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**Supplemental Table 1**

Intake of dietary iron vs. iron RDA†

|  |  |  |  |
| --- | --- | --- | --- |
|  | RDA1 of iron (mg/d) | (%) of population meeting RDA | Median intake of animal source iron as % of RDA |
| PSAC 1-3 y | 7 | 5.8 | 14.2 |
| PSAC 4-5 y | 10 | 2.8 | 7.1 |
| SAC 6-8 y | 10 | 10.4 | 9.2 |
| SAC 9-14 y | 9 | 16.6 | 10 |
| NPNLW 15-18 y | 15 | 0 | 6.6 |
| NPNLW 19-49 y | 18 | 0 | 5.2 |

†Institute of Medicine (IOM)(48)

**Supplemental Table 2**

Measure of serum ferritin in the study populations

|  |  |  |  |
| --- | --- | --- | --- |
|  | Serum ferritin (ng/ml) | | |
|  | n | Median | 25th,75th |
| PSAC | 468 | 31.3 | 17.5, 46.0 |
| SAC | 1281 | 49.8 | 34.4,70.6 |
| NPNLW | 886 | 54.2 | 30.3,84.3 |

**Supplemental Table 3**

Elevated CRP, AGP, unadjusted serum ferritin and iron deficiency, adjusted serum ferritin and iron deficiency

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | Elevated CRP\* | | Elevated AGP† | Iron Defciency (unadjusted) | S.Ferritin (unadjusted) | Iron Deficiency (adjusted‡) | S. Ferritin (adjusted‡) |
| PSAC | Proportion(95% CI) | | | Proportion(95% CI) | Mean(SD) | Proportion(95% CI) | Mean(SD) |
| National | 4.6 (1.8-7.5) | 28.5 (22.6-34.4) | | 9.7(5.0-14.5) | 34.4(2.1) | 10.7(5·8-15·6) | 30.3(2.0) |
| Rural | 3.5(0.4-6.7) | 28.2(20.5-35.9) | | 9.1(2.9-15.3) | 34.7 (2.0) | 9.4(3·2-15·7) | 30.9(1.9) |
| Urban | 7.8(0.9-14.7) | 27.9(21.5-34.2) | | 10.4(4.6-16.1) | 35.3(2.2) | 12.3(4·3-20·2) | 30.6(2.1) |
| Slum | 8.8 (1.7-16.1) | 37.7(25.5-49.9) | | 18.8(11.4-26.2) | 24.9 (2.3) | 27.2(19·5-34·9) | 20.7(2.3) |
| SAC |  |  | |  |  |  |  |
| National | 2.2 (0.7-3.7) | 15.3 (12.1-18.6) | | 3.9 (1.7-6.1) | 49.3(1.8) | 3.9(1·7-6·1) | 46.1(1.8) |
| Rural | 1.9 (0.01-3.9) | 14.6(11.1-18.3) | | 4.1(1.1-7.0) | 48.9(1.8) | 4.1(1·1-6·9) | 46.0(1.7) |
| Urban | 3.3 (0.06-3.3) | 18.1(9.8-26.2) | | 3.6 (1.2-5.9) | 49.4(1.8) | 3.6(1·2-5·9) | 46(1.7) |
| Slum | 1.3 (-0.02-2.9) | 14.1(8.1-19.9) | | 3.4 (1.2-5.5) | 47.9(1.8) | 3.4(1·2-5·5) | 45.6(1.8) |
| NPNLW |  |  | |  |  |  |  |
| National | 1.9(0.6-3.2) | 12.8(0.9-16.6) | | 7.5(4.7-10.3) | 50.4(2.2) | 7.1(4·2-9·9) | 50.9(2.2) |
| Rural | 0.9(-0.3-2.1) | 11.5(6.5-16.5) | | 7.3(3.8-10.8) | 50.4(2.2) | 6.7(3·1-10·2) | 50.9(2.1) |
| Urban | 5.8(1.4-10.2) | 17.8(12.5-23.1) | | 8.6(4.0-13.2) | 51.4(2.3) | 8.7(4·1-13·3) | 51.8(2.3) |
| Slum | 2.9(0.6-5.2) | 13.7(8.2-19.1) | | 7.4(3.8-11.1) | 47.0(2.1) | 7.4(3·8-11·1) | 47.4(2.1) |

\*Elevated CRP>10mg/l

†Elevated AGP>g/l

‡Adjusted: corrected for elevated CRP and AGP

**Supplemental Table 4**

Role of serum retinol, zinc, and folate on haemoglobin synthesis

|  |  |  |  |
| --- | --- | --- | --- |
| Serum micronutrients | Anemic | Non anemic | p |
| Mean(SD) | | | |
| Serum retinol (µmol/l) †‡ | 1.01(1.4) | 1.26(1.8) | 0.002 |
| Serum zinc(µmol/l) | 9.7(1.4) | 10.2(1.8) | 0.001 |
| Serum folate (nmol/l) †‡ | 4.75(1.5) | 5.36(1.7) | 0.009 |

†Log-transformed

‡Geometric mean

**Supplemental Table 5**

Serum ferritin above normal reference limit49

|  |  |  |  |
| --- | --- | --- | --- |
|  | Proportion of population with above reference limit†‡ (%) | | |
|  | All | PHGWI area | PLGWI area |
| PSAC; 6-59 mo | 69.1 | 80.5\* | 62.2 |
| SAC; 6-9 y | 51.8 | 64.1\*\* | 44.1 |

†S. ferritin of >24 ng/ml in PSAC

‡S. ferritin of >55 ng/ml in SAC

\*P=0.006; in relation to PLGWI

\*\*P=0.001; in relation to PLGWI

**Supplemental Table 6**

Underlying analyses into the multivariate regression findings determining serum ferritin

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Regression finding#1: PHGWI area was positively associated with serum ferritin in PSAC | | | | | | |  |
| Status of GWI | HH spending (US$)/month | Dietary iron intake (total)  (mg/d) | | Dietary iron intake (animal)  (mg/d) | | Serum ferritin  (ng/ml) |  |
| PHGWI area | 88.5\*\* | 3.1\* | | 0.65\*\* | | 39\*\* |  |
| PLGWI area | 109.2 | 4.1 | | 0.93 | | 21 |  |
| Regression finding#2: Urban stratum was associated with lower level of serum ferritin in SAC | | | | | | |  |
| Residence | HH spending (US$)/month | Dietary iron intake (animal)  (mg/d) | | Serum ferritin  (ng/ml) | | Usage of tube well (%) |  |
| Rural | 102.81 | 1.14\*\*\* | | 46.4\* | | 78\*\* |  |
| Urban | 125.6 | 1.28 | | 46.3 | | 70.8 |  |
| Regression finding#3:Non possession of electricity was associated with higher level of ferritin in SAC | | | | | | |  |
|  | HH spending | Dietary iron intake | | Serum ferritin | | PHGWI | PLHGI |
|  | US$/month | mg/d | | ng/ml | | (%) | (%) |
| Non possession | 83.3\*\*\*\* | 5.85\* | | 48.9\*\*\* | | 37\*\* | 25 |
| Possession | 121.9 | 6.28 | | 44.7 | |  |  |
| Regression finding#4: Moderately food insecure (ModFI) households positively determined serum ferritin in NPNLW | | | | | | |  |
| Status of HH food insecurity | HH spending (US$/month) | | Dietary iron intake (mg/d) | | Serum ferritin  (ng/ml) | |  |
| Moderately food insecure | 98.7\*\*\*\* | | 6.8\*\*\* | | 74\*\* | |  |
| Food secure | 146.1 | | 7.8 | | 61 | |  |
| Status of GWI | Prevalence of moderate and/or higher grade of household food insecurity (%) | | | | | |  |
| PHGWI area | 47\* | | | | | |  |
| PLGWI area | 23 | | | | | |  |

Regression finding#1; \*p=0.006; \*\*p<0.001

Regression finding#2; \*p=ns; \*\*p<0.05; \*\*\*P=0.001

Regression finding #3: \*p=0.05; \*\*p=0.04; \*\*\*p=0.03; \*\*\*\*p<0.001

Regression finding#4; \*p=0.03; \*\*\* p=0.01; \*\*p=0.02; \*\*\*\*p<0.001

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**Supplemental Table 7**

Underlying analyses into multivariate regression findings determining haemoglobin status

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Regression finding#1: Being a girl SAC was a negative determinant of haemoglobin status | | | | | | | |
| Sex | Dietary intake of iron (mg/d) | | | | Dietary intake of animal source vitamin A (RE/d) | | |
| Girl | 5.88\*\* | | | | 87\* | | |
| Boy | 6.40 | | | | 137 | | |
| Regression finding#2: The SAC living in urban area are likely to have higher haemoglobin than the children living in rural households | | | | | | | |
|  | | Prevalence of anaemia in 6-11 y (%) | | Dietary intake of iron (mg/d) | | | Dietary intake of vitamin A (RAE/d) |
| Urban | | 11.8\* | | 6.80\*\*\* | | | 770\*\* |
| Rural | | 21.7 | | 5.95 | | | 563 |
| Regression finding#3: Moderate & severe grades of household food insecurity did not predict lower haemoglobin in NPNLW | | | | | | | |
| Status of food insecurity | | | Dietary intake of animal source iron (mg/d) | | | Serum ferritin (ng/ml) | |
| Moderate food insecurity | | | 0.80a | | | 66b | |
| Severe food insecurity | | | 0.64 | | | 53 | |
| Food security | | | 1.38 | | | 45 | |
| Status of GWI | | | Proportion of households with (Moderate+Severe) food insecurity (%) | | | | |
| PHGWI area | | | 47c | | | | |
| PLGWI area | | | 23 | | | | |
| Regression finding#4: Intake of animal source iron was a positive determinant of haemoglobin in NPNLW | | | | | | | |
| Dietary intake of animal source iron (mg/d) | | | | | | | |
| Anemic | | | | Non-anemic | | | |
| 0.97\* | | | | 1.14 | | | |

Regression finding#1; \*p=0.01; \*\*p=0.005

Regression finding#2; \*p=0.05; \*\*p=0.002; \*\*\*p=0.001

Regression finding#3; ap<0.05(between the groups); bp<0.05 (between the groups); cp<0.05

Regression finding#4; \*p<0.001

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**Supplemental Figure 1**: Correlation analyses: Haemoglobin vs. log-serum ferritin

**Supplemental Table 8**



R=0.11; p=0.001

R=0.37; p<0.001





R=0.23; p<0.001

Groundwater iron level and iron deficiency in South East Asian countries and Bangladesh

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Thailand | Viet Nam | Cambodia | Bangladesh |
| Ground water iron (mg/l) | 7.3**†** | 2.6**§** | 3.5**§** | 11**¶** |
| Iron deficiency (%) | 4.4**‡** | 12.9**|** | 2**|** | 0**¶** |

References; †50, ‡51, §52, |53, ¶41

**Supplemental Table 9**

Sample size to estimate prevalence of anaemia and iron deficiency

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Target group | Indicator | Sample size | | 95% CI | |
| 1 stratum | 3 strata | 1 stratum | 3 strata |
| Preschool age children (PSAC) | Anaemia | 196 | 588 | ±9.9 | ±5.7 |
| Iron deficiency | ±9.9 | ±5.7 |
| Non pregnant non lactating women (NPNLW) | Anaemia | 318 | 954 | ±7.8 | ±4.5 |
| Iron deficiency | ±7.8 | ±4.5 |
| School age children (SAC) | Anaemia | 485 | 1455 | ±6.2 | ±3.6 |
| Iron deficiency | ±5.2 | ±3.0 |