Table S1. Socio-demographic characteristics – semi-urban hospitals

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Variablesa | Nyantende  *n*=51 | Ciriri  *n*=288 | Totalb  *N*=339 | *P*-valuec | Effect size |
| *Socio-demographic characteristics of the mother* |  |  |  |  |  |
| Age of the mothers (years)  < 25 years  25 to 29 years  30 to 34 years  ≥ 35 years | *n*=51  25.0  (22.0, 29.0)  23 (45.1)  16 (31.4)  5 (9.8)  7 (13.7) | *n*=279  26.0 (22.0, 32.0)  111 (39.8)  73 (26.2)  48 (17.2)  47 (16.8) | *n*=330  26.0  (22.0, 32.0)  134 (40.6)  89 (27.0)  53 (16.1)  54 (16.4) | 0.435‡  0.483 | 0.043  0.086 |
| Religion  Christian: catholic  Christian: protestant, revival church  Other: Christian denomination, natural religion, no church | *n*=51  32 (62.7)  14 (27.5)  5 (9.8) | *n*=285  174 (61.1)  104 (36.5)  7 (2.5) | *n*=336  206 (61.3)  118 (35.1)  12 (3.6) | **0.031†** | **0.150** |
| Marital status  Married, living together with husband  Married, husband living elsewhere  Divorced  Living with a partner without marriage  Single | *n*=49  16 (32.7)  1 (2.0)  0 (0.0)  32 (65.3)  0 (0.0) | *n*=285  106 (37.2)  2 (0.7)  4 (1.4)  172 (60.4)  1 (0.4) | *n*=334  122 (36.5)  3 (0.9)  4 (1.2)  204 (61.1)  1 (0.3) | 0.595† | 0.079 |
| Education level  Never attended school  Attended school < 3 years  Elementary level (attended school 3-6 years)  Secondary level (attended school 7-12 years)  Higher level of education | *n*=51  6 (11.8)  6 (11.8)  22 (43.1)  17 (33.3)  0 (0.0) | *n*=286  24 (8.4)  14 (4.9)  101 (35.3)  144 (50.3)  3 (1.0) | *n*=337  30 (8.9)  20 (5.9)  123 (36.5)  161 (47.8)  3 (0.9) | 0.087† | 0.153 |
| Main occupation  Farmer (own farm)  Farmer (farm of someone else)  Small business  Other job (employed / self-employed)  Without employment  Student | *n*=51  15 (29.4)  8 (15.7)  4 (7.8)  5 (9.8)  19 (37.3)  0 (0.0) | *n*=284  0 (0.0)  0 (0.0)  95 (33.5)  22 (7.7)  165 (58.1)  2 (0.7) | *n*=335  15 (4.5)  8 (2.4)  99 (29.6)  27 (8.1)  184 (54.9)  2 (0.6) | **0.000†** | **0.650** |
| *Characteristics of the index infant* |  |  |  |  |  |
| Age (days) | *n*=51  2.0 (2.0, 3.0) | *n*=288  3.0 (2.0, 4.0) | *n*=339  3.0 (2.0, 4.0) | **0.000‡** | 0.241 |
| Sex  Male  Female | *n*=51  25 (49.0)  26 (51.0) | *n*=288  149 (51.7)  139 (48.3) | *n*=339  174 (51.3)  165 (48.7) | 0.721 | 0.019 |

aCategorical variables are expressed as n (%) and continuous variables are expressed as mean ± SD / median (IQR).  
bTotal frequencies represent total number of participants, frequencies per variable include all respectively valid cases; lack of corresponding sum of frequencies with total sample size is due to missing data.  
cSignificantly different at P-value <0.05 (in bold); *P*-value was derived using t-test for continuous variables and chi-square analysis for categorical variables.  
†Fisher’s exact test.  
‡Mann-Whitney U test**.**

Table S2. Household characteristics – semi-urban hospitals

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Variablesa | Nyantende  *n*=51 | Ciriri  *n*=288 | Totalb  *N*=339 | *P*-valuec | Effect size |
| Head of household  Male  Female | *n*=51  49 (96.1)  2 (3.9) | *n*=287  280 (97.6)  7 (2.4) | *n*=338  329 (97.3)  9 (2.7) | 0.630† | 0.033 |
| Number of household members  1-4  5-9  ≥ 10 | *n*=51  6.0 (5.0, 7.0)  11 (21.6)  37 (72.5)  3 (5.9) | *n*=285  6.0 (4.0, 8.0)  72 (25.3)  160 (56.1)  53 (18.6) | *n*=336  6.0 (5.0, 8.0)  83 (24.7)  197 (58.6)  56 (16.7) | 0.323‡  **0.040** | 0.054  **0.138** |
| Number of children per household  1-2  3-8  ≥ 9 | *n*=51  4.0 (3.0, 5.0)  86 (25.6)  221 (65.8)  29 (8.6) | *n*=285  4.0 (2.0, 6.0)  45 (34.4)  76 (58.0)  10 (7.6) | *n*=336  4.0 (2.0, 6.0)  86 (25.6)  221 (65.8)  29 (8.6) | 0.340‡  0.167 | 0.052  0.088 |
| Main source of income *(multiple answers possible)\**  Job of the husband  Job of the mother  Own farm  Job of another family member  Other | *n*=49  40 (81.6)  17 (34.7)  8 (16.3)  0 (0.0)  1 (2.0) | *n*=275  242 (88.0)  115 (41.8)  2 (0.7)  9 (3.3)  1 (0.4) | *n*=324  282 (87.0)  132 (40.7)  10 (3.1)  9 (2.8)  2 (0.6) | 0.222  0.350  **0.000†**  0.365†  0.280† | 0.068  0.052  0.323  0.071  0.077 |
| Food sources *(multiple answers possible)\**  Local market  Own agricultural land  Own vegetable garden  Own livestock  Other | *n*=51  48 (94.1)  24 (47.1)  28 (54.9)  0 (0.0)  0 (0.0) | *n*=285  284 (99.6)  23 (8.1)  49 (17.2)  0 (0.0)  1 (0.4) | *n*=336  332 (98.8)  47 (14.0)  77 (22.9)  0 (0.0)  1 (0.3) | **0.012†**  **0.000**  **0.000**  -  1.000† | **0.183**  **0.403**  **0.322**  -  0.023 |

aCategorical variables are expressed as n (%) and continuous variables are expressed as mean ± SD / median (IQR).  
bTotal frequencies represent total number of participants, frequencies per variable include all respectively valid cases; lack of corresponding sum of frequencies with total sample size is due to missing data.  
cSignificantly different at P-value <0.05 (in bold); *P*-value was derived using t-test for continuous variables and chi-square analysis for categorical variables.  
†Fisher’s exact test.  
‡Mann-Whitney U test.\*Globally significant after adjustment by Bonferroni.

Table S3. Parity and family planning – semi-urban hospitals

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Variablesa | Nyantende  *n*=51 | Ciriri  *n*=288 | Totalb  *N*=339 | *P*-valuec | Effect size |
| *Parity* |  |  |  |  |  |
| Number of pregnancies (including the newborn) | *n*=51  3.0 (2.0, 5.0) | *n*=282  4.0 (2.0, 7.0) | *n*=333  4.0 (2.0, 6.5) | 0.595‡ | 0.029 |
| Number of children born alive (including the newborn) | *n*=51  3.0 (2.0, 5.0) | *n*=281  3.0 (2.0, 6.0) | *n*=332  3.0 (2.0, 6.0) | 0.478‡ | 0.039 |
| Birth space between the last pregnancies  9-12 months  1-2 years  2-3 years  > 3 years  Not relevant (primipara) | *n*=50  1 (2.0)  22 (44.0)  17 (34.0)  1 (2.0)  9 (18.0) | *n*=285  12 (4.2)  115 (40.4)  88 (30.9)  15 (5.3)  55 (19.3) | *n*=335  13 (3.9)  137 (40.9)  105 (31.3)  16 (4.8)  64 (19.1) | 0.890† | 0.073 |
| *Family planning* |  |  |  |  |  |
| Knowing any benefit / importance of family planning  Yes  No | *n*=48  33 (68.8)  15 (31.3) | *n*=277  214 (77.3)  63 (22.7) | *n*=325  247 (76.0)  78 (24.0) | 0.203 | 0.071 |
| Importance of family planning *(multiple answers possible)\**  Planned pregnancy  Health benefits for mother  Economically beneficial  Fight malnutrition  Child spacing  Other  Do not know | *n*=48  19 (39.6)  7 (14.6)  4 (8.3)  2 (4.2)  3 (6.3)  1 (2.1)  15 (31.3) | *n*=277  137 (49.5)  140 (50.5)  82 (29.6)  65 (23.5)  20 (7.2)  5 (1.8)  63 (22.7) | *n*=449  156 (48.0)  147 (45.2)  86 (26.5)  67 (20.6)  23 (7.1)  6 (1.8)  78 (24.0) | 0.206  **0.000**  **0.002**  **0.002**  1.000†  1.000†  0.203 | 0.070  **0.256**  **0.171**  **0.169**  0.013  0.007  0.071 |
| Knowledge about contraceptive methods  Yes  No | *n*=49  6 (12.2)  43 (87.8) | *n*=281  73 (26.0)  208 (74.0) | *n*=330  79 (23.9)  251 (76.1) | **0.038** | **0.114** |
| Contraceptive methods known *(multiple answers possible)*  Observation of the cycle  Three-month injection  Birth control pill  Lactational amenorrhea  Condom  Intrauterine device  Implant  Do not know | *n*=49  2 (4.1)  2 (4.1)  1 (2.0)  0 (0.0)  0 (0.0)  0 (0.0)  0 (0.0)  1 (2.0) | *n*=279  40 (14.3)  24 (8.6)  25 (9.0)  3 (1.1)  2 (0.7)  2 (0.7)  1 (0.4)  2 (0.7) | *n*=328  42 (12.8)  26 (7.9)  26 (7.9)  3 (0.9)  2 (0.6)  2 (0.6)  1 (0.3)  3 (0.9) | **0.048**  0.395†  0.148†  1.000†  1.000†  1.000†  1.000†  0.386† | **0.109**  0.060  0.091  0.040  0.033  0.033  0.023  0.050 |
| Practiced family planning  Yes  No | *n*=49  2 (4.1)  47 (95.9) | *n*=284  55 (19.4)  229 (80.6) | *n*=333  57 (17.1)  276 (82.9) | **0.009** | **0.144** |

aCategorical variables are expressed as n (%) and continuous variables are expressed as mean ± SD / median (IQR).  
bTotal frequencies represent total number of participants, frequencies per variable include all respectively valid cases; lack of corresponding sum of frequencies with total sample size is due to missing data.  
cSignificantly different at P-value <0.05 (in bold); *P*-value was derived using t-test for continuous variables and chi-square analysis for categorical variables.  
†Fisher’s exact test.  
‡Mann-Whitney U test.  
\*Globally significant after adjustment by Bonferroni.

Table S4. Health issues during pregnancy (self-reported) – semi-urban hospitals

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Variablesa | Nyantende  *n*=51 | Ciriri  *n*=288 | Totalb  *N*=339 | *P*-valuec | Effect size |
| Health problem during pregnancy  Yes  No | *n*=51  24 (47.1)  27 (52.9) | *n*=286  51 (17.8)  235 (82.2) | *n*=337  75 (22.3)  262 (77.7) | **0.000** | **0.252** |
| Health problem during pregnancy / perinatal *(multiple answers possible)*  Malaria  Urinary / genital / uro-genital infection  Hemorrhage  Threat of premature delivery / abortion  Infection (not precised)  Nausea  Hypertension  Other | *n*=23  12 (52.2)  1 (4.3)  1 (4.3)  4 (17.4)  5 (21.7)  0 (0.0)  0 (0.0)  2 (8.7) | *n*=51  18 (35.3)  11 (21.6)  7 (13.7)  5 (9.8)  1 (2.0)  3 (5.9)  1 (2.0)  9 (17.6) | *n*=74  30 (40.5)  12 (16.2)  8 (10.8)  9 (12.2)  6 (8.1)  3 (4.1)  1 (1.4)  11 (14.9) | 0.171  0.090†  0.422†  0.446†  **0.010†**  0.548†  1.000†  0.485† | 0.159  0.216  0.140  0.107  **0.335**  0.138  0.079  0.116 |
| Trimester of health problem during pregnancy *(multiple answers possible)*  First  Second  Third | *n*=24  9 (37.5)  14 (58.3)  7 (29.2) | *n*=51  19 (37.3)  27 (52.9)  17 (33.3) | *n*=75  28 (37.3)  41 (54.7)  24 (32.0) | 0.984  0.662  0.718 | 0.002  0.051  0.042 |
| Visit of a health facility at health problem during pregnancy  Yes  No | *n*=23  20 (87.0)  3 (13.0) | *n*=51  41 (80.4)  10 (19.6) | *n*=74  61 (82.4)  13 (17.6) | 0.743† | 0.080 |
| Taking medicine at health problem during pregnancy  Yes  No | *n*=21  20 (95.2)  1 (4.8) | *n*=44  43 (97.7)  1 (2.3) | *n*=65  63 (96.9)  2 (3.1) | 0.545† | 0.067 |
| Medication during pregnancy  Yes  No | *n*=42  41 (97.6)  1 (2.4) | *n*=280  256 (91.4)  24 (8.6) | *n*=322  297 (92.2)  25 (7.8) | 0.223† | 0.078 |
| Type of medication during pregnancy *(multiple answers possible)\**  Antimalarial drugs (*n*=447)  Deworming (*n*=446)  Antibiotics, antifungal (*n*=450)  Pain killer (*n*=448)  Pregnancy-related medication (*n*=447)  Vaccination (*n*=446)  Treatment of nausea (*n*=446)  Other (n=446) | *n*=36-40  35 (94.6)  29 (80.6)  10 (25.0)  3 (7.9)  3 (8.1)  2 (5.6)  0 (0.0)  0 (0.0) | *n*=280  246 (87.9)  250 (89.3)  12 (4.3)  11 (3.9)  10 (3.6)  0 (0.0)  2 (0.7)  6 (2.1) | *n*=316-320  281 (88.6)  279 (88.3)  22 (6.9)  14 (4.4)  13 (4.1)  2 (0.6)  2 (0.6)  6 (1.9) | 0.282†  0.163†  **0.000†**  0.227†  0.184†  **0.013†**  1.000†  1.000† | 0.068  0.086  **0.271**  0.063  0.073  **0.223**  0.029  0.050 |
| Diagnosis of anemia during pregnancy  Yes  No | *n*=51  3 (5.9)  48 (94.1) | *n*=287  9 (3.1)  278 (96.9) | *n*=338  12 (3.6)  326 (96.4) | 0.401† | 0.053 |
| Vision problems at dawn during pregnancy  Yes  No | *n*=51  2 (3.9)  49 (96.1) | *n*=286  20 (7.0)  266 (93.0) | *n*=337  22 (6.5)  315 (93.5) | 0.550† | 0.045 |
| Vision problems at daytime during pregnancy  Yes  No | *n*=51  1 (2.0)  50 (98.0) | *n*=282  22 (7.8)  260 (92.2) | *n*=333  23 (6.9)  310 (93.1) | 0. 225† | 0.083 |
| Use of mosquito net during pregnancy  Yes  No | *n*=51  46 (90.2)  5 (9.8) | *n*=287  258 (89.9)  29 (10.1) | *n*=338  304 (89.9)  34 (10.1) | 0.948 | 0.004 |

aCategorical variables are expressed as n (%).  
bTotal frequencies represent total number of participants, frequencies per variable include all respectively valid cases; lack of corresponding sum of frequencies with total sample size is due to missing data.  
cSignificantly different at P-value <0.05 (in bold); *P*-value was derived using chi-square analysis for categorical variables.  
†Fisher’s exact test.  
\*Globally significant after adjustment by Bonferroni.

Table S5. Modalities of delivery and initiation of breastfeeding – semi-urban hospitals

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Variablesa | Nyantende  *n*=51 | Ciriri  *n*=288 | Totalb  *n*=339 | *P*-valuec | Effect size |
| Mode of delivery  Vaginal  Cesarean section | *n*=51  42 (82.4)  9 (17.6) | *n*=288  207 (71.9)  81 (28.1) | *n*=339  249 (73.5)  90 (26.5) | 0.118 | 0.118 |
| Time of cord clamping  Early cord clamping (≤ 1 min after birth)  Late cord clamping (≥ 2 min after birth, recommended) | *n*=51  2 (3.9)  49 (96.1) | *n*=286  15 (5.2)  271 (94.8) | *n*=337  17 (5.0)  320 (95.0) | 1.000† | 0.022 |
| Initiation of breastfeeding  1st hour after birth  2-6 hours after birth  7-12 hours after birth  13-24 hours after birth  2-3 days after birth  Not yet | *n*=50  46 (92.0)  4 (8.0)  0 (0.0)  0 (0.0)  0 (0.0)  0 (0.0) | *n*=287  270 (94.1)  16 (5.6)  1 (0.3)  0 (0.0)  0 (0.0)  0 (0.0) | *n*=337  316 (93.8)  20 (5.9)  1 (0.3)  0 (0.0)  0 (0.0)  0 (0.0) | 0.588† | 0.043 |

aCategorical variables are expressed as n (%).  
bTotal frequencies represent total number of participants, frequencies per variable include all respectively valid cases; lack of corresponding sum of frequencies with total sample size is due to missing data.  
cSignificantly different at P-value <0.05 (in bold); *P*-value was derived using chi-square analysis for categorical variables.  
†Fisher’s exact test.

Table S6. Anthropometrics – semi-urban hospitals

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Variablesa | Nyantende  *n*=51 | Ciriri  *n*=288 | Totalb  *n*=339 | *P*-valuec | Effect size |
| *Mothers’ nutritional status (first week postpartum)* | | | | | |
| MUAC (cm) | *n*=51  26.2 (25.3, 28.1) | *n*=288  26.8 (24.6, 29.0) | *n*=339  26.7 (24.6, 29.0) | 0.986‡ | 0.001 |
| *Index infants’ nutritional status at birth* |  |  |  |  |  |
| Birth weight (g) | *n*=51  3194 ± 444 | *n*=288  3275 ± 443 | *n*=339  3263 ± 444 | 0.226 | -0.184 |
| Low birth weight\*  Yes  No | *n*=51  3 (5.9)  48 (94.1) | *n*=288  6 (2.1)  282 (97.9) | *n*=339  9 (2.7)  330 (97.3) | 0.139† | 0.084 |
| Weight per gestational age z-score | *n*=43  -0.2 ±1.1 | *n*=280  0.1 ± 1.0 | *n*=323  0.1 ±1.1 | 0.101 | -0.270 |
| Weight per gestational age centile | *n*=43  48.6 (11.3, 73.9) | *n*=280  55.8 (25.2, 80.6) | *n*=323  55.7 (24.2, 79.2) | 0.166‡ | 0.077 |
| Length per gestational age z-score | *n*=43  0.1 ± 1.3 | *n*=280  -0.0 ± 1.1 | *n*=323  -0.0 ± 1.1 | 0.475 | 0.139 |
| Length per gestational age centile | *n*=43  56.9 (15.3, 89.2) | *n*=280  51.4 (21.9, 74.8) | *n*=323  51.7 (21.8, 77.2) | 0.431‡ | -0.044 |
| Small-for-gestational age\* in weight  Yes  No | *n*=43  4 (9.3)  39 (90.7) | *n*=280  6 (2.1)  274 (97.9) | *n*=323  10 (3.1)  313 (96.9) | **0.032†** | **0.140** |
| Small-for-gestational age\* in length  Yes  No | *n*=43  3 (7.0)  40 (93.0) | *n*=280  12 (4.3)  268 (95.7) | *n*=323  15 (4.6)  308 (95.4) | 0.432† | 0.043 |
| *Index infants’ nutritional status (first week postpartum)* | | | | | |
| Weight-for-Length z-score (WLZ) | *n*=50  -0.5 ±1.2 | *n*=288  -0.2 ±1.0 | *n*=459  -0.2 ±1.0 | **0.028** | **-0.338** |
| Length-for-Age z-score (LAZ) | *n*=51  -0.3 ±1.1 | *n*=288  -0.6 ±1.0 | *n*=465  -0.5 ±1.0 | 0.062 | 0.285 |
| Weight-for-Age z-score (WAZ) | *n*=51  -0.4 ±0.9 | *n*=288  -0.4 ±0.9 | *n*=469  -0.4 ±0.9 | 0.998 | 0.000 |
| Body Mass Index (BMI) | *n*=51  12.7 (12.0, 13.6) | *n*=288  12.9 (12.3, 13.7) | *n*=465  12.9 (12.2, 13.6) | 0.284‡ | 0.058 |
| BMI-for-Age z-score (BAZ) | *n*=51  -0.5 (-1.1, 0.2) | *n*=288  -0.3 (-0.9, 0.3) | *n*=463  -0.3 (-0.9, 0.3) | 0.268‡ | 0.060 |

aCategorical variables are expressed as n (%) and continuous variables are expressed as mean ± SD / median (IQR).  
bTotal frequencies represent total number of participants, frequencies per variable include all respectively valid cases; lack of corresponding sum of frequencies with total sample size is due to values out of range for calculating scores.  
cSignificantly different at P-value <0.05 (in bold); *P*-value was derived using t-test for continuous variables and chi-square analysis for categorical variables.  
†Fisher’s exact test.  
‡Mann-Whitney U test.  
\*Low birth weight: < 2500g; Small-for-gestational age in weight/length: < ‑2 z-score.

Table S7. Nutritional aspects during pregnancy (retrospective assessment) – semi-urban hospitals

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Variablesa | Nyantende  *n*=51 | Ciriri  *n*=288 | Totalb  *n*=339 | *P*-valuec | Effect size |
| Main interest regarding diet during pregnancy *(multiple answers possible)\**  Good health, strength, energy  Quality  Quantity  Good health, weight, growth of the fetus  Increasing weight  Easy delivery  Appetite  Other (had no appetite, requirement of means, not precised)  No interest  Do not know | *n*=49  9 (18.4)  7 (14.3)  0 (0.0)  1 (2.0)  3 (6.1)  0 (0.0)  1 (2.0)  1 (2.0)  12 (24.5)  15 (30.6) | *n*=251  123 (49.0)  53 (21.1)  6 (2.4)  10 (4.0)  6 (2.4)  1 (0.4)  1 (0.4)  4 (1.6)  9 (3.6)  41 (16.3) | *n*=300  132 (44.0)  60 (20.0)  6 (2.0)  11 (3.7)  9 (3.0)  1 (0.3)  2 (0.7)  5 (1.7)  21 (7.0)  56 (18.7) | **0.000**  0.274  0.594†  1.000†  0.168†  1.000†  0.300†  0.593†  **0.000†**  **0.019** | **0.228**  0.063  0.063  0.038  0.081  0.026  0.075  0.013  **0.303**  **0.135** |
| Teacher about nutrition during pregnancy *(multiple answers possible)*  Nurse / nutritionist / doctor  Friend  Mother  Mother-in-law  Media  Other (family member, student, passenger)  No-one  Do not know | *n*=50  29 (58.0)  0 (0.0)  0 (0.0)  0 (0.0)  0 (0.0)  2 (4.0)  19 (38.0)  0 (0.0) | *n*=279  124 (44.4)  28 (10.0)  28 (10.0)  6 (2.2)  1 (0.4)  2 (0.7)  148 (53.0)  0 (0.0) | *n*=329  153 (46.5)  28 (8.5)  28 (8.5)  6 (1.8)  1 (0.3)  4 (1.2)  167 (50.8)  0 (0.0) | 0.077  **0.012†**  **0.012†**  0.596†  1.000†  0.111†  0.050  - | 0.098  **0.129**  **0.129**  0.058  0.023  0.108  0.108  - |
| Omitted foods during pregnancy  Yes  No | *n*=50  8 (16.0)  42 (84.0) | *n*=288  16 (5.6)  272 (94.4) | *n*=338  24 (7.1)  314 (92.9) | **0.015** | **0.144** |
| Food taboo for pregnancy  Yes  No | *n*=50  1 (2.0)  49 (98.0) | *n*=287  10 (3.5)  277 (96.5) | *n*=337  11 (3.3)  326 (96.7) | 1.000† | 0.030 |
| Supplement intake during pregnancy  Yes  No | *n*=40  36 (90.0)  4 (10.0) | *n*=279  249 (89.2)  30 (10.8) | *n*=319  285 (89.3)  34 (10.7) | 1.000† | 0.008 |

aCategorical variables are expressed as n (%).  
bTotal frequencies represent total number of participants, frequencies per variable include all respectively valid cases; lack of corresponding sum of frequencies with total sample size is due to missing data.  
cSignificantly different at P-value <0.05 (in bold); *P*-value was derived using chi-square analysis for categorical variables.  
†Fisher’s exact test.  
\*Globally significant after adjustment by Bonferroni.

Table S8. Socio-demographic characteristics – missing values

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Variablesa | Nyantende  *n*=51 | Ciriri  *n*=288 | Nyangezi  *n*=131 | Total  *N*=470 |
| *Socio-demographic characteristics of the mother* |  |  |  |  |
| Age of the mothers  Do not know  Missing | 0 (0.0)  0 (0.0) | 1 (0.3)  8 (2.8) | 0 (0.0)  2 (1.5) | 1 (0.2)  10 (2.1) |
| Religion  Missing | 0 (0.0) | 3 (1.0) | 0 (0.0) | 3 (0.6) |
| Marital status  No answer  Missing | 2 (3.9)  0 (0.0) | 0 (0.0)  3 (1.0) | 0 (0.0)  1 (0.8) | 2 (0.4)  4 (0.9) |
| Education level  No answer  Missing | 0 (0.0)  0 (0.0) | 0 (0.0)  2 (0.7) | 1 (0.8)  0 (0.0) | 1 (0.2)  2 (0.4) |
| Main occupation  Missing | 0 (0.0) | 4 (1.4) | 0 (0.0) | 4 (0.9) |
| *Characteristics of the index infant* |  |  |  |  |
| Age (days)  No missing values |  |  |  |  |
| Sex  No missing values |  |  |  |  |

aCategorical variables are expressed as n (%).

Table S9. Household characteristics – missing values

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Variablesa | Nyantende  *n*=51 | Ciriri  *n*=288 | Nyangezi  *n*=131 | Total  *N*=470 |
| Head of household  Missing | 0 (0.0) | 1 (0.3) | 0 (0.0) | 1 (0.2) |
| Number of household members  No answer  Missing | 0 (0.0)  0 (0.0) | 1 (0.3)  2 (0.7) | 0 (0.0)  0 (0.0) | 1 (0.2)  2 (0.4) |
| Number of children per household  No answer  Missing | 0 (0.0)  0 (0.0) | 1 (0.3)  2 (0.7) | 0 (0.0)  0 (0.0) | 1 (0.2)  2 (0.4) |
| Main source of income  Do not know  No answer  Missing | 1 (2.0)  0 (0.0)  1 (2.0) | 8 (2.8)  1 (0.3)  4 (1.4) | 21 (16.0)  0 (0.0)  1 (0.8) | 30 (6.4)  1 (0.2)  6 (1.3) |
| Food sources  Do not know  Missing | 0 (0.0)  0 (0.0) | 0 (0.0)  3 (1.0) | 4 (3.1)  0 (0.0) | 4 (0.9)  3 (0.6) |

aCategorical variables are expressed as n (%)**.**

Table S10. Parity and family planning – missing values

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Variablesa | Nyantende  *n*=51 | Ciriri  *n*=288 | Nyangezi  *n*=131 | Total  *N*=470 |
| *Parity* |  |  |  |  |
| Number of pregnancies (including the newborn)  Missing | 0 (0.0) | 6 (2.1) | 4 (3.1) | 10 (2.1) |
| Number of children born alive (including the newborn)  No answer  Missing | 0 (0.0)  0 (0.0) | 1 (0.3)  6 (2.1) | 0 (0.0)  1 (0.8) | 1 (0.2)  7 (1.5) |
| Birth space between the last pregnancies  Do not know  No answer  Missing | 0 (0.0)  0 (0.0)  1 (2.0) | 0 (0.0)  0 (0.0)  3 (1.0) | 1 (0.8)  7 (5.3)  1 (0.8) | 1 (0.2)  7 (1.5)  5 (1.1) |
| *Family planning* |  |  |  |  |
| Knowing any benefit / importance of family planning  No answer  Missing | 2 (3.9)  1 (2.0) | 9 (3.1)  2 (0.7) | 7 (5.3)  0 (0.0) | 18 (3.8)  3 (0.6) |
| Importance of family planning  No answer  Missing | 2 (3.9)  1 (2.0) | 9 (3.1)  2 (0.7) | 7 (5.3)  0 (0.0) | 18 (3.8)  3 (0.6) |
| Knowledge about contraceptive methods  Do not know  Missing | 1 (2.0)  1 (2.0) | 6 (2.1)  1 (0.3) | 5 (3.8)  0 (0.0) | 12 (2.6)  2 (0.4) |
| Contraceptive methods known  No answer  Not applicable  Missing | 0 (0.0)  2 (3.9)  0 (0.0) | 0 (0.0)  7 (2.4)  2 (0.7) | 2 (1.5)  5 (3.8)  4 (3.1) | 2 (0.4)  14 (3.0)  6 (1.3) |
| Practiced family planning  Do not know  No answer  Missing | 0 (0.0)  1 (2.0)  1 (2.0) | 1 (0.3)  1 (0.3)  2 (0.7) | 1 (0.8)  0 (0.0)  1 (0.8) | 2 (0.4)  2 (0.4)  4 (0.9) |

aCategorical variables are expressed as n (%)**.**

Table S11. Health issues during pregnancy (self-reported) – missing values

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Variablesa | Nyantende  *n*=51 | Ciriri  *n*=288 | Nyangezi  *n*=131 | Total  *N*=470 |
| Health problem during pregnancy  Missing | 0 (0.0) | 2 (0.7) | 0 (0.0) | 2 (0.4) |
| Health problem during pregnancy / perinatal – type of disease  Do not know  No answer  Not applicable | 1 (2.0)  0 (0.0)  27 (52.9) | 0 (0.0)  0 (0.0)  237 (82.3) | 0 (0.0)  1 (0.8)  97 (74.0) | 1 (0.2)  1 (0.2)  361 (76.8) |
| Trimester of health problem during pregnancy  Not applicable | 27 (52.9) | 237 (82.3) | 97 (74.0) | 361 (76.8) |
| Visit of a health facility at health problem during pregnancy  Not applicable  Missing | 27 (52.9)  1 (2.0) | 237 (82.3)  0 (0.0) | 97 (74.0)  0 (0.0) | 361 (76.8)  1 (0.2) |
| Taking medicine at health problem during pregnancy  Do not know  Not applicable  Missing | 2 (3.9)  27 (52.9)  1 (2.0) | 0 (0.0)  237 (82.3)  7 (2.4) | 4 (3.1)  97 (74.0)  1 (0.8) | 6 (1.3)  361 (76.8)  9 (1.9) |
| Medication during pregnancy  Do not know\*  Missing | 7 (13.7)  2 (3.9) | 0 (0.0)  8 (2.8) | 0 (0.0)  1 (0.8) | 7 (1.5)  11 (2.3) |
| Antimalarial drugs during pregnancy  Do not know\*\*  Not applicable  Missing | 12 (23.5)  0 (0.0)  2 (3.9) | 0 (0.0)  1 (0.3)  7 (2.4) | 0 (0.0)  1 (0.8)  0 (0.0) | 12 (2.6)  2 (0.4)  9 (1.9) |
| Deworming during pregnancy  Do not know\*\*  Not applicable  Missing | 13 (25.5)  0 (0.0)  2 (3.9) | 0 (0.0)  1 (0.3)  7 (2.4) | 0 (0.0)  1 (0.8)  0 (0.0) | 13 (2.8)  2 (0.4)  9 (1.9) |
| Antibiotics, antifungal during pregnancy  Do not know\*\*  Not applicable  Missing | 9 (17.6)  0 (0.0)  2 (3.9) | 0 (0.0)  1 (0.3)  7 (2.4) | 0 (0.0)  1 (0.8)  0 (0.0) | 9 (1.9)  2 (0.4)  9 (1.9) |
| Pain killer during pregnancy  Do not know\*\*  Not applicable  Missing | 11 (21.6)  0 (0.0)  2 (3.9) | 0 (0.0)  1 (0.3)  7 (2.4) | 0 (0.0)  1 (0.8)  0 (0.0) | 11 (2.3)  2 (0.4)  9 (1.9) |
| Pregnancy-related medication during pregnancy  Do not know\*\*  Not applicable  Missing | 12 (23.5)  0 (0.0)  2 (3.9) | 0 (0.0)  1 (0.3)  7 (2.4) | 0 (0.0)  1 (0.8)  0 (0.0) | 12 (2.6)  2 (0.4)  9 (1.9) |
| Vaccination during pregnancy  Do not know\*\*  Not applicable  Missing | 13 (25.5)  0 (0.0)  2 (3.9) | 0 (0.0)  1 (0.3)  7 (2.4) | 0 (0.0)  1 (0.8)  0 (0.0) | 13 (2.8)  2 (0.4)  9 (1.9) |
| Treatment of nausea during pregnancy  Do not know\*\*  Not applicable  Missing | 13 (25.5)  0 (0.0)  2 (3.9) | 0 (0.0)  1 (0.3)  7 (2.4) | 0 (0.0)  1 (0.8)  0 (0.0) | 13 (2.8)  2 (0.4)  9 (1.9) |
| Other medication during pregnancy  Do not know\*\*  Not applicable  Missing | 13 (25.5)  0 (0.0)  2 (3.9) | 0 (0.0)  1 (0.3)  7 (2.4) | 0 (0.0)  1 (0.8)  0 (0.0) | 13 (2.8)  2 (0.4)  9 (1.9) |
| Diagnosis of anemia during pregnancy  Do not know  No answer | 0 (0.0)  0 (0.0) | 0 (0.0)  1 (0.3) | 2 (1.5)  2 (1.5) | 2 (0.4)  3 (0.6) |
| Vision problems at dawn during pregnancy  No answer  Missing | 0 (0.0)  0 (0.0) | 0 (0.0)  2 (0.7) | 1 (0.8)  1 (0.8) | 1 (0.2)  3 (0.6) |
| Vision problems at daytime during pregnancy  No answer  Missing | 0 (0.0)  0 (0.0) | 3 (1.0)  3 (1.0) | 0 (0.0)  1 (0.8) | 3 (0.6)  4 (0.9) |
| Use of mosquito net during pregnancy  Missing | 0 (0.0) | 1 (0.3) | 0 (0.0) | 1 (0.2) |

aCategorical variables are expressed as n (%).  
\*Mother took anything but could not tell if medication or supplementation.  
\*\*Mother took medication but did not know the type of at least one of them.

Table S12. Modalities of delivery and initiation of breastfeeding – missing values

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Variablesa | Nyantende  *n*=51 | Ciriri  *n*=288 | Nyangezi  *n*=131 | Total  *n*=470 |
| Mode of delivery  No missing answers |  |  |  |  |
| Time of cord clamping  Not known  Missing | 0 (0.0)  0 (0.0) | 0 (0.0)  2 (0.7) | 1 (0.8)  18 (13.7) | 1 (0.2)  20 (4.3) |
| Initiation of breastfeeding  Missing | 1 (2.0) | 1 (0.3) | 0 (0.0) | 2 (0.4) |

aCategorical variables are expressed as n (%).

Table S13. Anthropometrics – missing values

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Variablesa | Nyantende  *n*=51 | Ciriri  *n*=288 | Nyangezi  *n*=131 | Total  *n*=470 |
| *Mothers’ nutritional status (first week postpartum)* | | | | |
| MUAC (cm)  No missing values |  |  |  |  |
| *Index infants’ nutritional status at birth* |  |  |  |  |
| Birth weight (g)  No missing values |  |  |  |  |
| Low birth weight  No missing values |  |  |  |  |
| Weight per gestational age z-score  Missing | 8 (15.7) | 8 (2.8) | 2 (1.5) | 18 (3.8) |
| Weight per gestational age centile  Missing | 8 (15.7) | 8 (2.8) | 2 (1.5) | 18 (3.8) |
| Length per gestational age z-score  Implausible value (WHO definition)  Missing | 0 (0.0)  8 (15.7) | 0 (0.0)  8 (2.8) | 2 (1.5)  5 (3.8) | 2 (0.4)  21 (4.5) |
| Length per gestational age centile  Implausible value (WHO definition)  Missing | 0 (0.0)  8 (15.7) | 0 (0.0)  8 (2.8) | 2 (1.5)  5 (3.8) | 2 (0.4)  21 (4.5) |
| Small-for-gestational age in weight  Missing | 8 (15.7) | 8 (2.8) | 2 (1.5) | 18 (3.8) |
| Small-for-gestational age in length  Implausible value (WHO definition)  Missing | 0 (0.0)  8 (15.7) | 0 (0.0)  8 (2.8) | 2 (1.5)  5 (3.8) | 2 (0.4)  21 (4.5) |
| *Index infants’ nutritional status (first week postpartum)* | | | | |
| Weight-for-Length z-score (WLZ)  z-score not calculated (missing, implausible)  z-score out of valid range | 1 (2.0)  0 (0.0) | 0 (0.0)  0 (0.0) | 7 (5.3)  3 (2.3) | 8 (1.7)  3 (0.6) |
| Length-for-Age z-score (LAZ)  z-score not calculated (missing, implausible) | 0 (0.0) | 0 (0.0) | 5 (3.8) | 5 (1.1) |
| Weight-for-Age z-score (WAZ)  z-score not calculated (missing, implausible) | 0 (0.0) | 0 (0.0) | 1 (0.8) | 1 (0.2) |
| Body Mass Index (BMI)  BMI not calculated (missing, implausible) | 0 (0.0) | 0 (0.0) | 5 (3.8) | 5 (1.1) |
| BMI-for-Age z-score (BAZ)  z-score not calculated (missing, implausible)  z-score out of valid range | 0 (0.0)  0 (0.0) | 0 (0.0)  0 (0.0) | 5 (3.8)  2 (1.5) | 5 (1.1)  2 (0.4) |

aCategorical variables are expressed as n (%)

Table S14. Nutritional aspects during pregnancy (retrospective assessment) – missing values

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Variablesa | Nyantende  *n*=51 | Ciriri  *n*=288 | Nyangezi  *n*=131 | Total  *n*=470 |
| *Nutrition during pregnancy* |  |  |  |  |
| Main interest regarding diet during pregnancy  No answer  Missing | 2 (3.9)  0 (0.0) | 36 (12.5)  1 (0.3) | 8 (6.1)  3 (2.3) | 46 (9.8)  4 (0.9) |
| Teacher about nutrition during pregnancy  No answer  Missing | 0 (0.0)  1 (2.0) | 7 (2.4)  2 (0.7) | 12 (9.2)  0 (0.0) | 19 (4.0)  3 (0.6) |
| Omitted foods during pregnancy  Missing | 1 (2.0) | 0 (0.0) | 1 (0.8) | 2 (0.4) |
| Food taboo for pregnancy  Missing | 1 (2.0) | 1 (0.3) | 0 (0.0) | 2 (0.4) |
| Supplement intake during pregnancy  Do not know\*  Missing | 10 (19.6)  1 (2.0) | 0 (0.0)  9 (3.1) | 0 (0.0)  1 (0.8) | 10 (2.1)  11 (2.3) |

aCategorical variables are expressed as n (%). \* Mother took anything but could not tell if medication or supplementation.

Table S15. Predictor variables for simple linear regression analysis

|  |  |
| --- | --- |
| Independent variables | Literature on associations with birth weight, LBW, SGA |
| *Residence* |  |
| Hospital location  Semi-urban, rural | (Kaur et al., 2019; Tadese et al., 2021) |
| *Socio-demographics of the household* |  |
| Household head by sex  Male, female | (Acharya et al., 2018; Kebede et al., 2021)a |
| Household size (number of household members) | (Hien & Kam, 2008; Acharya et al., 2018) |
| Number of children in the household | (Acharya et al., 2018)b |
| Number of income sources  One, more than one | (Muhihi et al., 2016)c |
| Food sources  Market/purchase only, only/partly own production | (Acharya et al., 2018) |
| *Socio-demographics of the mother* |  |
| Age of the mother | (Elshibly & Schmalisch, 2008; Muhihi et al., 2016; Kaur et al., 2019; Chasekwa et al., 2022) |
| Marital status / living situation  Living with partner, living alone | (Kargbo et al., 2021; Ngandu et al., 2021)d |
| Educational level  Low level, elementary level, secondary level | (Elshibly & Schmalisch, 2008; Muhihi et al., 2016; Acharya et al., 2018) |
| Occupation  No occupation, farmer (own farm/farm of someone else), small business, other job, student | (Acharya et al., 2018; Tadese et al., 2021) |
| *Family planning* |  |
| Practice of family planning | (Conde-Agudelo et al., 2006; Bauserman et al., 2020; Kargbo et al., 2021)e |
| *Pregnancy* |  |
| Parity  Primipara, multipara | (Elshibly & Schmalisch, 2008; Muhihi et al., 2016; Kaur et al., 2019) |
| Number of pregnancies | (Elshibly & Schmalisch, 2008; Muhihi et al., 2016; Kaur et al., 2019) |
| Number of live births | (Elshibly & Schmalisch, 2008; Muhihi et al., 2016; Kaur et al., 2019) |
| Birth interval  First pregnancy, 9-12 months, 1-2 years, 2-3 years, ≥ 3 years | (Conde-Agudelo et al., 2006; Bauserman et al., 2020; Kargbo et al., 2021) |
| Disease during pregnancy  Hemorrhage, nausea, hypertension, malaria, any infection, uro-genital infection, risk of abortion, other disease, none | (Deriba & Jemal, 2021; Tadese et al., 2021), (Kargbo et al., 2021)d |
| Medication during pregnancy  Antimalarial medication, deworming, antibiotics/antifungal, nausea treatment, pain killer, vaccination, pregnancy-related medication, other medication, none | (Acharya et al., 2018) |
| Use of mosquito net during pregnancy | (Kargbo et al., 2021)f |
| Supplement during pregnancy | (Acharya et al., 2018; Deriba & Jemal, 2021) |
| Food deleted during pregnancy | (Deriba & Jemal, 2021) |
| Food taboo during pregnancy | (Deriba & Jemal, 2021) |
| Interest in diet during pregnancy  Any  Quantity, quality, health, weight, infant, delivery, appetite, other interest, no interest | (Deriba & Jemal, 2021) |
| Teacher about nutrition  Any  Mother, mother-in-law, medical staff, friend, media, other, none | (Deriba & Jemal, 2021) |
| Gestational age at birth | (Villar et al., 2014) |
| *Maternal health* |  |
| MUAC | (Elshibly & Schmalisch, 2008; Muhihi et al., 2016; Kaur et al., 2019; Deriba & Jemal, 2021; Tadese et al., 2021; Chasekwa et al., 2022) |
| Height | (Elshibly & Schmalisch, 2008; Muhihi et al., 2016; Deriba & Jemal, 2021) |
| Sex of the infant  Male, female | (Muhihi et al., 2016; Acharya et al., 2018) |
|  |  |

aAssociation only in univariate analysis; association with wasting in children < 5 years.

bGreater family size.

cTrend for association of wealth quintile.

dOnly in univariate analysis.

eAssociations with birth spacing; family planning can contribute to adequate birth spacing.

fAssociation with occurrence of malaria (only in univariate analysis), mosquito nets are a preventive measure.

**References**

**Acharya D, Singh JK, Kadel R, Yoo S-J, Park J-H and Lee K** (2018) Maternal Factors and Utilization of the Antenatal Care Services during Pregnancy Associated with Low Birth Weight in Rural Nepal: Analyses of the Antenatal Care and Birth Weight Records of the MATRI-SUMAN Trial. *International Journal of Environmental Research and Public Health* **15**, 2450. doi: 10.3390/ijerph15112450.

**Bauserman M, Nowak K, Nolen TL, Patterson J, Lokangaka A, Tshefu A, Patel AB, Hibberd PL, Garces AL, Figueroa L, Krebs NF, Esamai F, Liechty EA, Carlo WA, Chomba E, Mwenechanya M, Goudar SS, Ramadurg U, Derman RJ, Saleem S, Jessani S, Koso-Thomas M, McClure EM, Goldenberg RL and Bose C** (2020) The relationship between birth intervals and adverse maternal and neonatal outcomes in six low and lower-middle income countries. *Reproductive Health* **17**(Suppl 2)**,** 157. doi: 10.1186/s12978-020-01008-4.

**Chasekwa B, Ntozini R, Church JA, Majo FD, Tavengwa N, Mutasa B, Noble C, Koyratty N, Maluccio JA, Prendergast AJ, Humphrey JH, Smith LE and Sanitation Hygiene Infant Nutrition Efficacy (SHINE) Trial Team** (2022) Prevalence, risk factors and short-term consequences of adverse birth outcomes in Zimbabwean pregnant women: a secondary analysis of a cluster-randomized trial. *International Journal of Epidemiology* **51**, 1785–1799. doi: 10.1093/ije/dyab248.

**Conde-Agudelo A, Rosas-Bermúdez A and Kafury-Goeta AC** (2006) Birth spacing and risk of adverse perinatal outcomes: a meta-analysis. *JAMA* **295**, 1809–1823. doi: 10.1001/jama.295.15.1809.

**Deriba BS and Jemal K** (2021) Determinants of Low Birth Weight Among Women Who Gave Birth at Public Health Facilities in North Shewa Zone: Unmatched Case-Control Study. *Inquiry: A Journal of Medical Care Organization, Provision and Financing* **58**, 469580211047199. doi: 10.1177/00469580211047199.

**Elshibly EM and Schmalisch G** (2008) The effect of maternal anthropometric characteristics and social factors on gestational age and birth weight in Sudanese newborn infants. *BMC Public Health* **8**, 244. doi: 10.1186/1471-2458-8-244.

**Hien NN and Kam S** (2008) Nutritional status and the characteristics related to malnutrition in children under five years of age in Nghean, Vietnam. *Journal of Preventive Medicine and Public Health = Yebang Uihakhoe Chi* **41**, 232–240. doi: 10.3961/jpmph.2008.41.4.232.

**Kargbo DK, Nyarko K, Sackey S, Addo-Lartey A, Kenu E and Anto F** (2021) Determinants of low birth weight deliveries at five referral hospitals in Western Area Urban district, Sierra Leone. *Italian Journal of Pediatrics* **47**, 212. doi: 10.1186/s13052-021-01160-y.

**Kaur S, Ng CM, Badon SE, Jalil RA, Maykanathan D, Yim HS and Jan Mohamed HJ** (2019) Risk factors for low birth weight among rural and urban Malaysian women. *BMC Public Health* **19**(Suppl 4), 539. doi: 10.1186/s12889-019-6864-4.

**Kebede D, Merkeb Y, Worku E and Aragaw H** (2021) Prevalence of undernutrition and potential risk factors among children under 5 years of age in Amhara Region, Ethiopia: evidence from 2016 Ethiopian Demographic and Health Survey. *Journal of Nutritional Science* **10**, e22. doi: 10.1017/jns.2021.17.

**Muhihi A, Sudfeld CR, Smith ER, Noor RA, Mshamu S, Briegleb C, Bakari M, Masanja H, Fawzi W and Chan GJ-Y** (2016) Risk factors for small-for-gestational-age and preterm births among 19,269 Tanzanian newborns. *BMC Pregnancy and Childbirth* **16**, 110. doi: 10.1186/s12884-016-0900-5.

**Ngandu CB, Momberg D, Magan A, Norris SA and Said-Mohamed R** (2021) Association Between Household and Maternal Socioeconomic Factors with Birth Outcomes in the Democratic Republic of Congo and South Africa: A Comparative Study. *Maternal and Child Health Journal* **25**, 1296–1304. doi: 10.1007/s10995-021-03147-x.

**Tadese M, Minhaji AS, Mengist CT, Kasahun F and Mulu GB** (2021) Determinants of low birth weight among newborns delivered at Tirunesh Beijing General Hospital, Addis Ababa, Ethiopia: a case-control study. *BMC Pregnancy and Childbirth* **21**, 794. doi: 10.1186/s12884-021-04275-6.

**Villar J, Cheikh Ismail L, Victora CG, Ohuma EO, Bertino E, Altman DG, Lambert A, Papageorghiou AT, Carvalho M, Jaffer YA, Gravett MG, Purwar M, Frederick IO, Noble AJ, Pang R, Barros FC, Chumlea C, Bhutta ZA, Kennedy SH and International Fetal and Newborn Growth Consortium for the 21st Century (INTERGROWTH-21st)** (2014) International standards for newborn weight, length, and head circumference by gestational age and sex: the Newborn Cross-Sectional Study of the INTERGROWTH-21st Project. *The Lancet*, **384**, 857–868. doi: 10.1016/S0140-6736(14)60932-6.