ABSTRACT

Objectives: To prevent iodine deficiency, Senegal mandated the iodization of all salt produced, imported or distributed. There has been an important increase in use of bouillon, which is claimed to contain iodine in Senegal. We undertook this survey to better understand the extent of bouillon cube use in the context of salt iodization.

Methods: A nationwide cross-sectional stratified cluster sample household-level survey. Measurements: Urinary iodine concentration in women 15–45 years and children 6–12 years, iodized salt, bouillon consumption, and iodine concentration in household salt. 3,768 households were surveyed including 7,980 women and 6,309 children.

Results: Only 56% of households surveyed had iodized salt. Average iodine concentration in salt was 22 ppm. Average per capita daily household consumption was 4.79 g salt and 3.98 g bouillon cube. Median urinary iodine concentration in children was 104.42 µg/l (141.25 µg/l urban, 82.63 µg/l rural) and 92.20 µg/l for women.

Conclusions: This study shows that household consumption of bouillon cubes is high in Senegal; mean UI seems to be adequate in urban setting but insufficient in rural areas, suggesting a lower intake of iodine from iodized salt/bouillon cube.

BACKGROUND

• In Senegal, iodization of all salt produced in and entering the country has been mandatory since 2000.
• There has been increased penetration of bouillon cube in Africa and Senegal in particular in recent years.
• Bouillon cube industries make claims for iodine contents of their products.
• Senegal has no legislation about use of iodized salt in bouillon cube production.
• Currently there is weak quality control and inspection under the salt iodization law.

OBJECTIVES

• To better understand the extent of bouillon cube use in the context of salt iodization.
• To measure correlation between urinary iodine and iodized salt and bouillon cube consumption in Senegal.

METHODS

• Nationwide cross-sectional stratified cluster sample household-level survey
  • Known endemic goiter area
  • Other area
• 3,768 households surveyed including 7,980 women and 6,309 children
• Personal digital assistants (PDAs) to administer questionnaires and collect responses
• 700 households sub-sampled to determine salt iodine concentrations and urinary iodine concentrations for non-pregnant women 15–45 y of age and children 6–12 y of age

RESULTS

• Only 56% of households surveyed had iodized salt.
• Average iodine concentration in salt was 22 ppm.
• Average per capita daily household consumption was 4.79 g salt and 3.98 g bouillon cube with variations by area of residence.
• Median urinary iodine concentration was 104.42 µg/l for children and 92.20 µg/l for women.
• There was no correlation between household consumption of iodized salt and iodine urinary concentration in children and women.

MAP OF SURVEY CLUSTERS AS INDICATED BY THE GLOBAL POSITIONING SYSTEM

URINARY IODINE CONCENTRATIONS OF NON-PREGNANT WOMEN AGED 15-49 YEARS IN SENEGAL

<table>
<thead>
<tr>
<th>Packet Type</th>
<th>Area of Residence</th>
<th>Urban</th>
<th>Rural</th>
<th>National</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bouillon/mean g (SD)</td>
<td>4.29 (2.23)</td>
<td>4.18, 4.41</td>
<td>4.72, 5.15</td>
<td>4.61 (4.37)</td>
</tr>
<tr>
<td>Salt, mean g (SD)</td>
<td>3.91 (1.95)</td>
<td>3.65, 4.00</td>
<td>4.05, 4.80</td>
<td>4.70 (2.72)</td>
</tr>
</tbody>
</table>

BOUILLON CUBE & SALT CONSUMPTION AND URINARY IODINE (UI)

<table>
<thead>
<tr>
<th>Packet Type</th>
<th>Area of Residence</th>
<th>Urban</th>
<th>Rural</th>
<th>National</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bouillon/mean µg/l (95% CI)</td>
<td>104 (83-125)</td>
<td>95, 113</td>
<td>104, 120</td>
<td></td>
</tr>
<tr>
<td>Salt, mean µg/l (95% CI)</td>
<td>72 (61-83)</td>
<td>61, 79</td>
<td>72, 84</td>
<td></td>
</tr>
<tr>
<td>Median UI (µg/l)</td>
<td>104 (83-125)</td>
<td>95, 113</td>
<td>104, 120</td>
<td></td>
</tr>
<tr>
<td>Median UI (µg/l)</td>
<td>83</td>
<td>73, 104</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

DATA COLLECTION USING PDAS

ACKNOWLEDGEMENTS

The Micronutrient Initiative’s work including this survey is undertaken with the financial support of the Government of Canada through the Department of Foreign Affairs, Trade and Development and other generous donors.

The survey showed that the iodine status of school-aged children is of borderline sufficiency on the national level and that those living in rural areas are mildly iodine deficient. Household consumption of bouillon cubes is high in Senegal; mean UI seems to be adequate in urban setting but insufficient in rural areas, suggesting a lower intake of iodine from sources such as iodized salt/bouillon cube. Ensuring equitable coverage of adequately iodized salt should be of priority.

Adequate iodine concentration in bouillon cube could be an avenue to tackle IDD in Senegal. However to guide decisions, further research is warranted on current content and bioavailability of iodine in bouillon cube as well as feasibility of iodization of bouillon cube as complement to iodized salt in Senegal.