extent, with a high percent of urban households using adequately iodized salt, which appears to reflect availability of packaged salt at retailers in these areas.

The relationship between supply and household access appears to be more complicated in rural areas. Open salt was found to be available in approximately the same proportion of retailers in both rural other and rural low performing...
areas and the quality of iodisation of packaged and open salt available at the retail level in both strata was also similar. However packaged salt was used in almost twice the number of households in rural other areas when compared with households in rural low performing areas, reflected in a similar difference in household use of adequately iodized salt between these two areas. Possible explanations for this difference in the relationship between supply at retail outlets and household use between the two rural strata could include one or a mix of a number of factors such as: differences in the relative proportion of packaged and open salt available at retail outlets between the two areas, affordability of packet in relation to differences in household vulnerability to poverty in the two areas, differences in consumer awareness of iodine deficiency and iodized salt, and whether consumers are obtaining salt from sources outside the retail outlets included in the survey sample. There is evidence that almost a third of households in the rural low performing area obtain salt from other sources, including many reporting to source this directly from the site of production.

Given the known differences in iodine levels between packaged and open salt at the household and retailer levels, it is not surprising that the results of regression analyses indicate that the factor most significantly associated with salt iodine content nationally and in all strata separately, is whether salt used in the household was packaged at the point of purchase.

The 2011 survey demonstrated a high level of association between household salt iodine content and urinary iodine, indicating iodine deficiency among the populations of both women and children in households were the salt iodine content was < 15ppm. Based on this and the very low household coverage of adequately iodized salt in low performing areas, the 2015 survey results suggest that a large proportion of the population in these areas of Bangladesh are at high risk of iodine deficiency.

Key Conclusions and Recommendations

The sustained production of adequately iodized salt over a ten year period and the high proportion of packaged salt containing adequate iodine reflect the commitment and efforts of the national CIDD programme, the medium and larger scale salt industry, and from supporting national and international partners. However, despite these intense efforts, the overall national household coverage with adequately iodized salt has not increased, which points to the need for an innovative review of USI-related strategy and policies. In particular, results from the newly added domain of rural low performing areas provide valuable information on the extent and possible causes of the serious problem in these areas, and these should be the basis for future programming.

There is an accepted urgent need to update and strengthen the salt law including clear guidance on enforcement of regulations for violating the. This should aim to improve production, labelling and packaging of adequately iodized salt from all medium and large scale producers. Additional efforts to improve access to enable monitoring and enforcement of the planned revisions are required, to ensure regulated salt production, iodization and packaging methods, particularly in regard to current sources of open salt.

It is recommended that a series of consultations should take place with involvement of national and international business-oriented partners to address the question of whether and how the small scale salt industry can be consolidated and modernised. The benefits in terms of elimination of iodine deficiency resulting in improved intellectual and physical potential among the population, and subsequent socio-economic development in these areas, would be expected to prove the worth of such an investment of financial and personnel resources in the longer term.

As well as actions related to the salt law and the salt industry, additional, temporary and/or replacement strategies may include the following:

- Development of salt banks through the framework of the Bangladesh Small Cottage Industries Corporation (BSCIC), to facilitate cost-effective salt iodisation and packaging
  - Includes development of the capacity of salt producers to efficiently iodize salt in the context they are working in, combined with sustained strong technical support and enforcement.
• Ensuring regulatory authorities have the capacity – staff, tools, other resources - needed to regulate and enforce production and packaging of adequately iodized salt in all areas of the country, with a focus on identified low performing areas.

• Implementation of a strengthened communication plan aimed at all points along the value chain including consumers, retailers, salt producers/wholesalers, and local government, developed based on a thorough analysis of the specific situation and needs, especially in relation to the sale of open salt and to the situation in low-performing areas.

• Identification of all opportunities to ensure quality iodized salt is used within schools, hospitals, garment factories, the army, and other institutions.

• Investigating alternative strategies to provide adequate iodine intake for vulnerable groups in the rural low performing areas, possibly through a subsidised supply of quality-assured salt, and/or through inclusion of iodine in nutrient supplements for young children and provision of iodine supplements for pregnant and lactating women, and/or investigation of an alternative food vehicle for iodine.

Potential Survey Limitations

While the 2015 survey provides excellent programmatic household iodized salt coverage data, in order to fully understand iodine nutrition in Bangladesh and to determine the extent of food industry sources of iodized salt; future surveys should include assessment of urinary iodine, along with a measure of consumption of key centrally processed foods that are or could be made with iodized salt.

The field work was conducted during a period of political difficulties which is expected to have resulted in some disruption to the distribution of goods and to an increase in food prices. No information was gathered as to whether this affected the availability of packet salt at household and retailer level or not. The fact that no respondents or retailers mentioned anything to survey field staff about availability or supply being different to normal, and that there was no significant decrease in the use of adequately iodized or of packet salt since 2011, suggest that any effect on salt supply was limited. However, it is accepted that this particular situation was a constraint which may have affected results to some extent. However, the estimates obtained are believed to be within a reasonable range of where they would be outside of this period and that their significance for programme review and planning is still valid.

References


