**Appendix 1: Supplemental Tables and Figures**

**Supplemental Table 1: Unweighted study characteristics**

|  |  |  |
| --- | --- | --- |
| **Covariate** |  | **Remoteness Category**  |
| **Overall****(N=2053)** | **Borbón****(N=481)** | **Close****(N=652)** | **Medium****(N=347)** | **Far****(N=573)** |
| **Age (yrs)(SD)** | 42.4 (16.8) | 40.4 (15.2) | 42.3 (16.9) | 44.1 (17.8) | 43.1 (17.3) |
| **Female (%)** | 60.2% | 64.7% | 40.0% | 44.1% | 40.8% |
| **Afro-Ecuadorian (%)** | 82.1% | 59.0% | 87.0% | 83.8% | 94.8% |
| **Education (yrs)(SD)** | 5.3 (3.9) | 7.0 (4.4) | 5.2 (3.8) | 4.1 (3.3) | 4.7 (3.5) |
|  |  |  |  |  |  |
| **Men (n=818):** |  |  |  |  |  |
| **Urban occupation** | 17.4% | 51.0% | 13.1% | 5.3% | 7.4% |
| **Rural occupation** | 64.4% | 14.0% | 71.8% | 84.0% | 77.5% |
| **Height (cm)(SD)** | 167.5 (11.0) | 166.9 (10.5) | 167.0 (13.0) | 166.5 (12.3) | 160.0 (7.5) |
| **Weight (kg)(SD)** | 68.7 (11.5) | 71.1 (13.2) | 69.7 (11.8) | 65.4 (10.3) | 67.8 (9.7) |
| **BMI (SD)** | 24.4 (4.1) | 25.4 (4.3) | 24.9 (5.0) | 23.3 (3.0) | 23.8 (3.1) |
| **% Underweight** | 2.7% | 2.4% | 1.9% | 4.0% | 3.0% |
| **% Normal** | 61.7% | 50.6% | 60.1% | 69.5% | 68.7% |
| **% OW** | 26.5% | 31.0% | 27.5% | 23.8% | 24.9% |
| **% OB** | 9.1% | 16.1% | 10.5% | 2.7% | 3.4% |
|  |  |  |  |  |  |
| **Women (n=1235):** |  |  |  |  |  |
| **Height (m)(SD)** | 156.2 (10.3) | 154.9 (9.5) | 155.7 (13.1) | 156.3 (8.8) | 157.9 (7.5) |
| **Weight (kg)(SD)** | 67.7 (14.5) | 66.9 (14.3) | 68.6 (15.3) | 67.2 (14.4) | 67.9 (13.6) |
| **BMI (SD)** | 27.5 (5.3) | 27.7 (5.5) | 27.7 (5.6) | 27.6 (5.3) | 27.1 (4.8) |
| **% Underweight** | 2.4% | 2.9% | 2.7% | 2.6% | 1.8% |
| **% Normal** | 31.7% | 31.1% | 32.7% | 32.5% | 32.9% |
| **% OW** | 36.0% | 36.6% | 32.4% | 39.3% | 40.4% |
| **% OB** | 29.9% | 29.5% | 32.2% | 25.6% | 24.9% |

**Supplemental Table 2: Characteristics of children under five, stratified by remoteness status.**

|  |  |
| --- | --- |
| **Covariate** | **Remoteness Category**  |
| **Overall** | **Borbón** | **Close** | **Medium** | **Far** |  |
|  | **n=4,170** | **n = 426** | **n= 1,538** | **N=667** | **n=1,539** | **p-value for difference** |
| **Neither case or control** | 68.4% | 29.8% | 70.2% | 71.2% | 76.0% | <0.0001 |
| **Control** | 13.2% | 27.7% | 13.2% | 11.8% | 9.9% |
| **Case** | 18.4% | 42.5% | 16.6% | 16.9% | 14.1% |
|  |  |  |  |  |  |  |
| **Age (months)****Mean (SD)** | 30.5 (16.5) | 30.3 (16.1) | 29.7 (16.6) | 30.8 (16.5) | 31.1 (16.4) | 0.1412 |
| **Female (%)** | 50.4% | 49.5% | 50.5% | 52.9% | 49.6% | 0.5353 |
|  |  |  |  |  |  |  |
| **Mean HAZ** | -0.67 (1.51) | -0.85 (1.42) | -0.77 (1.51) | -0.74 (1.64) | -0.48 (1.45) | p<0.0001 |
| **% Stunted** | 15.7% | 15.5% | 18.6% | 18.6% | 11.6% | p<0.0001 |
|  |  |  |  |  |  |  |
|  | **n=3,065** | **n = 245** | **n= 1,104** | **N=500** | **n=1,216** | **p-value for difference** |
| **Mean Hb (g/dL)** | 10.8 (1.4) | 10.8 (1.2) | 10.7 (1.4) | 10.9 (1.4) | 11.0 (1.4) | p<0.0001 |
| **% Anemic** | 51.8% | 51.1% | 57.3% | 48.9% | 48.3% | 0.0002 |

**Supplemental Table 3: Association between factors related to market integration, child stunting, and child anemia**

|  |  |  |
| --- | --- | --- |
|  | **Stunting****Children (n=4,170, N=2,395)** | **Anemia****Children (n=2,873, N=1,899)** |
|  | **Unadjusted****Prevalence ratio** | **Adjusted****Prevalence ratio** | **Unadjusted****Prevalence ratio** | **Adjusted****Prevalence ratio** |
| **Sex (ref=male)** | 1.41 (1.19, 1.68)(p<0.001) | 1.40 (1.18, 1.65)(p<0.001) | 1.07 (0.97, 1.19)(p=0.165) | - |
|  |  |  |  |  |
| **Household size** | 1.01 (0.98, 1.04)(p=0.607) | - | 1.01 (0.99, 1.03)(p=0.167) | - |
| **Max HH Education (years)** | 0.97 (0.94, 0.99)(p=0.006) | - | 1.00 (0.99, 1.02)(p=0.777) | - |
| **HH assets score\*\*** | 0.78 (0.71, 0.85)(p<0.001) | 0.80 (0.73, 0.88)(p<0.001) | 0.97 (0.92, 1.02)(p=0.274) | - |
| **Adult- Urban****Occupation** | 0.88 (0.72, 1.08)(p=0.219) | 0.90 (0.73, 1.11)(p=0.316) | 1.00 (0.89, 1.13)(p=0.969) | 0.98 (0.87, 1.11)(p=0.749) |
| **Adult - Rural occupation** | 1.02 (0.85, 1.22)(p=0.864) | - | 1.00 (0.89, 1.12)(p=0.953) | - |
| **HH engaged in agriculture** | 0.82 (0.70, 0.97)(p=0.021) | - | 0.96 (0.86, 1.08)(p=0.509) | - |
|  |  |  |  |  |
| **Study year\*\*\*** | 0.95 (0.92, 0.97)(p<0.001) | 0.96 (0.93, 0.98)(p=0.002) | 1.02 (1.01, 1.04)(p=0.009) | 1.02 (1.00, 1.04)(p=0.055) |
|  |  |  |  |  |
| **Borbón** | Ref | Ref | Ref |  |
| **Close** | 1.21 (0.91, 1.62)(p=0.195) | 1.40 (1.03, 1.89)(p=0.035) | 1.12 (0.92, 1.37)(p=0.259) | - |
| **Medium** | 1.20 (0.87, 1.66)(p=0.267) | 1.40 (0.99, 1.99)(p=0.060) | 0.96 (0.77, 1.20)(p=0.704) | - |
| **Far** | 0.76 (0.56, 1.012)(p=0.071) | 0.89 (0.64, 1.23)(p=0.475) | 0.95 (0.77, 1.15)(p=0.581) | - |
|  |  |  |  |  |
| **Agricultural Diversity** | 1.03 (0.98, 1.08)(p=0.207) | 1.01(0.96, 1.07)(p=0.659) | 0.98 (0.95, 1.00)(p=0.099) | 1.00 (0.96, 1.03)(p=0.816) |

**Supplemental Table 4:**

|  |  |
| --- | --- |
|  | **Overweight/Obese** |
|  | **Unadjusted****Prevalence ratio** | **Adjusted****Prevalence ratio** |
| **Non-stunted child under 5 in HH** | ref | ref |
| **Stunted child under 5 in HH** | 0.92 (0.65, 1.29)(p=0.642) | 0.89 (0.62, 1.31)(p=0.577) |
|  |  |  |
| **Non-anemic child under 5 in HH** | ref | ref |
| **Anemic child under 5 in HH** | 1.02 (0.83, 1.26)(p=0.842) | 0.93 (0.74, 1.17)(p=0.533) |

**\*** Adjusted models are adjusted for the sex, age, age^2, and years of education of the adult, as well as study year, and relative remoteness of the household, including interaction terms between sex and study year and sex and relative remoteness. Stunting and anemia models were run separately.

**Supplemental Figure 1:**

Trends over time in the reporting of ‘rural’ and ‘urban’ job types, as well as other common job types, are shown below for all adults 22 and above. Adults 18-21 were excluded, as a substantial proportion of these individuals listed their occupation as ‘student’.

|  |  |
| --- | --- |
|  |  |
| **Men** | **Women** |

**Appendix 2: Calculation of Individual- and Household-Level Probability of Sampling**

**Individual Level**

We followed the approach previously reported by Bhavani et al(46). Briefly,

For cases, the sampling weight $w\_{ij}=1$

 For controls prior to 2008, the sampling weight $w\_{ij}=^{1}/\_{(\frac{1}{\left(H-1\right)}+\frac{1}{\left(N-1\right)})}$

For controls prior to 2008, the sampling weight $w\_{ij}=0.10$

For the jth individual in the ith household, where H is the total household size and N is the total community size. Sampling was conducted such that a case might also be selected as a control for another case.

**Household Level**

To estimate the probability that at a household would include at least one sampled adult, we identified three possibly scenarios.

* *Scenario 1: The household includes an adult case.*
	+ In this case, the probability that the household will include a sampled adult is 1 (all cases were sampled)
* *Scenario 2. At least one adult in the household was be selected as a community control (in any study cycle).*
	+ In this case, the probability that any adult in a household without a case would be sampled is estimated as:

$$P\left(at least one adult sampled\right)= 1-P\left(no adult in the HH sampled\right)$$

$$=1- \frac{\left(\genfrac{}{}{0pt}{}{N-H\_{A}}{S}\right)}{\left(\genfrac{}{}{0pt}{}{N}{S}\right)}= 1- \frac{(N-H\_{A})!(N-S)!}{N!(N-H\_{A}-S)!}$$

Where Nrepresents the total number of healthy individuals in the community (pool of potential controls), HA represents the total number of healthy adults in the household, and S represents the total number of community controls sampled over the case control period.

* *Scenario 3. The household includes a case under the age of 18 years, and at least one adult in the household was selected as a household control (2 household controls were selected for each case in study cycles 1 through 8)*
	+ The probability that at least one adult in the household will be selected as a household control is:

$P\left(at least one adult sampled as a HH control\right)$ =

$$1-P \left(no adults sampled as HH control\right)=1- \frac{\left(\genfrac{}{}{0pt}{}{H\_{t}-H\_{A}}{2}\right)}{\left(\genfrac{}{}{0pt}{}{H\_{t}}{2}\right)}$$

Where Hc = the number of healthy children in the household; HA = the number of healthy adults in the household, X= the number of cases in the household, and Hc + HA = HT  and HT + X = H

The total probability that at least one adult in the household will be sampled for any reason is therefore equal to:

$$P\left(at least one adult sampled for any reason\right)=1-P\left(no adult in household sampled for any reason\right)=1-P\left(no adult in the HH sampled as a case\right)\*(P\left(no adult in the HH sampled as a community control\right)\*P(no adult in the HH sampled as a HH cont$$