**Table 1. Characteristics of mother-newborn pairs**

| Characteristic | N | n (%) / mean (SD) |
|---|---|---|
| **Baseline data** | | |
| Study site: | 1,435 | |
| Tanzania | | 557 (38.8) |
| Malawi | | 416 (29.0) |
| Kenya | | 462 (32.2) |
| Study settings: | 1,435 | |
| Rural | | 1,065 (74.2) |
| Semi-urban | | 309 (21.5) |
| Urban | | 61 (4.3) |
| Study interventions arms: | 1,435 | |
| SP | | 481 (33.5) |
| DP | | 472 (32.9) |
| DP+AZ | | 482 (33.6) |
| Education level: | 1,433 | |
| None | | 126 (8.8) |
| Primary | | 787 (54.9) |
| Secondary | | 440 (30.7) |
| Higher | | 80 (5.6) |
| Marital status: | 1,435 | |
| Married | | 1,235 (86.1) |
| Single | | 156 (10.9) |
| Others | | 44 (3.0) |
| Socio-economic status | 1,435 | |
| Low | | 506 (35.3) |
| Middle | | 466 (32.5) |
| High | | 462 (32.2) |
| History of smoking | 1,435 | 3 (0.2) |
| Alcohol use | 1,435 | 11 (0.8) |
| Age at enrolment, years [a] | 1,431 | 24.9 (5.8) |
| Height at enrolment, Cm [a] | 1,432 | 158.5 (7.1) |
| Weight at enrolment, Kg [a] | 1,431 | 60.6 (10.7) |
| BMI at enrolment, Kg/m$^2$ | 1,428 | |
| <18.5 (Undernutrition) | | 40 (2.8) |
| 18.5-24.9 (Normal) | | 914 (64.0) |
| 25-29.9 (Overweight) | | 347 (24.3) |
| >=30 (Obese) | | 127 (8.9) |
| MUAC at enrolment, cm [a] | 1,428 | 26.9 (3.4) |
| GA at enrolment, days [a] | 1,435 | 146.8 (24.2) |
| Bed net use at enrolment | 1,435 | 1,138 (79.3) |
| Bed net use last night | 1,138 | 1,116 (98.0) |
| Treated bed net | 1,137 | 891 (78.3) |
| IRS sprayed in household | 1,435 | 78 (5.4) |
| **Morbidity during pregnancy** | | |
| Hypertensive disorders: | 1,435 | |
| Essential hypertension [b] | | 4 (0.3) |
| Pregnancy induced hypertension [c] | | 8 (0.6) |
| Pre-eclampsia [d] | | 2 (0.1) |
| Urinary tract infection [e] | 1,435 | 221 (15.4) |
| Hemoglobin (g/dL) at enrolment [a] | 1,433 | 11.0 (1.5) |
| **Pregnancy outcome** | | |
| Place of delivery: | 1,338 | |
| Hospital | | 1,039 (77.7) |
| Health centre | | 202 (15.1) |
| Home | | 67 (5.0) |
| On the way | | 30 (2.2) |
| Mode of delivery: | 1,330 | |
| Spontaneous vaginal | | 1,196 (89.9) |
| Cesarean Section | | 132 (9.9) |
| Forcep/Vacuum | | 2 (0.2) |
| Live birth (GA>28) | 1,342 | 1,342 (100.0) |
| Male newborn | 1,342 | 663 (49.4) |
| GA at delivery, days | 1,339 | 278 (13.0) |
| Preterm delivery | 1,339 | 58 (4.3) |

| | | |
|---|---|---|
| Birthweight, grams [a, f] | 1,325 | 3087 (470) |
| Low birthweight (<2500g) | 1,325 | 107 (8.1) |
| Small for gestational age [g] | 1,299 | 174 (13.4) |
| Large for gestational age [h] | 1,299 | 96 (7.4) |

SP: sulfadoxine-pyrimethamine, DP: dihydroartemisinin-piperaquine, AZ: azithromycin, IRS: insecticide residue spray, BMI: body mass index, MUAC: mid upper arm circumference, GA: gestational age, [a] mean (standard deviation), [b] systolic blood pressure (sBP)>=140 or diastolic blood pressure (dBP)>=90 mmhg before GA 20 weeks measured twice at least 4 hours part, [c] sBP>=140 or dBP>=90 mmhg measured twice at least 4 hours apart after GA 20 weeks without proteinuria, [d] hypertension with proteinuria after GA 20 weeks, [e] positive urine leucocytes and nitrites, [f] The majority (78%) of the newborns were measured within 12 hours of birth, and weight measured >1 hour after birth were adjusted for the physiological weight loss [21], [g] <10th percentile based on a Tanzanian reference chart [22], [h] >90th percentile using Tanzanian reference chart [22].

### Table 2: Prevalence of Malaria and STIs/RTIs

| | Paucigravidae [a] | | Multigravidae | | *P*-value |
|---|---|---|---|---|---|
| **A. Malaria exposure: [b]** | N | n (%) / mean (SD) | N | n (%) / mean (SD) | |
| At Enrolment | 787 | 233 (29.6) | 648 | 144 (22.2) | **0.002** |
| During pregnancy | 787 | 160 (20.3) | 648 | 105 (16.2) | **0.045** |
| At Delivery | 787 | 84 (10.7) | 648 | 67 (10.3) | 0.84 |
| Cumulative malaria prevalence [c] | 787 | 364 (46.3) | 648 | 259 (40.0) | **0.017** |
| Number of malaria episodes | 787 | | 648 | | |
| 0 | | 423 (53.7) | | 389 (60.0) | **0.02** |
| 1 | | 249 (31.6) | | 198 (30.6) | |
| 2 | | 79 (10.0) | | 42 (6.5) | |
| 3+ | | 36 (4.6) | | 19 (2.9) | |
| Gestational age at first malaria detection, days [d] | | 177 (50) | | 187 (58) | **0.02** |
| Malaria by trimester [e] | | | | | |
| Never malaria | | 423 (53.7) | | 389 (60.0) | **0.006** |
| 2nd trimester only | | 190 (24.1) | | 120 (18.5) | |
| 3rd trimester only | | 94 (11.9) | | 92 (14.2) | |
| Both 2nd and 3rd trim. | | 80 (10.2) | | 47 (7.3) | |
| Symptomatic malaria | 787 | 119 (15.1) | 648 | 55 (8.5) | **<0.001** |

| **B. STIs/RTIs exposure** | | | | | |
|---|---|---|---|---|---|
| | Negative | | Positive at enrolment only | Positive at weeks 32-36 only | Positive at both enrolment and weeks 32-36 |
| | N | n (%) | n (%) | n (%) | n (%) |
| Composite STIs/RTIs [f] | 1,429 | 666 (46.6) | 304 (21.3) | 134 (9.4) | 325 (22.7) |
| Specific STIs/RTIs [g]: | | | | | |
| Bacterial vaginosis | 1,297 | 848 (65.4) | 214 (16.5) | 79 (6.1) | 156 (12.0) |
| Trichomoniasis | 1,301 | 999 (76.8) | 104 (8.0) | 106 (8.2) | 92 (7.1) |
| Chlamydia | 1,297 | 1,080 (83.3) | 137 (10.6) | 38 (2.9) | 42 (3.2) |
| Gonorrhoea | 1,298 | 1,244 (95.8) | 32 (2.5) | 17 (1.3) | 5 (0.4) |
| Syphilis | 1,407 | 1,380 (98.1) | 26 (1.9) | 1 (0.1) | 0 (0) |
| | No STIs/RTIs | | STIs/RTIs | | |
| Symptomatic STIs/RTIs | 666 | 4 (0.6) | 763 | 11 (1.4) | **0.19** |

[a] 1st and 2nd pregnancy, [b] Malaria was confirmed by any positive test: real time polymerase chain reaction, malaria rapid diagnostic test, microscopy, and at delivery also included placental histology, 599/623 (96%) of the women got the first malaria attack before the 3rd trimester, [c] the total number for enrolment, during and delivery visits is not equal to the cumulative number as some women had >1 episodes which are not mutually exclusive, GA: gestational age, [d] Mean (standard deviation), P by chi$^2$ for the difference in proportions or t-test for the mean difference. [e] The malaria prevalence in the 2nd and in the 3rd trimester was significantly different for paucigravidae (McNemar, p<0.001), and close to significant for multigravidae (McNemar, p=0.06). STIs/RTIs: Sexually transmitted/reproductive tract infections [f] women who were never tested for STIs/RTIs were excluded in all analyses where STIs/RTIs were considered as an exposure. The STIs/RTIs prevalence at enrolment and in the 3rd trimester was significantly different (McNemar, p<0.001),. [g] Women who were never tested for the specific STI/RTI were excluded in all analyses where the specific STIs/RTIs was considered as an exposure.

**Table 3: Fetal weight and newborn anthropometrics at delivery by malaria infection and composite STIs/RTIs status**

| A. Effect of malaria infection | | No malaria | | Malaria | | unadjusted | | adjusted | |
|---|---|---|---|---|---|---|---|---|---|
| | Outcome | n | Mean (SD) | n | Mean (SD) | mean difference (95% CI) | p-value | mean difference (95% CI) | p-value |
| All gravidae | BW, grams | 738 | 3115 (471) | 587 | 3053 (466) | -45.7 (-97.1, 5.8) | 0.08 | -36.5 (-80.6, 7.62) | 0.11 |
| | BW Z-score [a] | 722 | -0.09 (1.1) | 569 | -0.24 (1.1) | **-0.12 (-0.24, -0.01)** | **0.04** | -0.10 (-0.22, 0.02) | 0.09 |
| | HC, mm | 688 | 343 (18.6) | 566 | 342 (20.0) | -0.62 (-2.7, 1.5) | 0.56 | -0.12 (-2.0, 1.8) | 0.91 |
| | HC Z-score [b] | 675 | 0.38 (1.3) | 551 | 0.30 (1.3) | -0.03 (-0.17, 0.12) | 0.72 | -0.01 (-0.15, 0.13) | 0.89 |
| | AC, mm | 665 | 322 (21.8) | 553 | 320 (26.6) | -1.14 (-3.9, 1.6) | 0.42 | -0.88 (-3.5, 1.8) | 0.51 |
| | FW-Z-score [a] | 834 | 0.11 (1.3) | 284 | -0.20 (1.3) | **-0.18 (-0.30, -0.06)** | **0.004** | **-0.15 (-0.27, -0.03)** | **0.016** |
| Paucigravidae | BW, grams | 371 | 3110 (472) | 342 | 3008 (443) | **-100.2 (-168.4, -32.1)** | **0.004** | **-71.7 (-131.8, -11.6)** | **0.02** |
| | BW Z-score [a] | 362 | -0.13 (1.1) | 328 | -0.34 (1.1) | **-0.22 (-0.38, -0.05)** | **0.01** | **-0.19 (-0.35, -0.03)** | **0.02** |
| | HC, mm | 337 | 342 (19.6) | 331 | 341 (19.7) | -0.74 (-3.7, 2.2) | 0.62 | -0.76 (-1.98, 3.5) | 0.58 |
| | HC Z-score [b] | 328 | 0.26 (1.3) | 319 | 0.24 (1.2) | -0.01 (-0.18, 0.20) | 0.93 | -0.02 (-0.17, -0.22) | 0.81 |
| | AC, mm | 323 | 320 (22.2) | 325 | 319 (24.0) | -1.8 (-5.4, 1.81) | 0.34 | -0.13 (-3.6, 3.4) | 0.94 |
| | FW-Z-score [a] | 421 | 0.02 (1.3) | 176 | -0.30 (1.3) | **-0.21 (-0.37, -0.04)** | **0.014** | **-0.20 (-0.36, -0.03)** | **0.018** |
| Multigravidae | BW, grams | 367 | 3120 (471) | 245 | 3115 (491) | 20.6 (-58.0, 99.2) | 0.61 | 12.2 (-53.7, 78.0) | 0.72 |
| | BW Z-score [a] | 360 | -0.05 (1.1) | 241 | -0.10 (1.03) | -0.01 (-0.19, 0.16) | 0.87 | -0.02 (-0.19, 0.16) | 0.86 |
| | HC, mm | 351 | 344 (17.5) | 235 | 343 (20.4) | -0.61 (-3.7, 2.5) | 0.7 | -1.1 (-3.8, 1.8) | 0.49 |
| | HC Z-score [b] | 347 | 0.39 (1.1) | 232 | 0.38 (1.4) | -0.05 (-0.27, 0.17) | 0.66 | -0.02 (-0.23, 0.20) | 0.88 |
| | AC, mm | 342 | 323 (21.3) | 228 | 322 (29.7) | -0.61 (-4.9, 3.7) | 0.78 | -1.6 (-5.7, 2.5) | 0.45 |
| | FW-Z-score [a] | 413 | 0.19 (1.3) | 108 | -0.03 (1.3) | -0.15 (-0.34, 0.04) | 0.11 | -0.13 (-0.32, 0.05) | 0.17 |
| | Outcome | n | n (%) | n | n (%) | RR (95% CI) | p-value | RR (95% CI) | p-value |
| All gravidae | SGA [a] | 725 | 77 (10.6) | 574 | 97 (16.9) | **1.50 (1.14, 1.98)** | **0.004** | **1.50 (1.14, 1.97)** | **0.004** |
| | LBW | 738 | 52 (7.1) | 587 | 55 (9.4 | 1.24 (0.86, 1.79) | 0.25 | 1.28 (0.89,1.85) | 0.19 |
| | PT | 746 | 27 (3.6) | 593 | 31 (5.2) | 1.50 (0.90, 2.48) | 0.18 | 1.43 (0.86, 2.36) | 0.17 |
| Paucigravidae | SGA [a] | 363 | 36 (9.9) | 330 | 63 (19.1) | **1.86 (1.27,2.71)** | **0.001** | **1.84 (1.26, 2.69)** | **0.002** |
| | LBW | 371 | 27 (7.3) | 342 | 36 (10.5) | 1.40 (0.87, 2.25) | 0.17 | 1.33 (0.81, 2.18) | 0.25 |
| | PT | 373 | 8 (2.1) | 346 | 21 (6.1) | **3.03 (1.37, 6.71)** | **0.01** | **2.84 (1.29, 6.27)** | **0.01** |
| Multigravidae | SGA [a] | 362 | 41 (11.3) | 244 | 34 (13.9) | 1.12 (0.75, 1.69) | 0.58 | 1.11 (0.73, 1.67) | 0.63 |
| | LBW | 367 | 25 (6.8) | 245 | 19 (7.8) | 1.00 (0.55, 1.80) | 0.99 | 1.23 (0.70, 2.17) | 0.47 |
| | PT | 373 | 19 (5.1) | 247 | 10 (4.1) | 0.83 (0.38, 1.80) | 0.63 | 0.81 (0.38, 1.71) | 0.58 |
| **B. Effect of STIs/RTIs** | | **No STIs/RTIs** | | **STIs/RTIs** | | **unadjusted** | | **adjusted** | |
| | Outcome | n | Mean (SD) | n | Mean (SD) | mean difference (95% CI) | p-value | mean difference (95% CI) | p-value |
| All gravidae | BW, grams | 608 | 3107 (476) | 711 | 3071 (465) | -31.5 (-82.0, 19.0) | 0.22 | -38.7 (-81.8, 4.3) | 0.08 |
| | BW Z-score [a] | 589 | -0.09 (1.1) | 697 | -0.21 (1.04) | -0.10 (-0.21, -0.02) | 0.1 | -0.09 (-0.21, 0.02) | 0.12 |
| | HC, mm | 579 | 342 (21.1) | 669 | 344 (17.4) | 0.60 (-1.5, 2.7) | 0.57 | 0.21 (-1.7, 2.1) | 0.83 |

| | Outcome | n | mean (SD) | n | mean (SD) | Estimate (95% CI) | p-value | Estimate (95% CI) | p-value |
|---|---|---|---|---|---|---|---|---|---|
| | HC Z-score [b] | 561 | 0.32 (1.4) | 659 | 0.37 (1.2) | 0.003 (-0.14, 0.14) | 0.96 | 0.01 (-0.13, 0.15) | 0.93 |
| | AC, mm | 554 | 321 (26.9) | 658 | 321 (21.5) | -0.05 (-2.8, 2.7) | 0.97 | -0.75 (-3.3, 1.8) | 0.57 |
| | FW-Z-score [a] | 602 | 0.06 (1.3) | 514 | -0.01(1.3) | -0.08 (-0.20, 0.03) | 0.14 | -0.10 (-0.21, 0.01) | 0.08 |
| Paucigravidae | BW, grams | 738 | 3115 (471) | 587 | 3053 (466) | -38.6 (-106.7, 29.5) | 0.27 | -55.5 (-114.8, 3.7) | 0.07 |
| | BW Z-score [a] | 722 | -0.09 (1.1) | 569 | -0.24 (1.1) | **-0.17 (-0.33, -0.01)** | **0.04** | **-0.17 (-0.33, -0.01)** | **0.04** |
| | HC, mm | 688 | 343 (18.6) | 566 | 342 (20.0) | 0.01 (-2.9, 2.9) | 0.99 | 0.52 (-3.2, 2.1) | 0.7 |
| | HC Z-score [b] | 675 | 0.38 (1.3) | 551 | 0.30 (1.3) | -0.02 (-0.21, 0.17) | 0.85 | -0.02 (-0.21, 0.17) | 0.82 |
| | AC, mm | 665 | 322 (21.7) | 553 | 320 (26.6) | -0.90 (-4.5, 2.7) | 0.62 | -2.0 (-5.5, 1.4) | 0.25 |
| | FW-Z-score [a] | 307 | -0.07 (1.3) | 288 | -0.08 (1.3) | -0.03 (-0.19, 0.02) | 0.67 | -0.08 (-0.23, 0.08) | 0.33 |
| Multigravidae | BW, grams | 738 | 3115 (471) | 587 | 3053 (466) | -19.8 (-94.8, 56.4) | 0.62 | -17.2 (-79.8, 45.4) | 0.59 |
| | BW Z-score [a] | 722 | -0.09 (1.1) | 569 | -0.24 (1.1) | -0.02 (-0.18, 0.15) | 0.85 | -0.01 (-0.16, 0.17) | 0.96 |
| | HC, mm | 688 | 343 (18.6) | 566 | 342 (20.0) | 1.3 (-1.7, 4.3) | 0.4 | 1.10 (-1.6, 3.8) | 0.43 |
| | HC Z-score [b] | 675 | 0.38 (1.3) | 551 | 0.30 (1.3) | 0.03 (-0.18, 0.24) | 0.79 | 0.04 (-0.16, 0.25) | 0.68 |
| | AC, mm | 665 | 322 (21.7) | 553 | 320 (26.6) | 0.78 (-3.4, 4.8) | 0.73 | 0.26 (-3.7, 4.1) | 0.92 |
| | FW-Z-score [a] | 295 | 0.19 (1.3) | 226 | 0.08 (1.3) | -0.14 (-0.30, 0.02) | 0.1 | -0.13 (-0.29, 0.03) | 0.12 |

| | Outcome | n | n (%) | n | n (%) | RR (95% CI) | p-value | RR (95% CI) | p-value |
|---|---|---|---|---|---|---|---|---|---|
| All gravidae | SGA [a] | 593 | 72 (12.1) | 700 | 101 (14.4) | 1.14 (0.86,1.50) | 0.38 | 1.17 (0.88,1.55) | 0.28 |
| | LBW | 608 | 50 (8.2) | 711 | 56 (7.9) | 0.93 (0.64, 1.34) | 0.69 | 1.04 (0.72, 1.49) | 0.85 |
| | PT | 614 | 35 (5.7) | 719 | 22 (3.1) | **0.58 (0.35, 0.98)** | **0.041** | **0.58 (0.35, 0.97)** | **0.04** |
| Paucigravidae | SGA [a] | 297 | 36 (12.1) | 391 | 62 (15.9) | 1.30 (0.89, 1.91) | 0.18 | 1.37 (0.93,2.02) | 0.11 |
| | LBW | 307 | 26 (8.5) | 401 | 36 (9.0) | 1.10 (0.67, 1.80) | 0.7 | 1.26 (0.79, 2.00) | 0.34 |
| | PT | 311 | 20 (6.4) | 403 | 9 (2.3) | **0.37 (0.17, 0.82)** | **0.01** | **0.38 (0.17, 0.82)** | **0.01** |
| Multigravidae | SGA [a] | 296 | 36 (12.2) | 309 | 39 (12.6) | 0.96 (0.63, 1.45) | 0.84 | 0.94 (0.62, 1.42) | 0.75 |
| | LBW | 301 | 24 (8.0) | 310 | 20 (6.5) | 0.74 (0.42, 1.28) | 0.28 | 0.81 (0.44, 1.50) | 0.5 |
| | PT | 303 | 15 (5.0) | 316 | 13 (4.1) | 0.86 (0.43,1.71) | 0.67 | 0.89 (0.43, 1.81) | 0.74 |

Malaria infection was defined as any positive test: real time polymerase chain reaction, malaria rapid diagnostic test, microscopy, and at delivery also included placental histology, AC: abdominal circumference at delivery, BW: birthweight adjusted for time since delivery [21], [a] based on Tanzanian reference chart [22], FW: fetal weight (the mean is for the last FW but the models included all longitudinal FW measurements), HC: head circumference at delivery, [b] based on intergrowth-21 reference chart [25] but it does not include AC, LBW: low BW (<2.5Kg), PT: preterm delivery, SGA: small for gestational age (BW <10th percentiles), STIs/RTIs: Sexually transmitted/reproductive tract infections defined as composite of any STIs/RTIs, SD: standard deviation, P: P-value from linear regression model for newborn anthropometrics or mixed effect linear model for the FW. The unadjusted models included the *a priori* selected co-variables gravidity (paucigravidae defined as primi- or secundigravidae vs multigravidae defined as 3 or more pregnancies), study arm and site, and the adjusted models included gravidity, study arm and site, maternal body mass index, maternal age, and gestational age at enrolment and/or delivery. Furthermore, newborn sex if the outcome was not z-scores.

**Table 4: Fetal weight and newborn anthropometrics at delivery by malaria infection, composite STIs/RTIs, or both**

| A. Continuous Outcome | | Analysis | None | | Malaria only | | STIs/RTIs only | | STIs/RTIs + malaria | | Malaria-only vs None | | STIs/RTIs-only vs None | | dual infection vs None | | Malaria-only vs STI only | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | n | Mean (SD) | n | Mean (SD) | n | Mean (SD) | n | Mean (SD) | mean difference (95% CI) | p-value | mean difference (95% CI) | p-value | mean difference (95% CI) | p-value | mean difference (95% CI) | p-value |
| All gravidae | BW, grams | Unadjusted | 354 | 3140 (473) | 254 | 3061 (477) | 381 | 3090 (470) | 330 | 3050 (459) | -64.8 (-140.0, 10.4) | 0.09 | -47.9 (-114.8, 19.1) | 0.16 | -70.3 (-140.8, 0.16) | 0.05 | -16.9 (-91.8, 57.9) | 0.66 |
| | | Adjusted | | | | | | | | | -47.8 (-112.3, 16.7) | 0.15 | -50.8 (-107.8, 6.3) | 0.08 | **-67.3 (-127.5, -7.2)** | **0.03** | 3.0 (-61.0, 67.0) | 0.93 |
| | BW Z-score [a] | Unadjusted | 345 | 0.001 (1.1) | 244 | -0.22 (1.1) | 375 | -0.17 (1.04) | 322 | -0.25 (1.1) | **-0.19 (-0.36, -0.02)** | **0.03** | -0.15 (-0.31, 0.001) | 0.05 | **-0.20 (-0.36, -0.04)** | **0.02** | -0.04 (-0.21, 0.13) | 0.66 |
| | | Adjusted | | | | | | | | | -0.16 (-0.33, -0.01) | 0.07 | -0.14 (-0.29, 0.01) | 0.07 | **-0.17 (-0.34, -0.01)** | **0.03** | -0.02 (-0.19, 0.15) | 0.83 |
| | HC, mm | Unadjusted | 329 | 342 (18.0) | 250 | 341 (24.5) | 356 | 344 (19.0) | 313 | 343 (15.4) | -0.18 (-3.2, 2.9) | 0.91 | 0.94 (-1.8, 3.7) | 0.5 | 0.04 (-2.9, 2.9) | 0.98 | -1.12 (-4.16, 1.92) | 0.47 |
| | | Adjusted | | | | | | | | | 0.49 (-2.3, 3.3) | 0.73 | 0.72 (-1.8, 3.2) | 0.58 | 0.06 (-2.6, 2.7) | 0.96 | -0.23 (-3.00, 2.54) | 0.87 |
| | HC Z-score [b] | Unadjusted | 322 | 0.33 (1.3) | 239 | 0.30 (1.4) | 350 | 0.42 (1.3) | 309 | 0.32 (1.2) | 0.07 (-0.13, 0.28) | 0.51 | 0.07 (-0.11, 0.26) | 0.45 | -0.01 (-0.21, 0.18) | 0.9 | -0.002 (-0.21, 0.20) | 0.98 |
| | | Adjusted | | | | | | | | | 0.09 (-0.11, 0.30) | 0.38 | 0.08 (-0.11-0.26) | 0.4 | -0.01 (-0.18, 0.20) | 0.96 | 0.01 (-0.19, 0.22) | 0.9 |
| | AC, mm | Unadjusted | 313 | 322 (20.8) | 341 | 321 (33.3) | 349 | 321 (22.7) | 309 | 320 (20.0) | -0.61 (-4.6, 3.4) | 0.77 | 0.34 (-3.3, 4.0) | 0.85 | -1.1 (-4.9, 2.7) | 0.58 | -0.96 (-4.94, 3.02) | 0.64 |
| | | Adjusted | | | | | | | | | -0.38 (-4.4, 3.7) | 0.86 | 0.47 (-3.2, 4.1) | 0.8 | -0.71 (-4.5, 3.1) | 0.71 | -0.85 (-4.84, 3.14) | 0.68 |
| | FW-Z-score [a] | Unadjusted | 458 | 0.18 (1.3) | 144 | -0.32 (1.3) | 375 | 0.02 (1.3) | 139 | -0.07 (1.3) | **-0.31 (-0.48, -0.13)** | **<0.001** | **-0.16 (-0.30, -0.02)** | **0.02** | **-0.22 (-0.38, -0.05)** | **0.01** | -0.15 (-0.33, 0.03) | 0.1 |
| | | Adjusted | | | | | | | | | **-0.23 (-0.41, -0.06)** | **0.01** | **-0.15 (-0.28, -0.01)** | **0.03** | **-0.21 (-0.38, -0.05)** | **0.01** | -0.09 (-0.26, 0.09) | 0.33 |
| Paucigravidae | BW, grams | Unadjusted | 161 | 3134 (456) | 146 | 3032 (476) | 208 | 3088 (485) | 193 | 2995 (418) | -100.1 (-202.4, 2.3) | 0.06 | -40.8 (-133.9, 52.4) | 0.39 | **-132.7 (-228.3,-37.0)** | **0.007** | -59.3 (-157.4, 38.7) | 0.24 |
| | | Adjusted | | | | | | | | | -58.5 (-148.0, 31.1) | 0.2 | -47.2 (-128.3, 34.0) | 0.25 | **-121.0 (-205.0,-37.2)** | **0.005** | -11.3 (-97.0, 74.5) | 0.79 |
| | BW Z-score [a] | Unadjusted | 157 | -0.04 (1.1) | 139 | -0.23 (1.1) | 203 | -0.21 (1.1) | 186 | -0.42 (1.1) | -0.19 (-0.43, 0.08) | 0.13 | -0.15 (-0.37, 0.07) | 0.16 | **-0.36 (-0.59, -0.14)** | **0.002** | -0.04 (-0.26, 0.19) | 0.76 |
| | | Adjusted | | | | | | | | | -0.17 (-0.41, 0.09) | 0.18 | -0.16 (-0.38, 0.06) | 0.15 | **-0.34 (-0.57, -0.11)** | **0.003** | -0.01 (-0.24, 0.23) | 0.94 |
| | HC, mm | Unadjusted | 147 | 341 (17.7) | 145 | 341 (24.5) | 188 | 343 (20.9) | 183 | 342 (14.7) | 1.02 (-3.3, 5.3) | 0.64 | 1.4 (-2.6, 5.5) | 0.49 | -0.42 (-4.5, 3.7) | 0.84 | 1.6 (-2.2, 5.5) | 0.4 |
| | | Adjusted | | | | | | | | | 3.2 (-0.81, 7.2) | 0.12 | 1.5 (-2.2, 5.2) | 0.42 | -0.40 (-3.4, 4.2) | 0.83 | -0.40 (-4.6, 8.8) | 0.85 |
| | HC Z-score [b] | Unadjusted | 143 | 0.16 (1.3) | 137 | 0.31 (1.3) | 183 | 0.34 (1.3) | 179 | 0.22 (1.1) | 0.22 (-0.06, -0.51) | 0.12 | 0.17 (-0.10, 0.43) | 0.21 | 0.01 (-0.26, 0.28) | 0.95 | 0.06 (-0.22 0.33) | 0.68 |
| | | Adjusted | | | | | | | | | 0.24 (-0.04, 0.53) | 0.09 | 0.17 (-0.10, 0.42) | 0.22 | 0.02 (-0.25, 0.29) | 0.89 | 0.08 (-0.19, 0.35) | 0.57 |

| | Outcome | analysis | None n | None value (SD) | Malaria only n | Malaria only value (SD) | STI/RTI only n | STI/RTI only value (SD) | STIs/RTIs + malaria n | STIs/RTIs + malaria value (SD) | Malaria-only vs none (95%CI) | p-value | STI/RTI-only vs none (95%CI) | p-value | dual infection vs None (95%CI) | p-value | Malaria-only vs STI/RTI only (95%CI) | p-value |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Multigravidae | AC, mm | Unadjusted | 138 | 320 (20.3) | 141 | 320 (27.4) | 183 | 320 (23.6) | 181 | 317 (21.0) | -0.24 (-5.7, 5.2) | 0.93 | 0.27 (-4.8, 5.3) | 0.92 | -2.3 (-7.5, 2.8) | 0.38 | -0.52 (-5.7, 4.7) | 0.85 |
| | | Adjusted | | | | | | | | | 0.33 (-5.1-5.8) | 0.9 | -0.01 (-5.1, 5.1) | 0.99 | -1.4 (-6.6, 3.7) | 0.59 | 0.34 (-4.8, 5.6) | 0.9 |
| | FW-Z-score [a] | Unadjusted | 215 | 0.10 (1.3) | 92 | -0.45 (1.2) | 205 | -0.06 (1.3) | 83 | -0.12 (1.3) | **-0.32 (-0.56, -0.09)** | **0.008** | -0.11 (-0.30, 0.09) | 0.27 | -0.21 (-0.44, 0.01) | 0.07 | -0.22 (-0.45, 0.02) | 0.08 |
| | | Adjusted | | | | | | | | | **-0.27 (-0.50, -0.03)** | **0.03** | -0.11 (-0.31, 0.08) | 0.25 | **-0.24 (-0.47, -0.02)** | **0.03** | -0.14 (-0.73, 0.10) | 0.27 |
| | BW, grams | Unadjusted | 193 | 3145 (488) | 108 | 3099 (477) | 173 | 3093 (452) | 137 | 3127 (503) | -29.7 (-142.3, 82.5) | 0.6 | -60.0 (-157.0, 37.1) | 0.23 | 9.3 (-96.2, 114.7) | 0.86 | 31.0 (-85.7, 146.2) | 0.61 |
| | | Adjusted | | | | | | | | | -9.8 (-122.1, 102.4) | 0.86 | -44.5 (-141.2, 52.2) | 0.37 | 27.4 (-77.7, 132.5) | 0.61 | 34.7 (-80.3, 149.7) | 0.55 |
| | BW Z-score [a] | Unadjusted | 188 | 0.03 (1.1) | 105 | -0.21 (1.1) | 172 | -0.13 (1.02) | 136 | -0.02 (1.0) | -0.20 (-0.45, 0.05) | 0.11 | -0.16 (-0.37, 0.06) | 0.15 | 0.0001 (-0.023, 0.23) | 0.99 | -0.05 (-0.30, 0.21) | 0.72 |
| | | Adjusted | | | | | | | | | -0.15 (-0.41, 0.09) | 0.21 | -0.12 (-0.34, 0.09) | 0.25 | 0.04 (-0.19, 0.27) | 0.73 | -0.03 (-0.29, 0.22) | 0.8 |
| | HC, mm | Unadjusted | 182 | 344 (18.3) | 105 | 341 (24.5) | 168 | 345 (16.6) | 130 | 345 (16.2) | -1.9 (-6.1, 2.6) | 0.41 | 0.47 (-3.4, 4.3) | 0.81 | 0.80 (-3.4, 5.0) | 0.71 | -2.3 (-6.9, 2.2) | 0.31 |
| | | Adjusted | | | | | | | | | -1.6 (-6.1, 2.8) | 0.46 | 0.71 (-3.1, 4.5) | 0.72 | 1.4 (-2.8, 5.6) | 0.51 | -2.4 (-6.9, 2.1) | 0.3 |
| | HC Z-score [b] | Unadjusted | 179 | 0.46 (1.3) | 102 | 0.28 (1.5) | 167 | 0.50 (1.2) | 130 | 0.46 (1.2) | -0.11 (-0.42, 0.20) | 0.5 | -0.02 (-0.28, 0.25) | 0.90 | -0.001 (-0.29, 0.29) | 1 | -0.09 (-0.41, 0.23) | 0.58 |
| | | Adjusted | | | | | | | | | -0.10 (-0.41, 0.21) | 0.53 | -0.04 (-0.31, 0.23) | 0.77 | -0.004 (-0.29-0.29) | 0.98 | -0.06 (-0.38, 0.26) | 0.71 |
| | AC, mm | Unadjusted | 175 | 323 (21.1) | 100 | 322 (40.3) | 166 | 323 (21.6) | 128 | 323 (18.1) | -1.3 (-7.4, 4.9) | 0.68 | 0.31 (-5.0, 5.6) | 0.91 | 0.16 (-5.6, 5.9) | 0.96 | -1.6 (-7.9, 4.7) | 0.62 |
| | | Adjusted | | | | | | | | | 1.0 (-7.2, 5.2) | 0.75 | 0.50 (-4.8, 5.8) | 0.85 | 0.38 (-5.4, 6.2) | 0.9 | -1.5 (-7.8, 4.8) | 0.64 |
| | FW-Z-score [a] | Unadjusted | 243 | 0.25 (1.3) | 52 | -0.08 (1.2) | 170 | [a]0.11 (1.3) | 56 | 0.01 (1.4) | **-0.28 (-0.55, -0.02)** | **0.03** | **-0.21 (-0.40, -0.02)** | **0.03** | -0.23 (-0.48, 0.02) | 0.08 | -0.08 (-0.35, 0.19) | 0.58 |
| | | Adjusted | | | | | | | | | -0.24 (-0.50, 0.03) | 0.08 | -0.16 (-0.35,  0.03) | 0.1 | -0.21 (-0.46, 0.04) | 0.1 | -0.06 (-0.33, 0.21) | 0.68 |

| **B. Binary outcomes** | | analysis | None | | Malaria only | | STI/RTI only | | STIs/RTIs + malaria | | Malaria -only vs none | | STI/RTI-only  vs none | | dual infection vs None | | Malaria -only vs STI/RTI only | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | n | n (%) | n | n (%) | n | n (%) | n | n (%) | RR (95%CI) | p-value | RR (95%CI) | p-value | RR (95%CI) | p-value | RR (95%CI) | p-value |
| All gravidae | SGA [a] | Unadjusted | 346 | 33 (9.5) | 247 | 39 (15.8) | 376 | 44 (11.7) | 324 | 57 (17.6) | **1.60 (1.05,2.45)** | **0.03** | 1.19 (0.78,1.82) | 0.41 | **1.67 (1.12, 2.50)** | **0.01** | 1.34 (0.91,1.99) | 0.14 |
| | | Adjusted | | | | | | | | | **1.58 (1.03, 2.42)** | **0.04** | 1.21 (0.80, 1.85) | 0.37 | **1.71 (1.14, 2.55)** | **0.01** | 1.30 (0.87,1.94) | 0.2 |
| | LBW | Unadjusted | 354 | 26 (7.3) | 254 | 24 (9.5) | 381 | 26 (6.8) | 330 | 30 (9.1) | 1.25 (0.74,2.10) | 0.4 | 0.92 (0.56,1.56) | 0.78 | 1.13 (0.68, 1.86) | 0.65 | 1.34 (0.78,2.30) | 0.28 |
| | | Adjusted | | | | | | | | | 1.12 (0.68,1.86) | 0.66 | 0.92 (0.55,1.56) | 0.76 | 1.29 (0.79,2.09) | 0.31 | 1.21 (0.70,2.11) | 0.49 |
| | PT | Unadjusted | 359 | 17 (4.7) | 255 | 18 (7.1) | 384 | 9 (2.3) | 335 | 13 (3.9) | 1.47 (0.78,2.80) | 0.23 | 0.51 (0.24, 1.12) | 0.09 | 0.92 (0.46,1.85) | 0.81 | **2.87 (1.31,6.26)** | **0.01** |

| Group | Outcome | Model | N | n (%) | N | n (%) | N | n (%) | N | n (%) | RR (95% CI) | P | RR (95% CI) | P | RR (95% CI) | P | RR (95% CI) | P |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Adjusted | | | | | | | | | 1.14 (0.61,2.14) | 0.68 | **0.35 (0.14,0.89)** | **0.03** | 1.19 (0.58,2.38) | 0.65 | **3.28 (1.27,8.48)** | **0.01** |
| Paucigravidae | SGA [a] | Unadjusted | 157 | 12 (7.6) | 140 | 24 (17.4) | 204 | 24 (11.8) | 187 | 38 (20.3) | **2.20 (1.14,4.23)** | **0.02** | 1.54 (0.80,2.95) | 0.2 | **2.53 (1.37, 4.68)** | **0.003** | 1.43 (0.85,2.43) | 0.18 |
| | | Adjusted | | | | | | | | | **2.11 (1.08, 4.10)** | **0.03** | 1.53 (0.80, 2.92) | 0.2 | **2.53 (1.37, 4.67)** | **0.003** | 1.38 (0.81,2.36) | 0.24 |
| | LBW | Unadjusted | 161 | 11 (6.8) | 146 | 15 (10.3) | 208 | 16 (7.8) | 193 | 20 (10.4) | 1.47 (0.71,3.05) | 0.3 | 1.17 (0.56,2.44) | 0.68 | 1.53 (0.75, 3.10) | 0.24 | 1.26 (0.64,2.49) | 0.51 |
| | | Adjusted | | | | | | | | | 1.07 (0.54,2.12) | 0.85 | 0.99 (0.48, 2.05) | 0.99 | 1.57 (0.81,3.07) | 0.19 | 1.07 (0.54,2.13) | 0.84 |
| | PT | Unadjusted | 163 | 6 (3.7) | 148 | 14 (9.5) | 208 | 2 (0.96) | 195 | 7 (3.6) | **2.54 (1.06,6.07)** | **0.04** | 0.26 (0.05,1.26) | 0.10 | 1.11 (0.39,3.14) | 0.83 | **9.93 (2.14,46.01)** | **0.003** |
| | | Adjusted | | | | | | | | | **2.44 (1.02,5.84)** | **0.05** | 0.25 (0.05,1.23) | 0.09 | 1.07 (0.39,2.92) | 0.9 | **9.55 (2.03,44.81)** | **0.004** |
| Multigravidae | SGA [a] | Unadjusted | 189 | 21 (11.1) | 107 | 15 (14.0) | 172 | 20 (11.6) | 137 | 19 (13.9) | 1.17 (0.64,1.13) | 0.6 | 0.98 (0.56, 1.71) | 0.95 | 1.19 (0.65,2.18) | 0.95 | 0.52 (0.25,1.10) | 0.09 |
| | | Adjusted | | | | | | | | | 1.13 (0.62, 2.08) | 0.68 | 0.95 (0.54, 1.66) | 0.85 | 1.20 (0.68. 2.18) | 0.56 | 0.69 (0.31,1.56) | 0.37 |
| | LBW | Unadjusted | 193 | 15 (7.8) | 108 | 9 (8.3) | 173 | 10 (5.8) | 137 | 10 (7.3) | 1.01 (0.45,2.28) | 0.97 | 0.72 (0.34,1.50) | 0.38 | 1.41 (0.59,3.40) | 0.44 | 0.38 (0.14,0.99) | 0.05 |
| | | Adjusted | | | | | | | | | 1.53 (0.68,3.42) | 0.3 | 0.93 (0.38,2.27) | 0.88 | 1.64 (0.72,3.71) | 0.24 | 0.35 (0.19,1.62) | 0.28 |
| | PT | Unadjusted | 196 | 11 (5.6) | 107 | 4 (3.7) | 176 | 7 (4.0) | 140 | 6 (4.3) | 0.68 (0.21,2.23) | 0.52 | 0.73 (0.30, 1.71) | 0.46 | 0.93 (0.27,3.21) | 0.91 | 1.04 (0.18,5.9) | 0.96 |
| | | Adjusted | | | | | | | | | 0.54 (0.28,1.06) | 0.07 | 0.86 (0.33, 2.27) | 0.77 | 0.63 (0.26, 1.53) | 0.30 | 1.02 (0.18,3.9) | 0.98 |

Malaria infection was defined as any positive test: real time polymerase chain reaction, malaria rapid diagnostic test, microscopy, and at delivery also included placental histology, AC: abdominal circumference at delivery, BW: birthweight adjusted for time since delivery [21], [a] based on Tanzanian reference chart [22], FW: fetal weight (mean is for the last FW but the models included all longitudinal FW), HC: head circumference at delivery, [b] based on intergrowth-21 reference chart [25] but it does not include AC, LBW: low BW (<2.5Kg), PT: preterm delivery, SGA: small for gestational age (BW <10th percentiles), STIs/RTIs: Sexually transmitted/reproductive tract infections defined as composite of any STIs/RTIs, SD: standard deviation, P: P-value from linear regression model for newborn anthropometrics or mixed effect linear model for FW. Mixed effects linear model was used for continuous longitudinal outcomes while ordinary linear regression was used for continuous delivery outcomes and GLM commands (Poisson regression with robust error variance) was used for binary outcomes, The unadjusted models included the *a priori* selected co-variables gravidity, study arm and site, and the adjusted models included gravidity, study arm and site, maternal body mass index, maternal age, and gestational age at enrolment and/or delivery. Furthermore, newborn sex if the outcome was not z-scores.

**Table 5: Effect of malaria infection and composite STIs/RTIs during pregnancy on fetal growth trajectories as Z-scores of fetal weights and birth weights**

| Exposure groups | | Crude model [a] | | | | Adjusted model [b] | | |
|---|---|---|---|---|---|---|---|---|
| | n | mean difference | 95% CI | p-value | mean difference | 95% CI | p-value |
| **A. Effect of malaria infection all gravidae pairs [c]** | | | | | | | | |
| No malaria | 812 | Ref | | | | Ref | | |
| Malaria | 623 | **-0.14** | **-0.24, -0.05** | **0.003** | **-0.12** | **-0.22, -0.03** | **0.01** |
| **B. Effect of malaria infection among paucigravidae [c]** | | | | | | | | |
| No malaria | 423 | Ref | | | | Ref | | |
| Malaria | 364 | **-0.19** | **-0.32 -0.06** | **0.004** | **-0.17** | **-0.31, -0.04** | **0.01** |
| **C. Effect of malaria infection among multigravidae [c]** | | | | | | | | |
| No malaria | 389 | Ref | | | | Ref | | |
| Malaria | 259 | -0.09 | -0.23 -0.06 | 0.24 | -0.07 | -0.21, 0.07 | 0.34 |
| **D. Effect of composite STIs/RTIs among all women-newborn pairs [d]** | | | | | | | | |
| No STIs/RTIs | 666 | Ref | | | | Ref | | |
| STIs/RTIs | 763 | **-0.10** | **-0.20, -0.01** | **0.03** | **-0.11** | **-0.20, -0.01** | **0.03** |
| **E. Effect of composite STIs/RTIs among paucigravidae women-newborn pairs [d]** | | | | | | | | |
| No STIs/RTIs | 348 | Ref | | | | Ref | | |
| STIs/RTIs | 434 | -0.10 | -0.24, 0.03 | 0.11 | -0.13 | -0.26, 0.001 | 0.05 |
| **F. Effect of composite STIs/RTIs among multigravidae women-newborn pairs [d]** | | | | | | | | |
| No STIs/RTIs | 318 | Ref | | | | Ref | | |
| STIs/RTIs | 329 | -0.10 | -0.24, 0.04 | 0.15 | -0.08 | -0.21, 0.06 | 0.25 |
| **G. Effect of malaria infection and/or composite STI/RTI among all women-newborn pairs [e]** | | | | | | | | |
| No malaria no STIs/RTIs | 399 | Ref | | | | Ref | | |

| | n | | | | | | |
|---|---|---|---|---|---|---|---|
| Malaria only | 267 | **-0.22** | **-0.35, -0.08** | **0.002** | **-0.18** | **-0.31, -0.04** | **0.01** |
| STIs/RTIs only | 410 | **-0.15** | **-0.27, -0.04** | **0.01** | **-0.14** | **-0.26, -0.03** | **0.01** |
| Malaria and STIs/RTIs | 353 | **-0.21** | **-0.35, -0.08** | **0.001** | **-0.20** | **-0.33, -0.07** | **0.003** |

**H. Effect of malaria infection and/or composite STIs/RTIs among paucigravidae women-newborn pairs [e]**

| | n | | | | | | |
|---|---|---|---|---|---|---|---|
| No malaria no STIs/RTIs | 193 | Ref | | | Ref | | |
| Malaria only | 155 | **-21** | **-0.41,-0.02** | **0.027** | -0.17 | -0.36, 0.02 | 0.08 |
| STIs/RTIs only | 228 | -12 | -0.29, 0.04 | 0.15 | -0.13 | -0.30, 0.03 | 0.11 |
| Malaria and STIs/RTIs | 206 | **-0.28** | **-0.46, -0.10** | **0.002** | **-0.30** | **-0.48, -0.11** | **0.001** |

**I. Effect of malaria infection and/or composite STIs/RTIs among multigravidae women-newborn pairs [e]**

| | n | | | | | | |
|---|---|---|---|---|---|---|---|
| No malaria no STIs/RTIs | 206 | Ref | | | Ref | | |
| Malaria only | 112 | **-0.23** | **-0.43, -0.03** | **0.02** | -0.18 | -0.38, 0.02 | 0.08 |
| STIs/RTIs only | 182 | **-0.19** | **-0.35, 0.03** | **0.02** | -0.16 | -0.32, 0.001 | 0.05 |
| Malaria and STIs/RTIs | 147 | -0.13 | -0.33, 0.06 | 0.18 | -0.11 | -0.30, 0.09 | 0.28 |

The growth trajectories was based on Z-scores for both fetal weights by ultrasound and birthweight and was assessed using mixed effects regression model, [a] adjusted for gravidity, study arm and site (n=1,329 for all and 717 for paucigravidae), [b] adjusted for gravidity, study arm, site and other covariates including maternal age, maternal body mass index, gestational age at enrolment and delivery (n=1,319 for all and 708 for paucigravidae women-newborn pairs). [c] Considered malaria positive from when the first malaria attack occurred, [d] Considered STIs/RTIs positive from when STIs/RTIs was first diagnosed [e] Consider positive for both malaria and STIs/RTIs from when both diseases had occurred. Malaria was defined as any positive test: real time polymerase chain reaction, malaria rapid diagnostic test, microscopy, and at delivery also included placental histology (5 participants with malaria but no STIs/RTIs data were excluded), STIs/RTIs: Sexually transmitted/reproductive tract infections defined as composite of any STIs/RTIs, NA: not applicable as crude coefficients were not significant.