

**Appendix S1**  
**Table SA1: Data notes**

Variable	Definition	Source	Coverage
diabetes	Diabetes prevalence	NCD RisC	2000 – 2014
raisedBP	Prevalence of raised blood pressure	NCD RisC	2000 – 2015
sysBP	Mean systolic blood pressure (mmHg)	NCD RisC	2000 – 2015
hivprev	Percentage of people ages 15-49 who are infected with HIV	World Bank, from UNAIDS	2000 – 2016
ART	Percentage of total population on antiretroviral therapy (calculated as the proportion of HIV-positive times proportion of HIV-positives on ART)	World Bank, from UNAIDS	2000 – 2016
meanbmi	Mean body mass index (kg/m <sup>2</sup> )	NCD RisC	2000 – 2016
overweight	Prevalence of BMI $\geq$ 25 kg/m <sup>2</sup>	NCD RisC	2000 – 2016
obese	Prevalence of BMI $\geq$ 30 kg/m <sup>2</sup>	NCD RisC	2000 – 2016
enrol	Total enrolment in primary and secondary education, regardless of age, expressed as a percentage of the population of official primary and secondary education age	World Bank, from UNESCO	2000 – 2015
loggdp	Gross domestic product divided by midyear population, in constant 2010 U.S. dollars	World Bank	2000 – 2016
perc2039	Total 20-39 years old to all population (%)	United Nations	2000 – 2015 <sup>1</sup>
perc4059	Total 40-59 years old to all population (%)	United Nations	2000 – 2015 <sup>7</sup>
perc60	Total 60 years and older to all population (%)	United Nations	2000 – 2015 <sup>7</sup>

<sup>1</sup> Data given every 5 years

## Appendix S2: Regression results with linear time trend

**Table SB1: Diabetes**

VARIABLES	1	2	3	4	5	6
HIV	0.089** (0.015 - 0.163)	0.097** (0.020 - 0.174)	0.074** (0.010 - 0.139)	0.063*** (0.022 - 0.104)	0.059*** (0.018 - 0.100)	0.058*** (0.018 - 0.098)
ART		0.021* (-0.003 - 0.045)	0.029*** (0.012 - 0.046)	0.029*** (0.011 - 0.047)	0.029*** (0.011 - 0.047)	0.046*** (0.026 - 0.066)
BMI			0.010*** (0.008 - 0.013)	0.010*** (0.007 - 0.012)	0.010*** (0.007 - 0.013)	0.009*** (0.006 - 0.012)
Education				-0.010** (-0.019 - -0.002)	-0.010** (-0.019 - -0.002)	-0.012*** (-0.021 - -0.003)
Income					0.001 (-0.001 - 0.003)	0.000 (-0.002 - 0.002)
Age 20-39						-0.000 (-0.034 - 0.033)
Age 40-59						0.051** (0.009 - 0.094)
Age 60+						-0.130 (-0.298 - 0.037)
Year	0.001*** (0.001 - 0.002)	0.001*** (0.001 - 0.002)	0.001*** (0.000 - 0.001)	0.001*** (0.001 - 0.001)	0.001*** (0.000 - 0.001)	0.001*** (0.001 - 0.001)
Constant	-2.899*** (-3.185 - -2.613)	-2.836*** (-3.133 - -2.539)	-1.373*** (-1.745 - -1.001)	-1.681*** (-2.080 - -1.282)	-1.601*** (-2.032 - -1.170)	-1.726*** (-2.210 - -1.242)
Observations	660	660	660	562	559	559
Number of countries	44	44	44	42	42	42
Adjusted R-squared	0.937	0.939	0.961	0.970	0.970	0.973

Outcome variable: diabetes prevalence in percent; 95% confidence intervals in brackets; \* p < 0.1, \*\* p < 0.05, \*\*\* p < 0.01; all models adjusted for fixed effects

**Table SB2: Mean BMI**

VARIABLES	1	2	3	4	5
HIV	2.363 (-1.195 - 5.920)	2.119 (-0.999 - 5.238)	1.217 (-1.617 - 4.051)	1.434 (-1.534 - 4.403)	0.665 (-1.813 - 3.142)
ART		-0.613 (-2.251 - 1.024)	-0.089 (-1.793 - 1.616)	-0.220 (-1.961 - 1.522)	1.229 (-0.558 - 3.016)
Education			0.397 (-0.184 - 0.979)	0.292 (-0.233 - 0.817)	0.298 (-0.231 - 0.828)
Income				-0.030 (-0.283 - 0.223)	-0.077 (-0.327 - 0.172)
Age 20-39					-2.067* (-4.343 - 0.209)
Age 40-59					3.951** (0.223 - 7.679)
Age 60+					-2.709 (-14.449 - 9.030)
Year	0.077*** (0.070 - 0.084)	0.078*** (0.070 - 0.086)	0.070*** (0.058 - 0.082)	0.073*** (0.062 - 0.084)	0.074*** (0.062 - 0.086)
Constant	-132.096*** (-146.026 - -118.165)	-134.160*** (-150.550 - -117.770)	-117.685*** (-140.976 - -94.394)	-124.407*** (-145.844 - -102.969)	-124.831*** (-148.020 - -101.642)
Observations	748	748	582	578	578
Number of countries	44	44	42	42	42
Adjusted R-squared	0.933	0.934	0.933	0.938	0.942

Outcome variable: mean BMI (kg/m<sup>2</sup>); 95% confidence intervals in brackets; \* p < 0.1, \*\* p < 0.05, \*\*\* p < 0.01; all models adjusted for fixed effects

**Table SB3: Overweight**

VARIABLES	1	2	3	4	5
HIV	0.117* (-0.020 - 0.254)	0.139** (0.010 - 0.268)	0.137** (0.001 - 0.273)	0.142* (-0.000 - 0.284)	0.111 (-0.023 - 0.245)
ART		0.055* (-0.010 - 0.120)	0.058 (-0.016 - 0.133)	0.056 (-0.017 - 0.130)	0.073 (-0.037 - 0.182)
Education			0.014 (-0.012 - 0.040)	0.012 (-0.014 - 0.039)	0.009 (-0.014 - 0.032)
Income				-0.001 (-0.010 - 0.008)	-0.001 (-0.011 - 0.009)
Age 20-39					0.012 (-0.148 - 0.172)
Age 40-59					0.230** (0.019 - 0.440)
Age 60+					0.284 (-0.343 - 0.911)
Year	0.006*** (0.005 - 0.006)	0.006*** (0.005 - 0.006)	0.005*** (0.005 - 0.006)	0.005*** (0.005 - 0.006)	0.005*** (0.005 - 0.006)
Constant	-11.214*** (-11.845 - -10.584)	-11.029*** (-11.657 - -10.401)	-10.393*** (-11.476 - -9.311)	-10.513*** (-11.697 - -9.330)	-10.246*** (-11.217 - -9.274)
Observations	748	748	582	578	578
Number of countries	44	44	42	42	42
Adjusted R-squared	0.977	0.978	0.979	0.979	0.981

Outcome variable: prevalence of BMI $\geq$ 25kg/m<sup>2</sup> in percent; 95% confidence intervals in brackets; \* p < 0.1, \*\* p < 0.05, \*\*\* p < 0.01; all models adjusted for fixed effects

**Table SB4: Obesity**

VARIABLES	1	2	3	4	5
HIV	0.103 (-0.091 - 0.298)	0.155** (0.004 - 0.305)	0.167* (-0.003 - 0.336)	0.187** (0.022 - 0.351)	0.147** (0.025 - 0.269)
ART		0.130*** (0.063 - 0.197)	0.137*** (0.061 - 0.212)	0.136*** (0.064 - 0.209)	0.140*** (0.048 - 0.232)
Education			-0.000 (-0.027 - 0.027)	-0.002 (-0.028 - 0.025)	-0.003 (-0.023 - 0.017)
Income				-0.005 (-0.013 - 0.002)	-0.005 (-0.013 - 0.004)
Age 20-39					-0.003 (-0.144 - 0.138)
Age 40-59					0.234** (0.056 - 0.413)
Age 60+					0.547** (0.034 - 1.061)
Year	0.003*** (0.003 - 0.003)	0.003*** (0.002 - 0.003)	0.003*** (0.002 - 0.003)	0.003*** (0.002 - 0.003)	0.003*** (0.002 - 0.003)
Constant	-5.902*** (-6.608 - -5.197)	-5.465*** (-5.980 - -4.949)	-5.267*** (-6.425 - -4.109)	-5.597*** (-6.846 - -4.348)	-5.248*** (-6.134 - -4.363)
Observations	748	748	582	578	578
Number of countries	44	44	42	42	42
Adjusted R-squared	0.922	0.942	0.934	0.937	0.951

Outcome variable: prevalence of BMI $\geq$ 30kg/m<sup>2</sup> in percent; 95% confidence intervals in brackets; \* p < 0.1, \*\* p < 0.05, \*\*\* p < 0.01; all models adjusted for fixed effects

**Table SB5: Hypertension (Raised BP)**

VARIABLES	1	2	3	4	5	6
HIV	-0.095 (-0.330 - 0.141)	-0.117 (-0.347 - 0.113)	-0.095 (-0.337 - 0.147)	-0.150 (-0.422 - 0.122)	-0.182 (-0.450 - 0.086)	-0.096 (-0.305 - 0.112)
ART		-0.056 (-0.171 - 0.058)	-0.064 (-0.186 - 0.058)	-0.009 (-0.132 - 0.114)	-0.008 (-0.128 - 0.113)	-0.090 (-0.286 - 0.106)
BMI			-0.010 (-0.029 - 0.008)	-0.007 (-0.027 - 0.012)	-0.004 (-0.024 - 0.015)	0.003 (-0.019 - 0.024)
Education				-0.004 (-0.060 - 0.051)	-0.002 (-0.057 - 0.052)	-0.006 (-0.049 - 0.037)
Income					0.007 (-0.010 - 0.025)	0.009 (-0.010 - 0.028)
Age 20-39						0.150 (-0.183 - 0.482)
Age 40-59						-0.480*** (-0.797 - -0.162)
Age 60+						-0.612 (-1.747 - 0.523)
Year	-0.001*** (-0.001 - -0.000)	-0.001** (-0.001 - -0.000)	0.000 (-0.001 - 0.002)	0.000 (-0.002 - 0.002)	-0.000 (-0.002 - 0.001)	-0.001 (-0.003 - 0.001)
Constant	1.615*** (0.659 - 2.571)	1.434*** (0.394 - 2.473)	0.021 (-2.770 - 2.812)	0.329 (-2.661 - 3.318)	1.146 (-1.871 - 4.164)	1.624 (-1.645 - 4.894)
Observations	704	704	704	582	578	578
Number of countries	44	44	44	42	42	42
Adjusted R-squared	0.136	0.148	0.164	0.100	0.115	0.254

Outcome variable: prevalence of raised blood pressure in percent; 95% confidence intervals in brackets; \* p < 0.1, \*\* p < 0.05, \*\*\* p < 0.01; all models adjusted for fixed effects

**Table SB6: Systolic BP**

VARIABLES	1	2	3	4	5	6
HIV	-17.015 (-39.874 - 5.844)	-18.563 (-41.493 - 4.366)	-18.075 (-41.450 - 5.301)	-20.982 (-46.269 - 4.305)	-22.919* (-48.762 - 2.924)	-17.385 (-41.736 - 6.965)
ART		-3.932 (-12.654 - 4.790)	-4.099 (-12.996 - 4.799)	-1.278 (-10.769 - 8.212)	-1.363 (-10.801 - 8.075)	-8.324 (-24.783 - 8.134)
BMI			-0.229 (-1.722 - 1.263)	-0.163 (-1.724 - 1.398)	-0.070 (-1.724 - 1.584)	0.425 (-1.336 - 2.186)
Education				0.053 (-3.953 - 4.060)	0.099 (-3.846 - 4.045)	-0.085 (-3.868 - 3.697)
Income					0.502 (-1.067 - 2.072)	0.694 (-1.096 - 2.483)
Age 20-39						11.038 (-17.281 - 39.356)
Age 40-59						-32.407*** (-54.985 - -9.829)
Age 60+						-23.994 (-120.622 - 72.635)
Year	0.006 (-0.033 - 0.046)	0.013 (-0.030 - 0.055)	0.031 (-0.099 - 0.161)	0.020 (-0.110 - 0.150)	-0.002 (-0.141 - 0.137)	-0.028 (-0.182 - 0.126)
Constant	117.288*** (36.921 - 197.656)	104.648** (19.608 - 189.688)	73.273 (-156.696 - 303.243)	94.204 (-134.923 - 323.331)	132.070 (-114.483 - 378.623)	174.603 (-94.830 - 444.037)
Observations	704	704	704	582	578	578
Number of countries	44	44	44	42	42	42
Adjusted R-squared	0.069	0.077	0.077	0.101	0.105	0.181

Outcome variable: mean systolic blood pressure (mmHg); 95% confidence intervals in brackets; \* p < 0.1, \*\* p < 0.05, \*\*\* p < 0.01; all models adjusted for fixed effects

## Appendix S3: Regression results of robustness checks

**Table SA1: Regression results with year dummies**

VARIABLES	Diabetes prevalence	Mean BMI	Overweight prevalence	Obesity prevalence	Hypertension prevalence	Mean systolic blood pressure
HIV	0.056*** (0.015 - 0.097)	0.915 (-1.716 - 3.546)	0.110 (-0.026 - 0.245)	0.146** (0.021 - 0.271)	-0.101 (-0.316 - 0.114)	-16.736 (-41.809 - 8.337)
ART	0.042*** (0.022 - 0.062)	1.697* (-0.119 - 3.512)	0.069 (-0.044 - 0.182)	0.136*** (0.042 - 0.231)	-0.095 (-0.297 - 0.107)	-7.033 (-24.336 - 10.270)
BMI	0.010*** (0.007 - 0.013)				0.004 (-0.023 - 0.030)	0.074 (-2.011 - 2.159)
Education	-0.013*** (-0.023 - -0.004)	0.426 (-0.100 - 0.952)	0.008 (-0.016 - 0.032)	-0.004 (-0.025 - 0.017)	-0.007 (-0.053 - 0.039)	0.262 (-3.574 - 4.097)
Income	0.000 (-0.002 - 0.002)	-0.070 (-0.315 - 0.175)	-0.001 (-0.012 - 0.010)	-0.005 (-0.013 - 0.004)	0.009 (-0.010 - 0.028)	0.682 (-1.141 - 2.506)
Age 20-39	0.004 (-0.030 - 0.038)	-2.415** (-4.686 - -0.143)	0.015 (-0.149 - 0.179)	0.001 (-0.144 - 0.145)	0.155 (-0.190 - 0.500)	9.655 (-19.590 - 38.900)
Age 40-59	0.045** (0.003 - 0.088)	4.437** (0.487 - 8.386)	0.225** (0.012 - 0.437)	0.229** (0.049 - 0.410)	-0.489*** (-0.807 - -0.171)	-30.110*** (-52.044 - -8.176)
Age 60+	-0.136 (-0.317 - 0.046)	-1.681 (-14.435 - 11.072)	0.283 (-0.357 - 0.923)	0.543** (0.010 - 1.076)	-0.619 (-1.762 - 0.524)	-23.535 (-123.058 - 75.987)
Constant	-0.177*** (-0.251 - -0.103)	22.703*** (20.680 - 24.725)	0.163*** (0.067 - 0.259)	0.019 (-0.059 - 0.098)	0.208 (-0.390 - 0.805)	125.798*** (77.949 - 173.646)
Observations	559	578	578	578	578	578
Number of iso3	42	42	42	42	42	42
Adjusted R-squared	0.974	0.951	0.981	0.950	0.238	0.173

Results of linear regressions; 95% confidence intervals in brackets; \* p < 0.1, \*\* p < 0.05, \*\*\* p < 0.01; all models adjusted for fixed effects; all models include year dummies; outcome variables: diabetes prevalence in percent; country-level mean BMI (kg/m<sup>2</sup>); overweight as prevalence of BMI ≥ 25kg/m<sup>2</sup> in percent; overweight as prevalence of BMI ≥ 30kg/m<sup>2</sup> in percent; prevalence of raised blood pressure in percent; country-level mean systolic blood pressure (mm Hg).



**Table SC2: Regression results with quadratic time indicator**

VARIABLES	Diabetes prevalence	Mean BMI	Overweight prevalence	Obesity prevalence	Hypertension prevalence	Mean systolic blood pressure
HIV	0.056*** (0.016 - 0.097)	0.900 (-1.673 - 3.473)	0.109 (-0.024 - 0.242)	0.145** (0.022 - 0.268)	-0.099 (-0.309 - 0.111)	-16.681 (-41.198 - 7.837)
ART	0.042*** (0.022 - 0.062)	1.696* (-0.095 - 3.487)	0.069 (-0.044 - 0.181)	0.136*** (0.042 - 0.229)	-0.094 (-0.295 - 0.107)	-6.958 (-24.080 - 10.164)
BMI	0.010*** (0.007 - 0.013)				0.004 (-0.022 - 0.030)	0.076 (-1.994 - 2.146)
Education	-0.013*** (-0.023 - -0.004)	0.423 (-0.092 - 0.939)	0.008 (-0.016 - 0.031)	-0.004 (-0.025 - 0.016)	-0.007 (-0.052 - 0.038)	0.269 (-3.493 - 4.031)
Income	0.000 (-0.002 - 0.002)	-0.070 (-0.309 - 0.168)	-0.001 (-0.011 - 0.009)	-0.005 (-0.013 - 0.004)	0.009 (-0.010 - 0.028)	0.680 (-1.105 - 2.465)
Age 20-39	0.004 (-0.030 - 0.037)	-2.422** (-4.680 - -0.164)	0.015 (-0.147 - 0.177)	0.001 (-0.142 - 0.143)	0.154 (-0.186 - 0.495)	9.604 (-19.300 - 38.507)
Age 40-59	0.045** (0.002 - 0.087)	4.447** (0.537 - 8.356)	0.226** (0.015 - 0.436)	0.229** (0.051 - 0.408)	-0.487*** (-0.802 - -0.173)	-30.033*** (-51.806 - -8.261)
Age 60+	-0.136 (-0.316 - 0.043)	-1.758 (-14.297 - 10.781)	0.276 (-0.358 - 0.910)	0.538** (0.012 - 1.065)	-0.615 (-1.739 - 0.510)	-23.031 (-121.048 - 74.986)
time	0.000 (-0.000 - 0.001)	0.140*** (0.117 - 0.164)	0.005*** (0.004 - 0.006)	0.002*** (0.001 - 0.003)	-0.001 (-0.005 - 0.003)	0.131 (-0.204 - 0.465)
time squared	0.000** (0.000 - 0.000)	-0.002*** (-0.003 - -0.001)	0.000 (-0.000 - 0.000)	0.000* (-0.000 - 0.000)	0.000 (-0.000 - 0.000)	-0.004 (-0.009 - 0.002)
Constant	-0.182*** (-0.251 - -0.112)	21.396*** (19.504 - 23.288)	0.111** (0.020 - 0.201)	-0.005 (-0.079 - 0.069)	0.220 (-0.336 - 0.776)	124.761*** (80.200 - 169.323)
Observations	559	578	578	578	578	578
Number of iso3	42	42	42	42	42	42
Adjusted R-squared	0.974	0.952	0.981	0.951	0.254	0.191

Results of linear regressions; 95% confidence intervals in brackets; \* p < 0.1, \*\* p < 0.05, \*\*\* p < 0.01; all models adjusted for fixed effects; outcome variables: diabetes prevalence in percent; country-level mean BMI (kg/m<sup>2</sup>); overweight as prevalence of BMI>=25kg/m<sup>2</sup> in percent; overweight as prevalence of BMI>=30kg/m<sup>2</sup> in percent; prevalence of raised blood pressure in percent; country-level mean systolic blood pressure (mm Hg).

**Table SC3: Regression results without top and bottom 3 percentiles**

VARIABLES	Diabetes prevalence	Mean BMI	Overweight prevalence	Obesity prevalence	Hypertension prevalence	Mean systolic blood pressure
HIV	0.044** (0.004 - 0.085)	0.531 (-2.034 - 3.096)	0.073 (-0.090 - 0.236)	0.084 (-0.058 - 0.225)	-0.127 (-0.334 - 0.080)	-16.689 (-40.919 - 7.540)
ART	0.032** (0.008 - 0.056)	0.004 (-1.704 - 1.711)	0.014 (-0.093 - 0.122)	0.087* (-0.009 - 0.183)	-0.110 (-0.298 - 0.077)	-8.915 (-25.330 - 7.500)
BMI	0.010*** (0.008 - 0.013)				0.001 (-0.019 - 0.021)	0.468 (-1.328 - 2.263)
Education	-0.013*** (-0.021 - -0.005)	0.266 (-0.270 - 0.801)	0.010 (-0.015 - 0.035)	0.000 (-0.021 - 0.022)	0.004 (-0.037 - 0.044)	0.223 (-3.577 - 4.023)
Income	0.001 (-0.001 - 0.003)	-0.008 (-0.240 - 0.223)	0.001 (-0.008 - 0.010)	-0.003 (-0.009 - 0.004)	0.012 (-0.005 - 0.029)	0.748 (-0.967 - 2.462)
Age 20-39	0.029 (-0.018 - 0.076)	-1.428 (-3.660 - 0.804)	0.091 (-0.093 - 0.274)	0.071 (-0.105 - 0.247)	0.159 (-0.162 - 0.480)	12.710 (-19.322 - 44.741)
Age 40-59	0.030 (-0.016 - 0.076)	3.074 (-0.843 - 6.991)	0.158 (-0.059 - 0.375)	0.170** (0.003 - 0.337)	-0.367* (-0.757 - 0.023)	-30.384*** (-52.951 - -7.816)
Age 60+	-0.232*** (-0.395 - -0.070)	2.058 (-12.340 - 16.457)	0.208 (-0.602 - 1.018)	0.285 (-0.273 - 0.844)	-0.252 (-1.382 - 0.877)	-18.891 (-111.218 - 73.436)
Year	0.001*** (0.000 - 0.001)	0.074*** (0.062 - 0.087)	0.005*** (0.005 - 0.006)	0.003*** (0.002 - 0.003)	-0.001 (-0.003 - 0.001)	-0.042 (-0.212 - 0.128)
Constant	-1.583*** (-2.052 - -1.114)	-126.834*** (-150.210 - -103.457)	-10.168*** (-11.302 - -9.035)	-5.063*** (-6.042 - -4.083)	1.891 (-1.298 - 5.081)	199.515 (-99.189 - 498.219)
Observations	533	542	540	540	547	544
Number of iso3	42	42	41	41	42	40
Adjusted R-squared	0.976	0.946	0.982	0.956	0.209	0.175

Results of linear regressions; 95% confidence intervals in brackets; \* p < 0.1, \*\* p < 0.05, \*\*\* p < 0.01; all models adjusted for fixed effects; trimmed top and bottom 3 percentiles; outcome variables: diabetes prevalence in percent; country-level mean BMI (kg/m<sup>2</sup>); overweight as prevalence of BMI ≥ 25kg/m<sup>2</sup> in percent; overweight as prevalence of BMI ≥ 30kg/m<sup>2</sup> in percent; prevalence of raised blood pressure in percent; country-level mean systolic blood pressure (mm Hg).