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

NNP Related Research Finding Dissemination Workshop

Oct. 23-25, 2014
Adama, 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^{th}, 75^{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 (KIIs)

- Piloting
  - Pretested among 20 adolescent school girls from Quiha
- Data analysis
  - SPSS version 20
  - Information that was collected through KIIs 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%

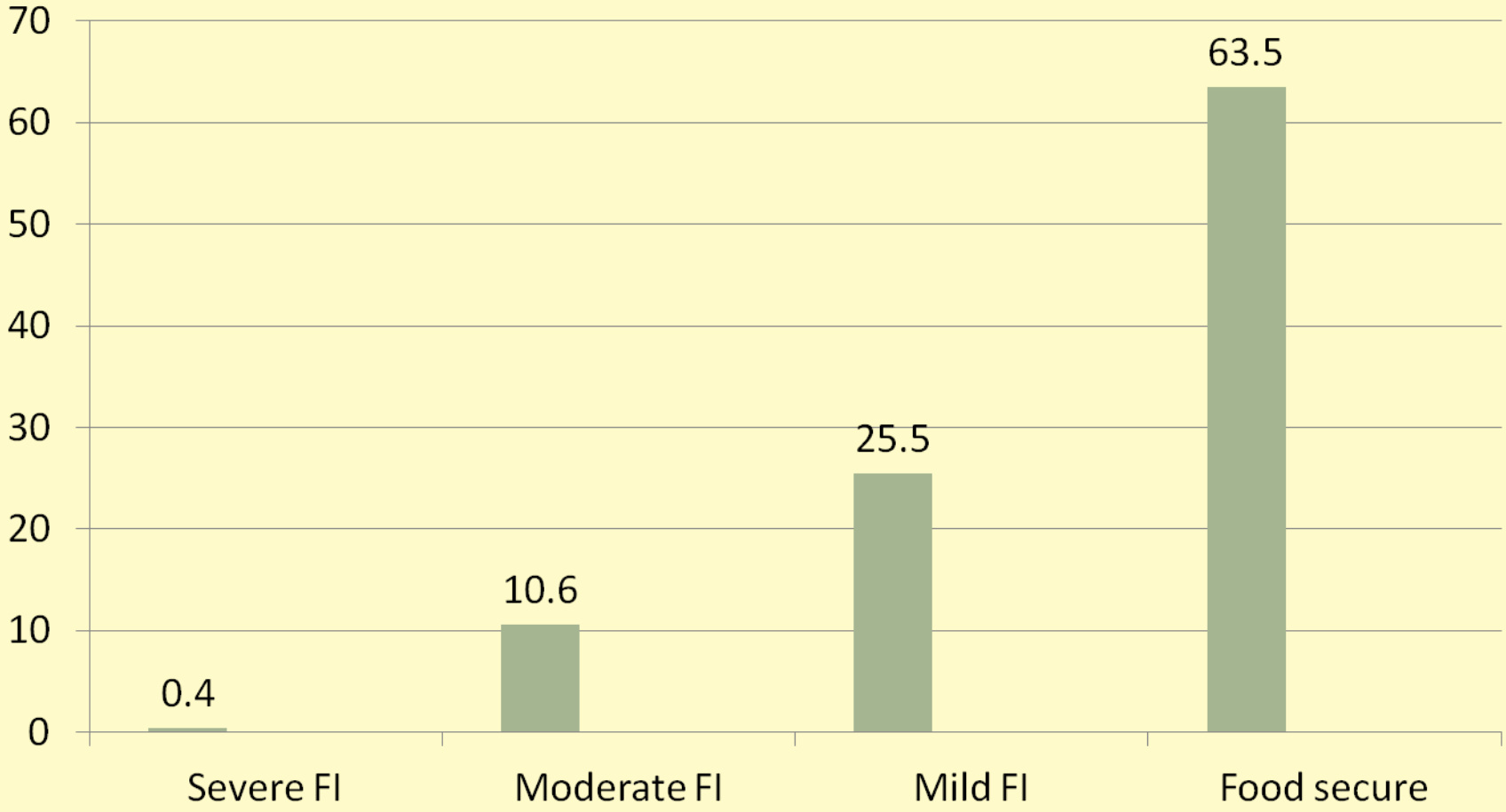
Socio-demographics

Characteristics		N	%
Age in years	15 – 17	545	65.8
	18 – 19	283	34.2
Religion	Christian	789	95.3
	Muslim	39	4.7
Education level	9th	360	62.3
	10th	77	13.3
	11th	67	11.6
	12th	74	12.8
Workload	Girls are overloaded than boys	467	56.4
	Boys are overloaded than girls	130	15.7
	Equally overloaded	231	27.9
Early marriage	No	717	86.6
	Yes	111	13.4
Family size	Mean (sd)	5.8 (1.8)	

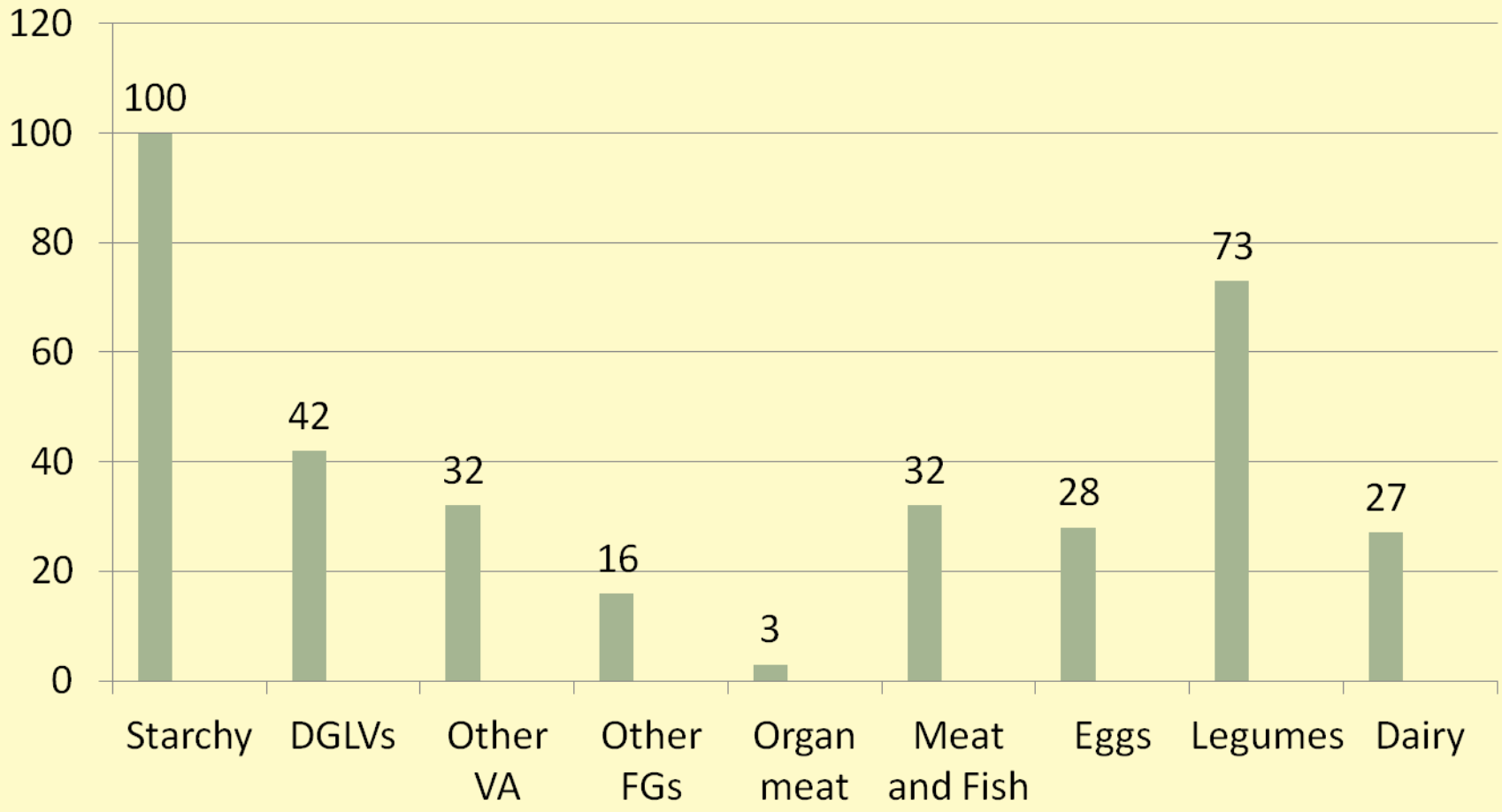
Frequency Distribution (zone/woreda)

Zone	School going		Out-of-school		Total	
	N	%	N	%	N	%
Central	88	73.3	32	26.7	120	14.5
Eastern	90	68.7	41	31.3	131	15.8
Mekelle	44	69.2	20	30.8	64	7.7
Northwest	92	75.3	39	24.7	131	15.8
Southwest	88	69.8	38	30.2	126	15.2
Southern	88	67.2	43	32.8	131	15.8
Western	88	70.4	37	29.6	125	15.1
Total	578	69.8	250	30.2	828	100

Household food insecurity (HFIAS)



Diet diversity score (DDS = 3.5)



Preferred facilities for iron supplementation in school going and out-of-school adolescent girls, 2013 (n = 828).

Setting		Out-of-school, n(%)	School going, n(%)
School*	Yes	28 (3.4)	287 (35.4)
	No	214 (26.4)	280 (35.4)
Health post*	Yes	102 (12.6)	167 (20.6)
	No	141 (17.4)	400 (49.4)
Health center*	Yes	118 (14.5)	170 (20.9)
	No	125 (15.4)	397 (49.0)
Hospital	Yes	4 (0.5)	12 (1.4)
	No	239 (29.5)	555 (68.5)

Bivariate and multivariable analysis of factors associated with perceived anemia status of the adolescent girls, 2013 (n = 828)

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

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 KIIs
    - 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!