# **Supplementary Materials**

**Table S1. Characteristics of the 1,037 surveyed infants under six months of age, by study site.**

|  | **Jimma (n = 610)** | **Deder (n = 428)** | **Difference (Jimma - Deder)** |
| --- | --- | --- | --- |
|  | **mean or %** | **95% CI** | **mean or %** | **95% CI** | **difference** | **95% CI** | **p-value** |
| Household members | 5.3 | 5.1; 5.5 | 5.6 | 5.4; 5.9 | -0.33 | -0.62; -0.04 | 0.025 |
| Household children aged <18 years | 3.1 | 2.9; 3.2 | 3.4 | 3.2; 3.6 | -0.35 | -0.59; -0.11 | 0.005 |
| Household head is male (%) | 98.9 | 97.6; 99.5 | 99.1 | 97.5; 99.6 | -0.21 | -1.45; 1.04 | 0.745 |
| Household head formal education |   |  |   |  |   |  |   |
| No education (%) | 36.0 | 32.1; 40.1 | 31.1 | 26.9; 35.7 |   |  |   |
| Grade 1-8 (%) | 45.2 | 41.1; 49.4 | 45.8 | 41.1; 50.6 |   |  |   |
| Grade 9-12 (%) | 10.7 | 8.40; 13.5 | 18.3 | 14.9; 22.3 |   |  |   |
| Technical and Vocational Education (%) | 0.70 | 0.30; 1.90 | 0.50 | 0.10; 1.90 |   |  |   |
| College/University (%) | 7.40 | 5.50; 9.90 | 4.30 | 2.70; 6.70 |   |  |   |
| Mother as main Caregiver (%) | 98.9 | 97.6; 99.5 | 99.8 | 98.3; 100 | -0.91 | -1.87; 0.05 | 0.063 |
| Grandparent help in infant care (%) | 32.1 | 28.5; 35.9 | 41.1 | 36.5; 45.8 | -9.00 | -15.0; -3.03 | 0.003 |
| Mother/Caregiver age (years) | 25.7 | 25.2; 26.1 | 26.2 | 25.7; 26.7 | -0.52 | -1.20; 0.15 | 0.127 |
| Mother/Caregiver is married (%) | 98.7 | 97.4; 99.3 | 99.1 | 97.5; 99.6 | -0.37 | -1.66; 0.92 | 0.572 |
| Mother/Caregiver age at marriage (years) | 18.0 | 17.8; 18.2 | 16.6 | 16.4; 16.8 | 1.42 | 1.13; 1.70 | <0.001 |
| Time married (years) | 7.66 | 7.22; 8.11 | 9.54 | 9.01; 10.1 | -1.88 | -2.57; -1.18 | <0.001 |
| Mother/Caregiver formal education |   |  |   |  |   |  |   |
| No education (%) | 38.5 | 34.7; 42.4 | 44.4 | 39.7; 49.1 |   |  |   |
| Grade 1-8 (%) | 44.2 | 40.3; 48.2 | 48.1 | 43.4; 52.9 |   |  |   |
| Grade 9-12 (%) | 11.5 | 9.16; 14.2 | 5.87 | 3.99; 8.54 |   |  |   |
| Technical and Vocational Education (%) | 1.80 | 1.00; 3.22 | 0.47 | 0.12; 1.86 |   |  |   |
| College/University (%) | 4.09 | 2.78; 5.99 | 1.17 | 0.49; 2.79 |   |  |   |
| Mother/Caregiver religion |   |  |   |  |   |  |   |
| Muslim (%) | 92.5 | 90.1; 94.3 | 96.7 | 94.5; 98.0 |   |  |   |
| Orthodox Christian (%) | 5.60 | 4.00; 7.70 | 3.30 | 2.00; 5.50 |   |  |   |
| Protestant (%) | 1.80 | 1.00; 3.20 | 0.00 | 0.00; 0.00 |   |  |   |
| Refused to answer (%) | 0.20 | 0.00; 1.20 | 0.00 | 0.00; 0.00 |   |  |   |
| Infant's age (weeks) | 12.4 | 11.9; 12.9 | 14.8 | 14.3; 15.4 | -2.46 | -3.20; -1.72 | <0.001 |
| Infant is male (%) | 54.5 | 50.5; 58.4 | 56.6 | 51.8; 61.2 | -2.07 | -8.22; 4.08 | 0.509 |
| Infant is singleton (%) | 98.4 | 97.0; 99.1 | 98.8 | 97.2; 99.5 | -0.46 | -1.90; 0.97 | 0.527 |
| Siblings aged <18 years | 2.0 | 1.8; 2.1 | 2.4 | 2.2; 2.6 | -0.47 | -0.72; -0.22 | <0.001 |
| Infant's birth order |   |  |   |  |   |  |   |
| 1st (%) | 27.7 | 24.3; 31.4 | 21.1 | 17.5; 25.3 |   |  |   |
| 2nd (%) | 22.8 | 19.6; 26.3 | 17.6 | 14.3; 21.5 |   |  |   |
| 3rd (%) | 14.9 | 12.3; 18.0 | 15.3 | 12.1; 19.0 |   |  |   |
| 4th (%) | 11.1 | 8.87; 13.9 | 13.9 | 10.9; 17.5 |   |  |   |
| 5th (%) | 10.3 | 8.13; 13.0 | 12.7 | 9.84; 16.2 |   |  |   |
| 6th+ (%) | 13.3 | 10.8; 16.2 | 19.5 | 16.0; 23.5 |   |  |   |
| Recent death of sibling (%) | 11.6 | 9.30; 14.4 | 19.5 | 16.0; 23.5 | -7.84 | -12.39; -3.30 | 0.001 |
| Infant ever breastfed (%) | 98.4 | 97.0; 99.1 | 99.8 | 98.4; 100 | -1.4 | -2.51; -0.29 | 0.013 |
| Infant received breastmilk as first food (%) | 98.0 | 96.6; 98.9 | 93.2 | 90.4; 95.2 | 4.84 | 2.21; 7.48 | <0.001 |
| Infant was breastfed in the past 24 hrs (%) | 94.6 | 92.5; 96.1 | 93.4 | 90.6; 95.4 | 1.17 | -1.79; 4.13 | 0.438 |
| Breastfeeding frequency in past 24 hrs (times) | 10.5 | 10.2; 10.8 | 10.4 | 10.1; 10.6 | 0.11 | -0.24; 0.47 | 0.534 |
| Infant exclusively breastfed (%) | 46.8 | 42.9; 50.8 | 51.9 | 47.1; 56.6 | -5.07 | -11.3; 1.12 | 0.108 |
| Infant was bottle-fed (%) | 13.4 | 10.9; 16.4 | 17.8 | 14.5; 21.8 | -4.42 | -8.96; 0.12 | 0.056 |
| Infant fed any solid, semi-solid or soft foods (%) | 1.64 | 0.88; 3.02 | 2.58 | 1.43; 4.60 | -0.95 | -2.76; 0.87 | 0.306 |
| Bilateral pitting oedema (%) | 1.15 | 0.55; 2.39 | 0.00 | 0.00; 0.00 | 1.15 | 0.30; 1.99 | 0.008 |
| Weight (kg) | 5.58 | 5.48; 5.68 | 5.68 | 5.57; 5.80 | -0.1 | -0.26; 0.05 | 0.185 |
| Length (cm) | 59.1 | 58.8; 59.5 | 60.4 | 59.9; 60.8 | -1.24 | -1.82; -0.67 | <0.001 |
| Mid-upper arm circumference (cm) | 12.5 | 12.4; 12.6 | 12.4 | 12.3; 12.5 | 0.05 | -0.10; 0.21 | 0.487 |
| Triceps skinfold (mm) | 7.9 | 7.7; 8.0 | 7.6 | 7.4; 7.7 | 0.27 | 0.06; 0.48 | 0.011 |
| Subscapular skinfold (mm) | 7.1 | 7.0; 7.3 | 6.3 | 6.1; 6.4 | 0.86 | 0.67; 1.04 | <0.001 |
| Head circumference (cm) | 40.0 | 39.8; 40.2 | 40.8 | 40.6; 41.1 | -0.79 | -1.09; -0.49 | <0.001 |
| Knee-to-heel length (mm) | 147 | 146; 148 | 149 | 148; 151 | -2.39 | -4.14; -0.64 | 0.007 |
| Weight-for-age z-score (WAZ) | -0.47 | -0.57; -0.37 | -0.89 | -1.01; -0.77 | 0.42 | 0.26; 0.58 | <0.001 |
| Length-for-age z-score (LAZ) | -0.28 | -0.38; -0.18 | -0.44 | -0.58; -0.31 | 0.17 | -0.01; 0.34 | 0.059 |
| Weight-for-length z-score (WLZ) | -0.31 | -0.40; -0.22 | -0.7 | -0.83; -0.58 | 0.39 | 0.23; 0.54 | <0.001 |
| Wasted (%) | 7.45 | 5.61; 9.84 | 15.7 | 12.6; 19.5 | -8.28 | -12.3; -4.23 | <0.001 |
| Stunted (%) | 7.54 | 5.69; 9.93 | 12.9 | 10.0; 16.4 | -5.31 | -9.11; -1.50 | 0.006 |
| Underweight (%) | 10.4 | 8.2; 13.1 | 16.4 | 13.2; 20.3 | -6.00 | -10.3; -1.72 | 0.006 |
| Underweight, stunted and wasted was defined as WAZ, LAZ and WLZ <-2, respectively. |

**Table S2.** **Proportion of infants aged under 6 months with and without CIAF overlapping with low MUAC or underweight.**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | **0-5 weeks** | **6-10 weeks** | **11-15 weeks** | **16-20 weeks** | **21-25 weeks** |
|  | **n = 18** | **n = 57** | **n = 58** | **n = 59** | **n = 31** |
| **Infants with CIAF** | **%** | **95% CI** | **%** | **95% CI** | **%** | **95% CI** | **%** | **95% CI** | **%** | **95% CI** |
| MUAC <10.5cm | 61.1 | 37.6; 80.4 | 17.5 | 9.68; 29.7 | 15.5 | 8.25; 27.3 | 10.2 | 4.62; 20.9 | 6.45 | 1.60; 22.6 |
| MUAC <11.0cm | 72.2 | 47.8; 88.1 | 42.1 | 30.0; 55.2 | 25.9 | 16.2; 38.6 | 18.6 | 10.6; 30.7 | 16.1 | 6.82; 33.6 |
| MUAC <11.0cm if <17 weeks, <11.5 thereafter | 72.2 | 47.8; 88.1 | 42.1 | 30.0; 55.2 | 25.9 | 16.2; 38.6 | 23.7 | 14.6; 36.2 | 32.3 | 18.2; 50.4 |
| MUAC <11.0cm if <13 weeks, <11.5 thereafter | 72.2 | 47.8; 88.1 | 42.1 | 30.0; 55.2 | 34.5 | 23.4; 47.6 | 23.7 | 14.6; 36.2 | 32.3 | 18.2; 50.4 |
| MUAC <11.0cm if <7 weeks, <11.5 thereafter | 72.2 | 47.8; 88.1 | 61.4 | 48.2; 73.1 | 39.7 | 27.9; 52.7 | 23.7 | 14.6; 36.2 | 32.3 | 18.2; 50.4 |
| MUAC <11.0cm if <6 weeks, <11.5 thereafter | 72.2 | 47.8; 88.1 | 61.4 | 48.2; 73.1 | 39.7 | 27.9; 52.7 | 23.7 | 14.6; 36.2 | 32.3 | 18.2; 50.4 |
| MUAC <11.5cm | 88.9 | 64.3; 97.3 | 61.4 | 48.2; 73.1 | 39.7 | 27.9; 52.7 | 23.7 | 14.6; 36.2 | 32.3 | 18.2; 50.4 |
| Underweight | 38.9 | 19.6; 62.4 | 64.9 | 51.7; 76.2 | 51.7 | 39.0; 64.3 | 67.8 | 54.9; 78.5 | 61.3 | 43.3; 76.7 |
| **Infants without CIAF** | **n = 75** | **n = 210** | **n = 227** | **n = 184** | **n = 109** |
| MUAC <10.5cm | 40.0 | 29.5; 51.6 | 0.48 | 0.07; 3.33 | 0.00 | 0.00; 0.00 | 0.00 | 0.00; 0.00 | 0.00 | 0.00; 0.00 |
| MUAC <11.0cm | 64.0 | 52.4; 74.1 | 3.33 | 1.59; 6.85 | 0.00 | 0.00; 0.00 | 0.00 | 0.00; 0.00 | 0.00 | 0.00; 0.00 |
| MUAC <11.0cm if <17 weeks, <11.5 thereafter | 64.0 | 52.4; 74.1 | 3.33 | 1.59; 6.85 | 0.00 | 0.00; 0.00 | 0.00 | 0.00; 0.00 | 0.00 | 0.00; 0.00 |
| MUAC <11.0cm if <13 weeks, <11.5 thereafter | 64.0 | 52.4; 74.1 | 3.33 | 1.59; 6.85 | 0.88 | 0.22; 3.47 | 0.00 | 0.00; 0.00 | 0.00 | 0.00; 0.00 |
| MUAC <11.0cm if <7 weeks, <11.5 thereafter | 64.0 | 52.4; 74.1 | 9.52 | 6.21; 14.3 | 3.08 | 1.47; 6.34 | 0.00 | 0.00; 0.00 | 0.00 | 0.00; 0.00 |
| MUAC <11.0cm if <6 weeks, <11.5 thereafter | 64.0 | 52.4; 74.1 | 14.8 | 10.6; 20.3 | 3.08 | 1.47; 6.34 | 0.00 | 0.00; 0.00 | 0.00 | 0.00; 0.00 |
| MUAC <11.5cm | 80.0 | 69.3; 87.7 | 14.8 | 10.6; 20.3 | 3.08 | 1.47; 6.34 | 0.00 | 0.00; 0.00 | 0.00 | 0.00; 0.00 |
| Underweight | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| CIAF: Composite Index of Anthropometric Failure. MUAC: Mid-Upper Arm Circumference. |

**Table S3. Proportion of CIAF categories overlapping with low MUAC.**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | **Wasted only** | **Wasted & Underweight** | **Wasted, Stunted & Underweight** | **Stunted & Underweight** | **Stunted only** | **Underweight only** |
|  | **n = 53** | **n = 46** | **n = 13** | **n = 51** | **n = 37** | **n = 23** |
| **Indicator** | **%** | **95% CI** | **%** | **95% CI** | **%** | **95% CI** | **%** | **95% CI** | **%** | **95% CI** | **%** | **95% CI** |
| MUAC <10.5cm | 9.40 | 3.98; 20.8 | 17.4 | 8.94; 31.1 | 46.2 | 22.3; 71.9 | 31.4 | 20.2; 45.3 | 2.70 | 0.38; 16.9 | 8.70 | 2.18; 28.9 |
| MUAC <11.0cm | 11.3 | 5.17; 23.0 | 34.8 | 22.5; 49.5 | 69.2 | 40.9; 88.0 | 52.9 | 39.4; 66.1 | 8.11 | 2.63; 22.3 | 30.4 | 15.2; 51.6 |
| MUAC <11.0cm if <17 weeks, <11.5 thereafter | 11.3 | 5.17; 23.0 | 43.5 | 30.0; 58.0 | 92.3 | 60.9; 98.9 | 54.9 | 41.2; 67.9 | 8.11 | 2.63; 22.3 | 30.4 | 15.2; 51.6 |
| MUAC <11.0cm if <13 weeks,<11.5 thereafter | 11.3 | 5.17; 23.0 | 50.0 | 35.9; 64.1 | 92.3 | 60.9; 98.9 | 56.9 | 43.1; 69.7 | 8.11 | 2.63; 22.3 | 34.8 | 18.4; 55.7 |
| MUAC <11.0cm if <7 weeks,<11.5 thereafter | 20.8 | 11.9; 33.7 | 56.5 | 42.0; 70.0 | 92.3 | 60.9; 98.9 | 64.7 | 50.8; 76.5 | 8.11 | 2.63; 22.3 | 43.5 | 25.2; 63.7 |
| MUAC <11.0cm if <6 weeks,<11.5 thereafter | 20.8 | 11.9; 33.7 | 56.5 | 42.0; 70.0 | 92.3 | 60.9; 98.9 | 64.7 | 50.8; 76.5 | 8.11 | 2.63; 22.3 | 43.5 | 25.2; 63.7 |
| MUAC <11.5cm | 24.5 | 14.8; 37.8 | 58.7 | 44.1; 71.9 | 92.3 | 60.9; 98.9 | 64.7 | 50.8; 76.5 | 8.11 | 2.63; 22.3 | 43.5 | 25.2; 63.7 |
| CIAF: Composite Index of Anthropometric Failure. MUAC: Mid-Upper Arm Circumference. |