Iodine status of pregnant women and household salt iodine concentration in rural Ada Woreda, Oromia region, Ethiopia

Conference place: Desalegh Hotel
By: Mengistu Fereja
Presentation outline

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• Results and discussion
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Introduction

• Iodine deficiency:
  – Is a major public health problem for populations throughout the world
  – Particularly among pregnant women and young children.
  – Globally 1.8 billion people have insufficient iodine intake, including 241 million of SAC (Andersson et al., 2012).
• ID is associated with a wide range of abnormalities, collectively named as “IDD” (WHO, 2007).

– Consequences of maternal ID during pregnancy include:

• Increased risk of abortion, stillbirth, perinatal death, as well as neuromotor, behavioral and cognitive impairments (Yarrington and Pearce, 2011).
• In Ethiopia IDD have been recognized as a major public health problem for many decades (Abuye and Urga, 2000)

– In 2011, it was estimated that 66 million people were at risk of ID (Andersson et al., 2012)

– The National Survey conducted in 2005 showed high TGR of 35.8% among women of 15-49 years age (Abuye and Berhane, 2007).
Concerning pregnant women, two study conducted before national salt iodization was initiated reported

- 49% TGR and 60% of severe ID (UIC < 20 µg/L) in Sidama (Ersino et al., 2013)

- 82.8% prevalence of ID (UIC < 150 µg/L) in Haramaya (Kedir et al., 2014).
• Recognizing the problem of ID in Ethiopia, the government started implementing a mandatory salt iodization program in 2012.

• Assessment and monitoring system plays a fundamental role in the control of IDD.

• However, there is scant information for monitoring USI in Ethiopia.

• Furthermore, there is no studies addressing iodine status of pregnant women since the mandatory salt iodization program was initiated.
Research objective

General objective
• To determine iodine status of pregnant women and household salt iodine concentration in rural Ada Woreda, Oromia region, Ethiopia

Specific objectives
• To assess the iodine status of pregnant women based on urinary iodine concentration (UIC) and goiter rate.

• To determine the iodine concentration of the salt consumed by pregnant women.
Methodology

Study area
• The study was conducted in six rural kebeles of Ada district, which is located 45 km South East of Addis Ababa.

Study period
• The study was conducted in October and November, 2014
cont...

Study design
• A community based, cross-sectional descriptive study

Source population
• All pregnant women living in the study area.

Study population
• Pregnant women residing in the selected kebeles and those volunteered to participate in the study.
### Sample size

**Specific objectives**

To assess the iodine status of pregnant women

**Formula and inputs used**

\[ n = \frac{Z^2 P(1-P)}{d^2} \]

With, \( Z = 1.96 \), \( P = 82.8\% \), \( d = 5\% \), DEFF = 1.5 and Non response rate = 10%

**Calculated sample size**

362
Sampling technique

• A two-stage cluster sampling method

  – The study kebeles was selected by Probability Proportional to Size (PPS) method.

  – The sampling frame was developed

  – Finally, individual subjects were selected using systematic random-sampling technique
cont...

Data collection method

• A structured questionnaire was used to collect data on:
  
  – Socio-demographic characteristics,
  
  – Food consumption patterns and
  
  – Knowledge of iodized salt and IDD and practice of use of iodized salt.
Goiter examination
– Presence of goiter was examined by palpation and graded according to the recommended criteria of WHO

Urine sample collection and analysis
– Casual urine samples were collected in disposable plastic cups and transferred into 2 mL screw-capped plastic vial.

– UIC was determined using inductively coupled plasma mass spectrometry (ICPMS).
Salt sample collection and analysis

• Approximately 20 g of the salt were collected from participants’ homes and local shops.

• Salt iodine concentration was determined using a WYD Iodine Checker (National Salt Research Center, Tianjin, China).
Quality control

• Training was given for DC and supervisors.

• A pre-test was conducted before the data collection

• The collected data were checked for incompleteness and inconsistency.

• Laboratory analysis of all samples were conducted in duplicate
Data analysis

• The data were entered, cleaned and analyzed using SPSS 20 for windows.

• Descriptive analysis was done using mean (SD), median (IQR) and frequency and percentage.
Ethical considerations

– Ethical clearance was obtained from the Institutional Review Board (IRB) of Hawassa University.

– The local authorities were informed about the study objectives.

– Respondent was informed about the study purpose and appropriate informed verbal and written consent was obtained.
Results and discussion

Socio-demographic characteristics

– The response rate of 98.3%.

– The median age was 24 (IQR: 21-27) years

– The majority were Oromo in ethnicity and Orthodox Christians in religion
Knowledge and practice of iodized salt and IDD

– Only 26% of the respondents had ever heard of iodized salt

– Sixty one (64.9%) of the women who had heard of iodized salt indicated that it is important to prevent IDD or to cure goiter.

– Twenty two percent of the respondents had ever heard of goiter.
• In this study, the awareness about IDD and iodized salt noted to be very poor.

• Similar low levels of awareness about IDD and iodized salt was reported elsewhere in the country by Girma et al., 2012; Takele et al., 2003.
Results and discussion cont…

Practice about iodized salt

<table>
<thead>
<tr>
<th>Practices</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time salt is added during food cooking</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Early and at the middle of cooking</td>
<td>149</td>
<td>41.9</td>
</tr>
<tr>
<td>Late at the end/After cooking</td>
<td>207</td>
<td>58.1</td>
</tr>
<tr>
<td>Sunlight exposure of salt</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>320</td>
<td>89.9</td>
</tr>
<tr>
<td>Yes</td>
<td>36</td>
<td>10.1</td>
</tr>
<tr>
<td>Type of container used to store salt</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Container with lid/cover</td>
<td>355</td>
<td>99.7</td>
</tr>
<tr>
<td>Container without lid/cover</td>
<td>1</td>
<td>0.3</td>
</tr>
</tbody>
</table>
• More than half of the respondents (58.1%) had proper practice related to iodized salt, they usually add salt late at the end or after cooking.

• Most (89.9%) of the respondents did not expose their salt to sunlight.

• Concerning storage practice of salt, all (99.7%) of the respondents stored the salt in a container with a lid/cover.
Household salt iodine concentration

– The median household salt iodine concentration was 12.2 (IQR: 6.9-23.8) ppm.

– Only 39% (95% CI: 34-44%) of households were consuming adequately iodized salt (≥15 ppm).

– Majority (61%) were consuming salt with inadequate or almost negligible iodine content.
Distribution of the iodine concentration in household salt (n = 351)

<table>
<thead>
<tr>
<th>Salt iodine (ppm)</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;5</td>
<td>45</td>
<td>12.8</td>
</tr>
<tr>
<td>5-14.9</td>
<td>168</td>
<td>47.9</td>
</tr>
<tr>
<td>15-40</td>
<td>85</td>
<td>24.2</td>
</tr>
<tr>
<td>&gt; 40</td>
<td>53</td>
<td>15.1</td>
</tr>
</tbody>
</table>
Results and discussion cont...

• This is in line with the findings of a national survey which reported 42.7% of adequately iodized salt nationally and 36.7% in the Oromia region (EPHI, 2014).
Results and discussion cont...

Urinary iodine concentration

– The median UIC was 85.7 (IQR: 45.7-136) µg/L.

– 78% (95% CI: 73-82%) of the pregnant women had a UIC below 150 µg/L.

– 56 (16.1%) of the women had adequate, 13 (3.7%) more than adequate and 9 (2.6%) had excessive iodine.
Distribution of urinary iodine concentration levels

<table>
<thead>
<tr>
<th>Urinary iodine conc. (µg/L)</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;150</td>
<td>270</td>
<td>77.6</td>
</tr>
<tr>
<td>150 – 249</td>
<td>56</td>
<td>16.1</td>
</tr>
<tr>
<td>250 – 499</td>
<td>13</td>
<td>3.7</td>
</tr>
<tr>
<td>&gt;500</td>
<td>9</td>
<td>2.6</td>
</tr>
</tbody>
</table>
Results and discussion cont…

• The median UIC in our study was higher than the previous studies conducted in Sidama (Ersino et al., 2013), Haramaya (Kedir et al., 2014) and Jimma town (Zenebe et al., 2014).

  – This may be due to the fact that our study was undertaken after mandatory salt iodization in Ethiopia

• High prevalence of iodine deficiency in pregnant women was reported from studies in Niger Republic (Sadou et al., 2013) and Democratic Republic of Congo (Habimana et al., 2013).
Results and discussion cont…

Prevalence of goiter

• Of the total study subjects 72 had grade 1 (palpable) goiter giving prevalence of 20.2% (95% CI: 16-24).

– Visible goiter (Grade 2) was not found in any of the study subjects.
Results and discussion cont…

• Prevalence of goiter in our study was lower compared to studies in West Gojjam (Kebede et al., 2014), Sidama (Ersino et al., 2013) and the 2005 national survey (Abuye et al., 2007).

– This variation could be due to geographical disparity in the country along with the probable environmental and dietary ID.
Conclusion

• Iodine deficiency is a problem of public health significance in study area.

• Proportion of households consuming adequately iodized salt was very low and there were wide variations in the iodine concentrations of salt.

• Awareness about iodized salt and IDD was very low.
Recommendation

• Strengthen monitoring of the USI program to improve the situation of ID through increased access to adequately iodized salt.

• Improve assurance of the quality of the entire iodized salt supply

• Iodine supplementation to meet increased iodine requirement of pregnant women.

• Innovative education and communication strategies, such as social marketing of iodated salt.
Acknowledgement

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