Examining means of reaching school attending and out-of-school adolescent girls for iron supplementation in Tigray, Northern Ethiopia

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Presentation outline

• Background
• Objectives
• Methods
• Results and Discussion
• Conclusion
• Recommendations
• Acknowledgements
Background

• Adolescent nutrition in Ethiopia
  – Beginning to receive the attention it deserves
  – Lagging activities in the NNP
  – Dearth of research on adolescent nutrition
• **Nutrients of particular concern**
  
  – **Vitamins**
    • Vitamin A (Petkovich 1992; vanPelt and deRooij 1991; vanPelt, Morena et al. 1996)
    • Folate (Duthie 1999; Lin, Lin et al. 1999; Fang and Xiao 2003)

  – **Minerals**
    • Iron (Beard, Dawson et al. 1996; Beard 2000)
    • Calcium (Golden 2000)
    • Zinc (Hambidge 2000; MacDonald 2000)
    • Iodine (Kimball 1923)
• Iron

  – Need for increased iron is based on the
  • Rapid rate of linear growth
  • Increase in blood volume
  • Increase in lean body mass
  • Onset of menarche in girls (Beard, Dawson et al. 1996; Beard 2000).
Iron deficiency in school going adolescent girls from Tigray

- 413 adolescent school girls (10 – 15 years)
- 48.4 (25.1) µg/L was their mean (sd) ferritin values
- sTfR ranged between 4.6 and 18.5 mg/L with a mean of 8.2 (2.6) mg/L
- The median (25\textsuperscript{th}, 75\textsuperscript{th}) level of C-reactive protein was 0.4 (0.2, 0.8) mg/L
• Iron status in the school girls
  – 7.1% were anemic
  – 8.9% of the school girls were iron depleted (ferritin < 15 µg/L)
  – 15.3% had low iron stores (ferritin 15 - 30 µg/L) suggesting that iron deficiency was prevalent in this population (Afework et al, 2009)
  – No report on anemia for out-of-school girls
• Multicenter study from 270 clustered villages and 9 administrative regions
  – Conducted in 22,861 women of reproductive age (15-49 years) reported
    • Clinical anemia in 11.3%
    • Anemia in 30.4%
    • Iron deficiency in 49.7%
    • Iron deficiency anemia in 17% of women
    • The existence of mild to moderate iron deficiency anemia among women of reproductive age with significant geographic variation (Umeta, Haidar et al. 2008).
• EDHS 2011 (women age 15 – 49 years)
  – 17% were anemic
  – 13% had mild anemia
  – 3% had moderate anemia
  – 1% had severe anemia
  – Anemia prevalence varies by urban and rural residences

  • Higher proportion of women in rural areas were anemic (18%) than those in urban areas (11%)
• Regional variation
  – Women in the Somali, Affar, and Dire Dawa regions have a relatively high prevalence of anemia
    • 44%, 35% and 29%, respectively
  – Women in Addis Ababa and the SNNP and Tigray regions are at the other end of the range, with relatively low prevalence of anemia
    • 9%, 11% and 12%, respectively
Where anemia is prevalent, supplementation would benefit

- Women of reproductive age
- Preschool children
- School-age children
- Adolescent girls
• Action for prevention of anemia in adolescents
  – As a target group in their own right
  – Pregnancy itself is too short a period for addressing pre-existing anemia and therefore action for prevention of anemia must be taken during adolescence itself
  – Effort to improve iron status and anemia during pregnancy is therefore rather late and inadequate to meet the high requirements
  – In fact, it is noted that the longer the pre-pregnancy preventive supplementation, the better is its impact on iron nutrition during pregnancy
Objectives

• General
  – Examine means of reaching school attending and out-of-school adolescent girls for iron supplementation in Tigray region, Northern Ethiopia.
• Specific objectives
  – Identify means or settings for iron supplementation to school adolescent girls
  – Identify means or settings for iron supplementation to out-of-school adolescent girls
  – Identify barriers and facilitators for the acceptability of iron supplements
  – Describe current dietary practices in adolescent girls from the study communities
  – Describe responsibilities of the various community settings on iron supplementation to adolescent girls
Methods

• Study sites
  – Seven districts of Tigray

• Design
  – Cross-sectional

• Study subjects
  – School going and out-of-school adolescent girls
  – 15 – 19 years
• Population
  – Source population
    • Adolescent girls
  – Study population
    • 15 – 19 years old adolescent girls
• Sampling technique
  – Stratified multi-stage sampling technique
  – One wereda with a high/preparatory school from each zone was selected using simple random sampling (SRS)
  – From each selected wereda, a high/preparatory school was selected randomly
  – School going and out-of-school girls were stratified and selected by systematic random sampling (SyRS) from neighboring communities

• Sampling frames
  – School roster
  – Registration book
• Sample size
  – Single population
    • $n = Z^2_{1-\alpha/2} P (1-P) /d^2$
    • $Z_{1-\alpha/2}$ set at 1.96 (for 95% confidence interval)
    • $d$ is the desired degree of precision (taken as 0.05)
    • $p$ was the estimate of iron deficiency = 49.7% (Melaku U, et al. 2008).
    • Adjustment for design effect of 2
    • 10% rate of non-responses and invalid responses yielded a final sample size of 847
• **Inclusion criteria**
  – Subjects must reside within the study area for more than six months prior to the data collection
  – 15 – 19 years of age at the time of data collection

• **Criteria for exclusion**
  – Subjects who were pregnant or married at the time of data collection
• Data collection
  – Quantitative
  – Qualitative approaches
    • Focus group discussions (FGDs)
    • Key informant interviews (KII)
• Piloting
  – Pretested among 20 adolescent school girls from Quiha

• Data analysis
  – SPSS version 20
  – Information that was collected through KII and FGDs was transcribed and qualitatively analyzed

• Ethical consideration
  – Obtained from IRB of MU-CHS
Results and Discussion

• Data was collected from 828
  – 578 school going
  – 250 non school going adolescent girls

• Mean (sd) ages were 16.7 (1.4)
  – 15 years old – 24.5%
  – 16 years old – 22%
  – 17 years old – 19.3%
  – 18 years old – 21.9%
  – 19 years old – 12.3%
# Socio-demographics

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>N</th>
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<tr>
<td>Age in years</td>
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<tr>
<td>15 – 17</td>
<td>545</td>
<td>65.8</td>
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<td>18 – 19</td>
<td>283</td>
<td>34.2</td>
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<tr>
<td>Religion</td>
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<tr>
<td>Christian</td>
<td>789</td>
<td>95.3</td>
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<td>Muslim</td>
<td>39</td>
<td>4.7</td>
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<td>Education level</td>
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<tr>
<td>9th</td>
<td>360</td>
<td>62.3</td>
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<tr>
<td>10th</td>
<td>77</td>
<td>13.3</td>
</tr>
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<td>11th</td>
<td>67</td>
<td>11.6</td>
</tr>
<tr>
<td>12th</td>
<td>74</td>
<td>12.8</td>
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<tr>
<td>Workload</td>
<td></td>
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<tr>
<td>Girls are overloaded than boys</td>
<td>467</td>
<td>56.4</td>
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<td>Boys are overloaded than girls</td>
<td>130</td>
<td>15.7</td>
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<td>Equally overloaded</td>
<td>231</td>
<td>27.9</td>
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<tr>
<td>Early marriage</td>
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<td></td>
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<td>No</td>
<td>717</td>
<td>86.6</td>
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<td>Yes</td>
<td>111</td>
<td>13.4</td>
</tr>
<tr>
<td>Family size</td>
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<tr>
<td>Mean (sd)</td>
<td>5.8 (1.8)</td>
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NNP related Research Finding Dissemination Workshop
Frequency Distribution (zone/woreda)

<table>
<thead>
<tr>
<th>Zone</th>
<th>School going</th>
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<th>Out-of-school</th>
<th></th>
<th>Total</th>
<th></th>
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<tr>
<td></td>
<td>N</td>
<td>%</td>
<td>N</td>
<td>%</td>
<td>N</td>
<td>%</td>
</tr>
<tr>
<td>Central</td>
<td>88</td>
<td>73.3</td>
<td>32</td>
<td>26.7</td>
<td>120</td>
<td>14.5</td>
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<tr>
<td>Eastern</td>
<td>90</td>
<td>68.7</td>
<td>41</td>
<td>31.3</td>
<td>131</td>
<td>15.8</td>
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<tr>
<td>Mekelle</td>
<td>44</td>
<td>69.2</td>
<td>20</td>
<td>30.8</td>
<td>64</td>
<td>7.7</td>
</tr>
<tr>
<td>Northwest</td>
<td>92</td>
<td>75.3</td>
<td>39</td>
<td>24.7</td>
<td>131</td>
<td>15.8</td>
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<tr>
<td>Southwest</td>
<td>88</td>
<td>69.8</td>
<td>38</td>
<td>30.2</td>
<td>126</td>
<td>15.2</td>
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<tr>
<td>Southern</td>
<td>88</td>
<td>67.2</td>
<td>43</td>
<td>32.8</td>
<td>131</td>
<td>15.8</td>
</tr>
<tr>
<td>Western</td>
<td>88</td>
<td>70.4</td>
<td>37</td>
<td>29.6</td>
<td>125</td>
<td>15.1</td>
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<tr>
<td>Total</td>
<td>578</td>
<td>69.8</td>
<td>250</td>
<td>30.2</td>
<td>828</td>
<td>100</td>
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NNP related Research Finding
Dissemination Workshop
Household food insecurity (HFIAS)

- Severe FI: 0.4
- Moderate FI: 10.6
- Mild FI: 25.5
- Food secure: 63.5

NNP related Research Finding
Dissemination Workshop
Diet diversity score (DDS = 3.5)

- Starchy: 100
- DGLVs: 42
- Other VA: 32
- Other FGs: 16
- Organ meat: 3
- Meat and Fish: 32
- Eggs: 28
- Legumes: 73
- Dairy: 27
Preferred facilities for iron supplementation in school going and out-of-school adolescent girls, 2013 (n = 828).

<table>
<thead>
<tr>
<th>Setting</th>
<th>Out-of-school, n(%)</th>
<th>School going, n(%)</th>
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</thead>
<tbody>
<tr>
<td>School*</td>
<td>Yes</td>
<td>28 (3.4)</td>
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<tr>
<td></td>
<td>No</td>
<td>214 (26.4)</td>
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<tr>
<td>Health post*</td>
<td>Yes</td>
<td>102 (12.6)</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>141 (17.4)</td>
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<tr>
<td>Health center*</td>
<td>Yes</td>
<td>118 (14.5)</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>125 (15.4)</td>
</tr>
<tr>
<td>Hospital</td>
<td>Yes</td>
<td>4 (0.5)</td>
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<tr>
<td></td>
<td>No</td>
<td>239 (29.5)</td>
</tr>
</tbody>
</table>

NNP related Research Finding Dissemination Workshop
Bivariate and multivariable analysis of factors associated with perceived anemia status of the adolescent girls, 2013 (n = 828)

<table>
<thead>
<tr>
<th>Variables</th>
<th>Perceived anemia status</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>No</td>
<td>Yes</td>
<td>COR (95% CI)</td>
<td>AOR (95% CI)</td>
<td></td>
</tr>
<tr>
<td><strong>Age</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>682</td>
<td>146</td>
<td>1.17(1.071, 1.384)*</td>
<td>1.074(0.852, 1.354)</td>
<td></td>
</tr>
<tr>
<td>Educational level</td>
<td></td>
<td></td>
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<td></td>
<td></td>
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<tr>
<td>9th</td>
<td>307</td>
<td>53</td>
<td>0.50(0.275, 0.908)*</td>
<td>0.551(0.228, 1.329)</td>
<td></td>
</tr>
<tr>
<td>10th</td>
<td>60</td>
<td>17</td>
<td>0.82(0.388, 1.736)</td>
<td>0.946(0.372, 2.408)</td>
<td></td>
</tr>
<tr>
<td>11th</td>
<td>53</td>
<td>14</td>
<td>0.765(0.348, 1.679)</td>
<td>0.83(0.339, 2.034)</td>
<td></td>
</tr>
<tr>
<td>12th</td>
<td>55</td>
<td>19</td>
<td>1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Distance to health facility</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt; 30 minutes</td>
<td>400</td>
<td>90</td>
<td>1.519(0.698, 3.303)</td>
<td>1.072(0.415, 2.766)</td>
<td></td>
</tr>
<tr>
<td>30 – 60 minutes</td>
<td>213</td>
<td>39</td>
<td>1.236(0.546, 2.798)</td>
<td>1.139(0.426, 3.042)</td>
<td></td>
</tr>
<tr>
<td>&gt;60 minutes</td>
<td>54</td>
<td>8</td>
<td>1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Distance to school</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt; 30 minutes</td>
<td>166</td>
<td>44</td>
<td>1.452(0.820, 2.571)</td>
<td>1.322(0.655, 2.668)</td>
<td></td>
</tr>
<tr>
<td>30 – 60 minutes</td>
<td>192</td>
<td>36</td>
<td>1.027(0.572, 1.844)</td>
<td>1.01(0.521, 1.956)</td>
<td></td>
</tr>
<tr>
<td>&gt;60 minutes</td>
<td>115</td>
<td>21</td>
<td>1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Workload</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Less than boys</td>
<td>115</td>
<td>15</td>
<td>0.811 (0.421, 1.561)</td>
<td>0.661(0.23, 1.9)</td>
<td></td>
</tr>
<tr>
<td>More than boys</td>
<td>368</td>
<td>99</td>
<td>1.673(1.084, 2.583)*</td>
<td>2.612(1.419, 4.811)*</td>
<td></td>
</tr>
<tr>
<td>Same</td>
<td>199</td>
<td>32</td>
<td>1</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>
Qualitative study findings

• FGDs
  – Schools were identified as the best places to provide counseling and education on the need for iron supplementation for girls
  – Schools and health facilities should
    • Educate the community to clear the wrong messages coined with iron supplements as contraceptive pills
    • Maintain enough stocks
  – Families
    • Remind the time for intake of iron supplements
    • Improve compliance
Key informants

- Incorporation of adolescent nutrition in to the curriculum
- Establishment of girls’ nutrition clubs
- Organize class arguments on adolescent nutrition
- Train teachers on anemia and iron supplementation
- Present issues related to anemia and adolescent nutrition in the mini media
- Discuss the consequences of anemia and merits of iron supplementation in the cooperative learning sessions (networking)
• Potential facilitators
  – Well organized bottom up (kebelle to Woreda) structure
  – Easy accessibility and availability of schools and health facilities
  – Availability of professionals such as teachers and HEWs
  – Organization of women in various institutions such as women development armies, women league, women affairs, women association and youth association
  – Access to media especially radio and TV
  – Increased school enrollment rate of girls
• Potential barriers for iron supplementation
  • Lack of awareness
  • Wrong perception about iron tablets
    – Viewed as contraceptives
    – Iron tablets increase bleeding during menstruation
    – Association of taking supplements for an extended period with ART regimen
  • Perceived feeling of illness due to the association between tablets and illness
    – Prevention vs treatment
  • Side effects
  • Peer pressure (embarrassment from male peers).
• Limitation

  – Adolescent to adolescent approach was not included in the tools, FGDs and KII

  • Adolescents who are in school may be easier to reach through the school system while those not in schools could be reached through an adolescent to adolescent approach i.e. a school going adolescent reaches an out-of-school adolescent in the community
Conclusion

• Health posts and health centers were the preferred health facilities for iron supplementation to out-of-school adolescent girls.

• Schools were the preferred facilities for iron supplementation to school attending adolescent girls.
Recommendations

• In areas where anemia in adolescent girls is high, use schools for school adolescent girls and health posts and health centers for out-of-school adolescent girls for iron supplementation

• Introduce time and energy saving technologies at the household level to address the heavy workload of adolescent girls
• Conduct operational research on the best approach (daily, weekly or intermittently) for iron supplementation for school going and out-of-school adolescent girls

• Development of health education materials for school teachers and adolescent girls
• Health education
  – Consequences of anemia
  – Advantages of iron supplementation
  – Promoting the consumption of iron–rich foods
  – Promoting the consumption of enhancers
  – Decreasing iron loss through treatment of parasitic infections
  – Decreasing parasitic infection that cause iron loss, such as hookworm and schistosomiasis
  – Prevention of malaria
  – Promotion of household technologies that improve the bioavailability of iron
  – Side effects
Acknowledgements

• The financial and technical support from Ethiopian Public Health Institute is duly acknowledged.

• The support from Mrs Aregash Samuel from EPHI, local administrators, school administrators and study participants is highly appreciated.
Thank you all for listening!