Supplementary Table 1.Characteristics of ART-naïve adult patients enrolled in the HIV treatment and care program in Dar es Salaam, Tanzania from 2004 to 2012 who received multivitamins as compared to patients who did not receive multivitamins at baseline (n = 48,207).

|  | **Multivitamin provision at baseline** |  |
| --- | --- | --- |
|  | **Yes** **(N=41,416)** | **No****(N=6,791)** |
| Age, mean years | 36 (10) | 37 (10) |
| * <30 years, %
 | 25 | 22 |
| * 30 to <40 years, %
 | 43 | 44 |
| * 40 to <50 years, %
 | 22 | 24 |
| * ≥50 years, %
 | 10 | 10 |
| Male Sex | 29 | 29 |
| Year  |  |  |
| * 2004 to <2006, %
 | 4 | 2 |
| * 2006 to <2008, %
 | 25 | 15 |
| * 2008 to <2010, %
 | 42 | 66 |
| * After 2010, %
 | 28 | 16 |
| District of Dar es Salaam |  |  |
| - Ilala, %  | 21 | 70 |
| - Kinondoni, %  | 41 | 22 |
| - Temeke, %  | 39 | 8 |
| Facility level |  |  |
| - Hospital, % | 83 | 93 |
| - Health center, % | 7 | 1 |
| - Dispensary, % | 10 | 6 |
| Education |  |  |
| - Primary, % | 66 | 64 |
| - Secondary, % | 29 | 29 |
| - Advanced, % | 4 | 7 |
| Marital Status  |  |  |
| - Married-monogamous, % | 39 | 41 |
| - Married-polygamous, % | 4 | 2 |
| - Live w/partner, % | 8 | 4 |
| - Single, % | 13 | 12 |
| - Widowed, % | 15 | 22 |
| - Divorced, % | 7 | 10 |
| - Separated, % | 14 | 9 |
| Body mass index (BMI), kg/m2 | 21.8(4.8) | 22.2 (5.0) |
| Wasting (BMI <18.5 kg/m2), % | 25 | 22 |
| CD4 T-cell count, cells/µL | 285 (250) | 258 (244) |
| Anemia (males Hb <13 g/dL, female <12 g/dL), % | 77 | 76 |
| Severe anemia (Hb < 8.5 g/dL), % | 18 | 18 |
| Alanine aminotransferase (ALT) > 40 IU/L, % | 11 | 12 |
| Tuberculosis, % | 11 | 8 |
| WHO HIV stage |  |  |
| - I, % | 19 | 15 |
| - II, % | 22 | 27 |
| - III, % | 44 | 43 |
| - IV, % | 15 | 15 |

Supplementary Table 2.Characteristics of ART-experienced adult patients enrolled in the HIV treatment and care program in Dar es Salaam, Tanzania from 2004 to 2012 who received multivitamins as compared to patients who did not receive multivitamins at baseline (n =46,977).

|  | **Multivitamin provision at baseline** |  |
| --- | --- | --- |
|  | **Yes (N=27,675)** | **No****(N=19,302)** |
| Age, mean years | 38 (10) | 38 (9) |
| * <30 years, %
 | 19 | 19 |
| * 30 to <40 years, %
 | 45 | 45 |
| * 40 to <50 years, %
 | 25 | 26 |
| * ≥50 years, %
 | 11 | 11 |
| Male Sex | 31 | 30 |
| Year  |  |  |
| * 2004 to <2006, %
 | 6 | 13 |
| * 2006 to <2008, %
 | 25 | 43 |
| * 2008 to <2010, %
 | 42 | 35 |
| * After 2010, %
 | 27 | 9 |
| District of Dar es Salaam |  |  |
| - Ilala, %  | 25 | 58 |
| - Kinondoni, %  | 39 | 25 |
| - Temeke, %  | 36 | 17 |
| Facility level |  |  |
| - Hospital, % | 78 | 93 |
| - Health center, % | 10 | 1 |
| - Dispensary, % | 12 | 6 |
| Education |  |  |
| - Primary, % | 65 | 62 |
| - Secondary, % | 31 | 32 |
| - Advanced, % | 5 | 6 |
| Marital Status  |  |  |
| - Married-monogamous, % | 39 | 39 |
| - Married-polygamous, % | 3 | 3 |
| - Live w/partner, % | 7 | 8 |
| - Single, % | 13 | 13 |
| - Widowed, % | 17 | 17 |
| - Divorced, % | 7 | 8 |
| - Separated, % | 14 | 13 |
| Body mass index (BMI), kg/m2 | 21.4(4.6) | 22.0 (4.7) |
| Wasting (BMI <18.5 kg/m2), % | 26 | 22 |
| CD4 T-cell count, cells/µL | 186 (172) | 201 (175) |
| Anemia (males Hb <13 g/dL, female <12 g/dL), % | 82 | 79 |
| Severe anemia (Hb < 8.5 g/dL), % | 17 | 17 |
| Alanine aminotransferase (ALT) > 40 IU/L, % | 13 | 13 |
| Tuberculosis, % | 14 | 9 |
| WHO HIV stage |  |  |
| - I, % | 6 | 7 |
| - II, % | 15 | 15 |
| - III, % | 54 | 54 |
| - IV, % | 26 | 23 |

Supplementary Table 3. Multivariate1 estimates of the hazard ratio (HR) of time-varying multivitamins exposure by time since enrollment with mortality and incident2 health outcomes adjusted for time-varying covariates among 48,207 HIV-infected ART-naïve adult patients enrolled in care in Dar es Salaam, Tanzania from 2004 to 2012

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Outcome** | **HR at 1 year (95% CI)** | **HR at 2 years (95% CI)** | **HR at 3 years (95% CI)** | **P-value for effect modification** **by time4** |
| All-cause mortality | 0.76 (0.62- 0.92) | 0.87 (0.62- 1.24) | 1.00 (0.59- 1.70) | 0.19 |
| ART eligibility  | 0.78 (0.74- 0.84) | 0.76 (0.70- 0.81) | 0.73 (0.65- 0.82) | 0.19 |
| Incident anemia3 | 0.88 (0.81- 0.95) | 0.81 (0.72- 0.92) | 0.76 (0.63- 0.91) | 0.08 |
| Incident severe anemia3  | 0.86 (0.78- 0.94) | 0.73 (0.64- 0.86) | 0.64 (0.51- 0.79) | 0.001 |
| Incident wasting (BMI < 18.5kg/m2) | 0.78 (0.72- 0.84) | 0.72 (0.64- 0.81) | 0.67 (0.56- 0.80) | 0.04 |
| Incident tuberculosis | 0.84 (0.76- 0.92) | 0.84 (0.72- 0.98) | 0.85 (0.68- 1.06) | 0.88 |
| Incident WHO Stage III or IV | 0.72 (0.67- 0.76) | 0.67 (0.61- 0.73) | 0.63 (0.55- 0.72) | 0.02 |
| Any increase in WHO HIV Stage | 0.80 (0.76- 0.85) | 0.80 (0.73- 0.87) | 0.79 (0.70- 0.90) | 0.75 |
| Incident ALT >40 IU/L | 0.84 (0.78- 0.91) | 0.74 (0.65- 0.85) | 0.66 (0.54- 0.81) | 0.002 |
| Incident ALT >200 IU/L | 0.83 (0.57-1.20) | 0.99 (0.52- 1.89) | 1.19 (0.45- 3.14) | 0.30 |

1 Model adjusted for covariates with p-value < 0.2 in the univariate time to mortality models when covariate was not the outcome of interest: age at baseline, sex, district, facility level, height, BMI, wasting at visit, MUAC at visit, CD4 cell count at visit, Hb at visit, anemia at visit, ALT at visit, tuberculosis at visit, WHO HIV stage, and on ART within 60 days of enrollment). Time-varying analyses used updated covariates. Missing indicator method used for missing covariate observations in the adjusted models.

2 Individuals with event of interest at baseline excluded from the analysis

3 Anemia: males Hb <13 g/dL, female <12 g/dL; severe anemia: <8.5 g/dL for both sexes

4 P-value for Likelihood Ratio Test.

Supplementary Table 4. Multivariate1 estimates of the effect of time-varying multivitamins exposure at each year since ART initiation with mortality and incident2 health outcomes adjusted for time-varying covariates among 46,977 HIV-infected ART-experienced adult patients enrolled in care in Dar es Salaam, Tanzania from 2004 to 2012

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Outcome** | **HR at 1 year (95% CI)** | **HR at 2 years (95% CI)** | **HR at 3 years (95% CI)** | **P-value for effect modification** **by time5** |
| All-cause mortality | 0.90 (0.84- 0.96) | 1.05 (0.95- 1.16) | 1.22 (1.06- 1.41) | <0.001 |
| Incident anemia3 | 0.82 (0.77- 0.88) | 0.76 (0.70- 0.83) | 0.71 (0.63- 0.80) | 0.003 |
| Severe incident anemia3 | 0.88 (0.82- 0.95) | 0.87 (0.79- 0.95) | 0.86 (0.75- 0.98) | 0.60 |
| Incident wasting (BMI < 18.5 kg/m2) | 0.84 (0.79- 0.88) | 0.78 (0.73- 0.83) | 0.72 (0.66- 0.79) | <0.001 |
| Immunologic failure4 | 0.85 (0.74- 0.98) | 0.71 (0.57- 0.88) | 0.58 (0.41- 0.83) | 0.01 |
| Incident tuberculosis | 0.78 (0.73- 0.84) | 0.82 (0.75- 0.89) | 0.85 (0.75- 0.97) | 0.08 |
| Incident WHO Stage III or IV | 0.93 (0.86- 1.01) | 1.06 (0.97- 1.16) | 1.20 (1.06- 1.36) | <0.001 |
| Any increase in WHO HIV stage | 1.01 (0.95- 1.08) | 1.04 (0.97- 1.12) | 1.07 (0.97- 1.19) | 0.16 |
| Incident ALT >40 IU/L | 0.81 (0.77- 0.84) | 0.79 (0.74- 0.84) | 0.77 (0.70- 0.85) | 0.32 |
| Incident ALT >200 IU/L | 0.81 (0.63- 1.04) | 0.76 (0.52- 1.07) | 0.69 (0.41- 1.17) | 0.44 |

1 Model adjusted for covariates with p-value < 0.2 in the univariate time to mortality models when covariate was not the outcome of interest: age at baseline, sex, district, facility level, height, BMI, wasting at visit, MUAC at visit, CD4 cell count at visit, Hb at visit, anemia at visit, ALT at visit, tuberculosis at visit, WHO HIV stage, and on ART within 60 days of enrollment). Time-varying analyses used updated covariates. Missing indicator method used for missing covariate observations in the adjusted models.

2 Individuals with event of interest at baseline excluded from the analysis

3 Anemia: males Hb <13 g/dL, female <12 g/dL; severe anemia: <8.5 g/dL for both sexes

4 Immunologic failure: On or after 168 days on ART, CD4 count ≤ CD4 at baseline, CD4 < half of the maximum value, or CD4 < 100 cells/µl.

5 P-value for Likelihood Ratio Test.