### **Supplementary Table 1: Parameters associated with undetectable VL (≤50 copies/mL).**

Demographic, clinical, immunological and virological characteristics of HIV infected pregnant women of at least 20 week of gestational age stratified by undetectable and detectable plasma VL (cut off 50 copies/mL). 2 ART defaulters during the post-conception period were excluded.

**Abbreviations**: ANC: antenatal care, ART: antiretroviral therapy, CD4: cluster of differentiation 4, HIV: human immunodeficiency virus, MUAC: mid upper arm circumference, US$: United States dollars, VL: viral load, WHO: World Health Organisation.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Sample size (N)/**  **subgroups (n)**  **Maternal factors**  Median, (IQR),  Min-Max/ n (%) | **Overall**  **(N=606)** | **Undetectable VL**  **(≤50 copies/mL)**  **(n=371)** | **Detectable VL**  **(**>**50 copies/mL)**  **(n=235)** | **p-value** |
| **Socio-demographics** | | | | |
| **Age (years)** | 30.0, (25.0-34.0), 17.0-46.0 | 32.0, (27.5-35.0), 17.0-45.0 | 28.0, (23.0-33.0), 18.0-46.0 | **1.062e-08** |
| **Categorised age (years)**  <20  >20 | 21 (3.5%)  585 (96.5%) | 10 (2.7%)  361 (97.3%) | 11 (4.7%)  224 (95.3%) | 0.254 |
| **Gestational age at first**  **ANC booking (months)** | 6.0, (5.0-7.0), 1.0-9.0  (missing=2) | 6.0, (5.0-7.0), 2.0-9.0  (missing=2) | 7.0,(5.0-7.0), 1.0-9.0 | **0.022** |
| **Ethnicity**  Shona  Non-Shona | 500 (82.5%)  106 (17.5%) | 302 (81.4%)  69 (18.6%) | 198 (84.3%)  37 (15.7%) | 0.382 |
| **Marital status**  Married  Not married | 564 (93.1%)  42 (6.9%) | 349 (94.1%)  22 (5.9%) | 215 (91.5%)  20 (8.5%) | 0.251 |
| **Education level**  Primary  At least Secondary | 179 (29.5%)  427 (70.5%) | 104 (28%)  267 (72%) | 75 (31.9%)  160 (68.1%) | 0.316 |
| **Main religion**  Apostolic  Non-apostolic | 152 (25.2%)  452 (74.8%)  (missing=2) | 83 (22.4%)  288 (77.6%) | 69 (29.6%)  164 (70.4%)  (missing=2) | 0.050 |
| **Employment status**  Employed  Unemployed | 175 (28.9%)  431 (71.1%) | 117 (31.5%)  254 (68.5%) | 58 (24.7%)  177 (75.3%) | 0.080 |
| **Food security**  No  Yes | 159 (26.2%)  447 (73.8%) | 99 (26.7%)  272 (73.3%) | 60 (25.5%)  175 (75.5%) | 0.777 |
| **Money spent on food per month (US$)** | 56, (40.-100), 0-450  (missing=6) | 60, (50-100.), 0-350  (missing=2) | 50, (40-100.0), 0-450.0  (missing=4) | **0.021** |
| **MUAC (cm)**  < 25  ≥25 | 100 (16.6%)  504 (83.4%)  (missing=2) | 61 (16.5%)  309 (83.5%)  (missing=1) | 39 (16.7%)  195 (83.3%)  (missing=1) | 1.000 |
| **HIV and ART related factors** | | | | |
| **Disclosed HIV status?**  No  Yes | 64 (10.6%)  542 (89.4) | 12 (3.2%)  359 (96.8%) | 52 (22.1%)  183 (77.9%) | **3.556e-13** |
| **Days since HIV**  **diagnosis** | 561,(34-1502), 0-7985) | 1004, (360.5-1785), 0-7985 | 28, (1-297), 0-7259 | **< 2.2e-16** |
| **Spouse tested for HIV**  Yes  No  Don’t know | 413 (68.3%)  129 (21.4%)  62 (10.3%)  (missing=2) | 289 (77.9%)  54 (14.6%)  28 (7.5%) | 124 (53.2%)  75 (32.2%)  34 (14.6%)  (missing=2) | **1.954e-09** |
| **ART side effects** (**n=543**)  Yes  No | 114 (21.6%)  414 (78.4%)  (missing=15) | 62 (17.4%)  295 (82.6%)  (missing=8) | 52 (30.4%)  119 (69.6%)  (missing=7) | **0.001** |
| **ART stock supply always available** (**n=543**)  No  Yes | 12 (2.2%)  531 (97.8%) | 9 (2.5%)  356 (97.5%) | 3 (1.7%)  175 (98.3%) | 0.759 |
| **Ever switched ART regimen(n=543)**  No  Yes | 445 (82%)  98 (18%) | 291 (79.7%)  74 (20.3%) | 154 (86.5%)  24 (13.5%) | **0.0058** |
| **CD4+T-lymphocytecounts (cells/µL)**  <200  200-350  >350 | 76 (13.2%)  160 (27.8%)  339 (59.0%)  (missing =31) | 30 (8.5%)  85 (24.2%)  237 (67.3%)  (missing=19) | 46 (20.6%)  75 (33.6%)  102 (45.8%)  (missing=12) | **2.964e-07** |
| **WHO clinical staging**  Stage 1  Stage 2  >Stage 2 | 496 (82.1%)  60 (9.9%)  48 (8.0%)  (missing=2) | 299 (80.8%)  41 (11.1%)  30 (8.1%)  (missing=1) | 197 (84.2%)  19 (8.1%)  18 (7.7%)  (missing=1) | 0.477 |
| **Comorbidities** | | | | |
| **Hypertension**  Yes  No | 73 (12.0%)  533 (88.0%) | 44 (11.9%)  327 (88.1%) | 29 (12.3%)  206 (87.7%) | 0.898 |
| **Self-reported depression**  Yes  No | 9 (1.5%)  596 (98.5%)  (missing=1) | 4 (1.1%)  367 (98.9%) | 5 (2.1%)  229 (97.9%)  (missing=1) | 0.318 |
| **Concurrent medications** | | | | |
| **Iron supplementation**  Yes  No | 306 (50.5%)  300 (49.5%) | 175 (46.1%)  196 (53.9%) | 131 (55.7%)  104 (44.3%) | **0.045** |
| **Antibiotics use**  Yes  No | 110 (18.2%)  496 (81.8%) | 85 (22.9%)  286 (77.1%) | 25 (10.6%)  210 (89.4%) | **0.0001** |

Statistical methods used: Shapiro Wilk test for normalcy, continuous variables – Mann Whitney-U test, categorical variables - Fisher's exact test. Overall column was not included in p-value determination.

**Supplementary Table 2: Parameters associated with low level viremia (51-1000 copies/mL).** Demographic, clinical, immunological and virological characteristics of HIV infected pregnant women of at least 20 weeks of gestational age stratified by undetectable (≤50 copies/mL) and low level viremia (51-1000copies/mL). 2 ART defaulters during the post-conception period and all those with VL > 1000copies/mL were excluded.

**Abbreviations**: ANC: antenatal care, ART: antiretroviral therapy, CD4: cluster of differentiation 4, HIV: human immunodeficiency virus, LLV: low level viremia, MUAC: mid upper arm circumference, US $: United States dollars, VL: viral load, WHO: World Health Organisation.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Sample size (N)/**  **subgroups (n)**  **Maternal factors**  Median, (IQR),  Min-Max/ n (%) | **Overall**  **VL: ≤1000 copies/mL**  **(N=473)** | **Undetectable VL**  **(≤50 copies/mL)**  **(n=371)** | **LLV**  **(51 - 1000 copies/mL)**  **(n=102)** | **p-value** |
| **Socio-demographics** | | | | |
| **Age (years)** | 31.0, (27.0-35.0), 17.0-45.0 | 32.0, (27.5-35.0), 17.0-35.0 | 29.0, (25.0-33.0), 18.0-44.0 | **0.002** |
| **Categorised age (years)**  <20  >20 | 13 (2.7%)  460 (97.3%) | 10 (2.7%)  361 (97.3%) | 3 (2.9%)  99 (97.1%) | 1.000 |
| **Gestational age at first**  **ANC booking (months)** | 6.0, (5.0-7.0), 1.0-9.0  (missing=2) | 6.0, (5.0-7.0), 2.0-9.0  (missing=2) | 6.0, (5.0-7.0), 1.0-9.0 | 0.749 |
| **Ethnicity**  Shona  Non-Shona | 388 (82.0%)  85 (18.0%) | 302 (81.4%)  69 (18.6%) | 86 (84.3%)  16 (15.7%) | 0.562 |
| **Marital status**  Married  Not married | 442 (93.4%)  31 (6.6%) | 349 (94.1%)  22 (5.9%) | 93 (91.2%)  9 (8.8%) | 0.364 |
| **Education level**  Primary  At least Secondary | 137 (29.0%)  336 (71.0%) | 104 (28.0%)  267 (72.0%) | 33 (32.4%)  69 (67.6%) | 0.391 |
| **Main religion**  Apostolic  Non-apostolic | 119 (25.2%)  353 (74.8%)  (missing=1) | 83 (22.4%)  288 (77.6%) | 36 (35.6%)  65 (64.4%)  (missing=1) | **0.009** |
| **Employment status**  Employed  Unemployed | 141 (29.8%)  332 (70.2%) | 117 (31.5%)  254 (68.5%) | 24 (23.5%)  78 (76.5%) | 0.142 |
| **Food security**  No  Yes | 127 (26.8%)  346 (73.2%) | 99 (26.7%)  272 (73.3%) | 28 (27.5%)  74 (72.5%) | 0.899 |
| **Money spent on food per month (US $)** | 60.0, (50.0-100.0), 0.0-350.0  (missing=3) | 60.0, (50.0-100.0), 0.0-350.0  (missing=2) | 50.0, (40.0-100.0), 0.0-300.0  (missing=1) | 0.299 |
| **MUAC (cm)**  < 25  ≥25 | 81 (17.2%)  390 (82.8%)  (missing=2) | 61 (16.5%)  309 (83.5%)  (missing=1) | 20 (19.8%)  81 (80.2%)  (missing=1) | 0.458 |
| **HIV and ART related factors** | | | | |
| **Disclosed HIV status?**  No  Yes | 26 (5.5%)  447 (94.5%) | 12 (3.2%)  359 (96.8%) | 14 (13.7%)  88 (86.3%) | **0.0002** |
| **Days since HIV**  **diagnosis** | 779 (98-1651), 0-7985 | 1004, (360.5-1785), 0-7985 | 32,(14-414.6),0-4016 | **< 2.2e-16** |
| **Spouse tested for HIV**  Yes  No  Don’t know | 352 (74.4%)  79 (16.7%)  42 (8.9%) | 290 (78.2%)  53 (14.3%)  28 (7.5%) | 62 (60.8%)  26 (25.5%)  14 (13.7%) | **0.002** |
| **ART side effects** (**n=458**)  Yes  No | 85 (19.1%)  361 (80.9%)  (missing=12) | 62 (17.4%)  295 (82.6%)  (missing=8) | 23 (25.8%)  66 (74.2%)  (missing=4) | 0.072 |
| **ART stock supply always available** (**n=458**)  No  Yes | 9 (2.0%)  449 (98.0%) | 9 (2.5%)  356 (97.5%) | 0 (0%)  93 (100%) | 0.215 |
| **Ever switched ART regimen (n=458)**  No  Yes | 375 (81.9%)  83 (18.1%) | 291 (79.7%)  74 (20.3%) | 84 (90.3%)  9 (9.7%) | **0.016** |
| **CD4+ T-lymphocyte counts (cells/µL)**  <200  200-350  >350 | 42 (9.3%)  117 (26.0%)  291 (64.7%)  (missing=23) | 30 (8.5%)  85 (24.1%)  237 (67.4%)  (missing=19) | 12 (12.2%)  32 (32.7%)  54 (55.1%)  (missing=4) | 0.0786 |
| **WHO clinical staging**  Stage 1  Stage 2  >Stage 2 | 384 (81.5%)  49 (10.4%)  38 (8.1%)  (missing=2) | 299 (80.8%)  41 (11.1%)  30 (8.1%)  (missing=1) | 85 (84.2%)  8 (7.9%)  8 (7.9%)  (missing=1) | 0.698 |
| **Comorbidities** | | | | |
| **Hypertension**  Yes  No | 56 (11.8%)  417 (88.2%) | 44 (11.9%)  327 (88.1%) | 12 (11.8%)  90 (88.2%) | 1.000 |
| **Self-reported depression**  Yes  No | 4 (0.8%)  468 (99.2%)  (missing=1) | 4 (1.1%)  367 (98.9%) | 0 (0.0%)  101 (100%)  (missing=1) | 0.582 |
| **Concurrent medications** | | | | |
| **Iron supplementation**  Yes  No | 229 (48.4%)  244 (51.6%) | 175 (47.2%)  196 (52.8%) | 54 (52.9%)  48 (47.1%) | 0.316 |
| **Antibiotics**  Yes  No | 96 (20.3%)  377 (79.7%) | 85 (22.9%)  286 (77.1%) | 11 (10.8%)  91 (89.2%) | **0.008** |

Statistical methods used: Shapiro Wilk test for normalcy, continuous variables – Mann Whitney-U test, categorical variables - Fisher's exact test. Overall column was not included in p-value determination.

### **Supplementary Table 3**: **Predictors of virological outcomes for all women (naïve + on ART) without variable elimination.**

Predictors of undetectable VL at a cut-off of ≤50 and VS at cut-off of≤1000 copies/mL for all (**naïve + on ART**) HIV infected pregnant women of at least 20 weeks gestational age (602 observations).

**Abbreviations:** ART: antiretroviral therapy, CI–95% confidence interval, HIV: human immunodeficiency virus, MUAC: mid upper arm circumference, OR: odds ratio.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | **Predictors for ≤50 copies/mL** | | | **Predictors for ≤1000 copies/mL** | | |
| **OR** | **CI** | **p-value** | **OR** | **CI** | **p-value** |
| Intercept | 0.029 | 0.003-0.239 | **0.001** | 0.108 | 0.010 -1.105 | 0.062 |
| Age (per year) | 1.039 | 0.997-1.082 | 0.067 | 1.049 | 0.999-1.103 | 0.055 |
| Are you on ART? (Yes) | 8.111 | 3.197-24.483 | **4.29e-05** | 9.219 | 4.356-20.591 | **1.68e-08** |
| Self-reported depression (Yes) | 0.739 | 0.144-4.130 | 0.717 | 0.240 | 0.048-1.253 | 0.080 |
| Was this pregnancy planned? (Unplanned) | 1.420 | 0.963-2.097 | 0.077 | 1.116 | 0.705-1.764 | 0.640 |
| Disclosed HIV status to anyone? (Yes) | 2.366 | 1.054-5.459 | **0.038** | 1.694 | 0.750-3.659 | 0.190 |
| Days since HIV diagnosis (per day) | 1.001 | 1.0003-1.0008 | **1.62e-06** | 1.0002 | 0.9999-1.0005 | 0.137 |
| Currently living with spouse under one roof (Yes) | 1.760 | 0.857-3.593 | 0.120 | 1.429 | 0.630-3.063 | 0.374 |
| MUAC (per cm) | 0.968 | 0.914-1.026 | 0.270 | 0.970 | 0.907-1.037 | 0.368 |
| Gravida (per gravida) | 1.013 | 0.834-1.235 | 0.899 | 1.073 | 0.850-1.366 | 0.562 |
| Food security (Yes) | 1.087 | 0.690-1.704 | 0.717 | 0.902 | 0.520-1.539 | 0.709 |
| Maternal ethnicity (Shona) | 1.017 | 0.609-1.675 | 0.949 | 1.024 | 0.551-1.836 | 0.939 |
| Any domestic violence during pregnancy? (Yes) | 1.132 | 0.705-1.839 | 0.610 | 0.932 | 0.540-1.650 | 0.806 |
| Educational status (Primary education) | 0.837 | 0.551-1.277 | 0.407 | 0.906 | 0.559-1.491 | 0.694 |
| Current employment status (Unemployed) | 0.778 | 0.504-1.190 | 0.252 | 0.998 | 0.599-1.638 | 0.994 |

Statistical tests used: Logistic regression without variable elimination.

### **Supplementary Table 4: Predictors of virological outcomes for women on ART without variable elimination.**

Predictors of undetectable VL at a cut-off of ≤50 and VS at cut-off of ≤1000 copies/mL for HIV infected pregnant women on ART and at least 20 weeks gestational age (523 observations).

**Abbreviations**: ART: antiretroviral therapy, CI – 95% confidence interval HIV: human immunodeficiency virus, MUAC: mid upper arm circumference, OR: odds ratio.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | **Predictors for ≤50 copies/mL** | | | **Predictors for ≤1000 copies/mL** | | |
| **OR** | **CI** | **p-value** | **OR** | **CI** | **p-value** |
| Intercept | 0.179 | 0.011 - 3.457 | 0.238 | 0.206 | 0.009-  5.376 | 0.332 |
| ART duration >126 days? (Yes) | 8.628 | 4.842- 15.701 | **6.13e-13** | 6.758 | 3.239-14.779 | **7.18e-07** |
| Was this pregnancy planned? (Unplanned) | 1.266 | 0.809- 1.976 | 0.300 | 1.023 | 0.591-1.764 | 0.935 |
| Self-reported depression (Yes) | 0.263 | 0.042 -1.723 | 0.144 | 0.091 | 0.014-0.617 | **0.011** |
| ART side effects (Yes) | 0.694 | 0.419-1.153 | 0.156 | 0.554 | 0.315-0.984 | **0.041** |
| MUAC (per cm) | 0.988 | 0.925-1.056 | 0.718 | 1.003 | 0.926-1.088 | 0.943 |
| Age (per year) | 1.030 | 0.984- 1.079 | 0.199 | 1.043 | 0.988-1.104 | 0.129 |
| Days since HIV diagnosis (per day) | 0.9999 | 0.9997-1.0002 | 0.548 | 0.9997 | 0.999-0.99999 | **0.033** |
| Maternal ethnicity (Shona) | 1.079 | 0.599- 1.909 | 0.797 | 0.822 | 0.371-1.683 | 0.606 |
| Educational status (Primary education) | 0.763 | 0.474-1.228 | 0.263 | 0.728 | 0.420-1.282 | 0.263 |
| Current employment status (Unemployed) | 0.755 | 0.462-1.220 | 0.255 | 1.019 | 0.560-1.810 | 0.950 |
| Currently living with spouse under one roof? (Yes) | 1.670 | 0.746-3.690 | 0.207 | 1.344 | 0.501-3.321 | 0.537 |
| Any domestic violence during pregnancy? (Yes) | 1.157 | 0.677-2.007 | 0.598 | 1.171 | 0.611-2.352 | 0.644 |
| Disclosed HIV status to anyone? (Yes) | 1.316 | 0.492-3.571 | 0.584 | 1.603 | 0.529-4.473 | 0.381 |
| Food security (Yes) | 1.057 | 0.632-1.756 | 0.831 | 0.799 | 0.410-1.501 | 0.497 |
| Ever missed an ART dose? (Yes) | 1.158 | 0.616-.247 | 0.658 | 0.954 | 0.455-2.156 | 0.905 |
| Constant supply of ART? (Yes) | 1.285 | 0.167-.331 | 0.778 | 3.693 | 0.492-18.331 | 0.139 |
| Gravida (per gravida) | 0.973 | 0.788-1.207 | 0.799 | 0.951 | 0.741-1.231 | 0.697 |

Statistical tests used: Logistic regression without variable elimination.