

Supplemental Appendix for NSF Proposal:  
(Re)Emerging Disease and Global Security in the 21st  
Century

Summary Statistics and Maps

Table A1: Summary Statistics

	Min.	Median	Mean	Max.	Std. Dev.
Dependent variables					
<i>State conflict<sub>it</sub></i>	0	0	0.008	75	0.262
<i>Rebel conflict<sub>it</sub></i>	0	0	0.003	37	0.126
<i>Militia conflict<sub>it</sub></i>	0	0	0.005	22	0.134
<i>Pol. militia conflict<sub>it</sub></i>	0	0	0.003	21	0.109
<i>Id. militia conflict<sub>it</sub></i>	0	0	0.002	19	0.072
<i>State violence<sub>it</sub></i>	0	0	0.003	27	0.094
<i>Rebel violence<sub>it</sub></i>	0	0	0.003	46	0.108
<i>Militia violence<sub>it</sub></i>	0	0	0.010	50	0.195
<i>Pol. militia violence<sub>it</sub></i>	0	0	0.008	50	0.178
<i>Id. militia violence<sub>it</sub></i>	0	0	0.002	16	0.066
Independent variables					
<i>ZDO events<sub>it</sub></i>	0	0	0.001	14	0.032
<i>NTL<sub>it</sub><sup>1</sup></i>	0	0	1.307	5.344	1.634
<i>Population<sub>it</sub><sup>1</sup></i>	0	4.211	3.912	7.267	1.295
<i>Prec. anom<sub>it</sub></i>	-4.032	-0.037	0.053	5.295	0.855
<i>Drought<sub>it</sub></i>	-9.004	-0.199	-0.258	7.887	1.015
<i>Temp. anom<sub>it</sub></i>	-5.295	0.493	0.480	5.295	0.917
<i>Life exp.<sub>it</sub><sup>1</sup></i>	4.727	7.093	7.206	10.041	1.072
<i>Gov. eff.<sub>it</sub></i>	0	0.857	1.977	50.102	3.045
<i>GDPpc<sub>it</sub><sup>1</sup></i>	3.747	4.110	4.113	4.355	0.130
<i>State conflict<sub>jt</sub></i>	0	0	0.007	1	0.083
<i>Rebel conflict<sub>jt</sub></i>	0	0	0.003	1	0.057
<i>Militia conflict<sub>jt</sub></i>	0	0	0.006	1	0.078
<i>Pol. mil. conflict<sub>jt</sub></i>	0	0	0.004	1	0.062
<i>Id. mil. conflict<sub>jt</sub></i>	0	0	0.003	1	0.052
<i>State violence<sub>jt</sub></i>	0	0	0.004	1	0.061
<i>Rebel violence<sub>jt</sub></i>	0	0	0.004	1	0.060
<i>Militia violence<sub>jt</sub></i>	0	0	0.010	1	0.100
<i>Pol. mil. violence<sub>jt</sub></i>	0	0	0.008	1	0.091
<i>Id. mil. violence<sub>jt</sub></i>	0	0	0.003	1	0.050

*i* refers to a given grid cell, *j* refers to any adjacent grid cells, and *t* refers to month in a given year

<sup>1</sup> Natural log

# Main Analysis Tables

Table A2: Determinants of Armed Conflict in African Locations

	State		Rebel		Militia		Pol. Mil.		Id. Mil.	
	Base (1)	Count. (2)	Base (3)	Count. (4)	Base (5)	Count. (6)	Base (7)	Count. (8)	Base (9)	Count. (10)
<i>ZDO events<sub>it</sub></i>	-0.015*** (0.004)	-0.013** (0.006)	-0.002 (0.003)	0.002 (0.006)	0.018* (0.011)	0.020 (0.015)	0.011 (0.010)	0.010 (0.013)	0.008* (0.004)	0.012** (0.005)
<i>NLT<sub>it</sub></i> <sup>1</sup>	-0.0001 (0.0002)	0.0001 (0.0003)	0.0001 (0.0001)	0.0001 (0.0001)	0.001*** (0.0002)	0.001*** (0.0002)	0.0004*** (0.0001)	0.0004** (0.0002)	0.0002** (0.0001)	0.0002** (0.0001)
<i>Population<sub>it</sub></i> <sup>1</sup>	0.002 (0.002)	-0.001 (0.003)	0.002* (0.001)	-0.0003 (0.001)	0.005*** (0.002)	0.003 (0.002)	0.004*** (0.001)	0.003* (0.001)	0.0004 (0.001)	-0.0003 (0.001)
<i>DV<sub>it-1</sub></i>	0.626*** (0.126)	0.453*** (0.090)	0.488*** (0.138)	0.323*** (0.104)	0.320*** (0.068)	0.247*** (0.039)	0.401*** (0.092)	0.305*** (0.053)	0.135*** (0.022)	0.092*** (0.016)
<i>Prec. anom<sub>it</sub></i>	-0.00003 (0.0002)	0.0001 (0.0002)	-0.0003*** (0.0001)	-0.0002** (0.0001)	-0.0004*** (0.0001)	-0.0004*** (0.0002)	-0.0002 (0.0001)	-0.0002* (0.0001)	-0.0002** (0.0001)	-0.0002** (0.0001)
<i>Drought<sub>it</sub></i>	-0.0002 (0.0002)	-0.0001 (0.0002)	0.0002* (0.0001)	0.0003*** (0.0001)	0.0002 (0.0002)	0.0003* (0.0002)	0.0001 (0.0001)	0.0001 (0.0001)	0.0001 (0.0001)	0.0002** (0.0001)
<i>Temp. anom<sub>it</sub></i>	-0.0001 (0.0001)	-0.0003 (0.0003)	0.0002 (0.0002)	0.00001 (0.0001)	-0.0001 (0.0001)	-0.0001 (0.0001)	-0.0001 (0.0001)	-0.0001 (0.0001)	0.0001 (0.0001)	-0.00001 (0.0001)
<i>Life exp.<sub>it</sub></i> <sup>1</sup>		-0.004** (0.002)		-0.001*** (0.0003)		-0.002 (0.001)		-0.001 (0.001)		-0.0004 (0.0005)
<i>Gov. eff.<sub>it</sub></i>		-0.001 (0.0004)		0.001*** (0.0004)		0.0001 (0.0002)		0.0002 (0.0002)		-0.0002 (0.0001)
<i>GDPpc<sub>it</sub></i> <sup>1</sup>		-0.061*** (0.009)		-0.011*** (0.004)		-0.038*** (0.007)		-0.016*** (0.005)		-0.026*** (0.004)
$\tau_t$	0.00003*** (3.741e-06)	0.0001*** (0.00001)	0.00000 (5.970e-06)	0.00002*** (0.00001)	0.00002*** (0.00001)	0.0001*** (0.00002)	0.00001*** (0.00001)	0.00003*** (0.00001)	0.00002*** (1.316e-05)	0.00004*** (4.755e-06)
Observations	1,779,790	1,473,765	1,779,790	1,473,765	1,779,790	1,473,765	1,779,790	1,473,765	1,779,790	1,473,765
R <sup>2</sup>	0.531	0.641	0.345	0.152	0.230	0.145	0.293	0.166	0.054	0.067
Adjusted R <sup>2</sup>	0.528	0.639	0.341	0.146	0.226	0.139	0.289	0.160	0.049	0.061

Standard errors clustered on grid cell in parentheses; fixed effects by month and country were included in each regression, although none is reported here.

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

<sup>1</sup> Natural log

Table A3: Determinants of Repressive Violence in African Locations

	State		Rebel		Militia		Pol. Mil.		Id. Mil.	
	Base (11)	Count. (12)	Base (13)	Count. (14)	Base (15)	Count. (16)	Base (17)	Count. (18)	Base (19)	Count. (20)
<i>ZDO events<sub>it</sub></i>	0.004 (0.006)	0.008 (0.009)	-0.001 (0.008)	0.005 (0.009)	0.025 (0.021)	0.035 (0.026)	0.003 (0.009)	0.005 (0.011)	0.032 (0.024)	0.042 (0.030)
<i>N<sub>T</sub>L<sub>it</sub><sup>1</sup></i>	0.0003* (0.0001)	0.0001 (0.0001)	-0.0003** (0.0001)	-0.0003*** (0.0001)	0.001*** (0.0003)	0.001** (0.0003)	0.001*** (0.0003)	0.0005* (0.0003)	0.0003*** (0.0001)	0.0002** (0.0001)
<i>Population<sub>it</sub><sup>1</sup></i>	0.003*** (0.001)	0.001 (0.001)	0.004*** (0.001)	0.001 (0.002)	0.008*** (0.002)	0.003 (0.002)	0.007*** (0.002)	0.002 (0.002)	0.001* (0.001)	0.001 (0.001)
<i>DV<sub>it-1</sub></i>	0.356*** (0.049)	0.327*** (0.073)	0.297*** (0.042)	0.277*** (0.036)	0.468*** (0.055)	0.473*** (0.075)	0.491*** (0.061)	0.509*** (0.085)	0.218*** (0.039)	0.215*** (0.042)
<i>Prec. anom<sub>it</sub></i>	-0.00004 (0.0001)	-0.0001 (0.0001)	-0.0003*** (0.0001)	-0.0002* (0.0001)	-0.001*** (0.0002)	-0.001*** (0.0002)	-0.0004** (0.0002)	-0.0005*** (0.0002)	-0.0002 (0.0001)	-0.0002* (0.0001)
<i>Drought<sub>it</sub></i>	-0.00001 (0.0001)	0.0001 (0.0001)	0.0005*** (0.0001)	0.0004*** (0.0001)	0.0002 (0.0002)	0.001** (0.0002)	0.0001 (0.0002)	0.0003* (0.0002)	0.00002 (0.0001)	0.0001 (0.0001)
<i>Temp. anom<sub>it</sub></i>	-0.0002** (0.0001)	-0.0002 (0.0001)	0.001*** (0.0002)	0.001*** (0.0001)	-0.0005*** (0.0002)	-0.0002 (0.0002)	-0.0004*** (0.0002)	-0.0001 (0.0002)	-0.0001 (0.0001)	-0.0002*** (0.0001)
<i>Life exp.<sub>it</sub><sup>1</sup></i>		0.001 (0.0005)		-0.001*** (0.001)		-0.004*** (0.001)		-0.003** (0.001)		-0.001*** (0.0004)
<i>Gov. eff.<sub>it</sub></i>		0.0001 (0.0001)		0.0004 (0.0003)		-0.0003* (0.0002)		-0.0001 (0.0001)		-0.0003*** (0.0001)
<i>GDPpc<sub>it</sub><sup>1</sup></i>		-0.023*** (0.007)		-0.009* (0.005)		-0.040*** (0.009)		-0.025*** (0.007)		-0.020*** (0.003)
$\tau_t$	0.00002*** (3.741e-06)	0.00004*** (0.00001)	0.00001** (3.815e-05)	0.00002*** (0.00001)	0.00004*** (0.00001)	0.0001*** (0.00002)	0.00002*** (0.00001)	0.0001*** (0.00001)	0.00002*** (0.000001)	0.00004*** (4.008e-05)
Observations	1,779,790	1,473,765	1,779,790	1,473,765	1,779,790	1,473,765	1,779,790	1,473,765	1,779,790	1,473,765
R <sup>2</sup>	0.229	0.233	0.158	0.184	0.363	0.399	0.390	0.439	0.092	0.111
Adjusted R <sup>2</sup>	0.225	0.227	0.154	0.179	0.360	0.395	0.387	0.435	0.087	0.105

Standard errors clustered on grid cell in parentheses; fixed effects by month and country were included in each regression, although none is reported here.

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

<sup>1</sup> Natural log

Table A4: Determinants of Armed Conflict in African Locations – GMMs (2013–2019)

	<b>State</b> (21)	<b>Rebel</b> (22)	<b>Militia</b> (23)	<b>Pol. Mil.</b> (24)	<b>Id. Mil.</b> (25)
<i>ZDO events<sub>it</sub></i>	-0.019** (0.008)	0.005 (0.008)	0.053** (0.024)	0.029 (0.022)	0.027*** (0.009)
<i>NTL<sub>it</sub></i> <sup>1</sup>	-0.0002 (0.0002)	-0.0001* (0.0001)	0.0002 (0.0002)	0.0003 (0.0002)	-0.00003 (0.0001)
<i>Population<sub>it</sub></i> <sup>1</sup>	0.003*** (0.001)	0.001*** (0.0002)	0.005*** (0.0004)	0.003*** (0.0003)	0.003*** (0.0002)
<i>DV<sub>it-1</sub></i>	0.798*** (0.088)	0.463*** (0.133)	0.350*** (0.043)	0.400*** (0.058)	0.169*** (0.021)
<i>Prec. anom<sub>it</sub></i>	-0.0004 (0.0004)	-0.0003 (0.0002)	-0.001*** (0.0003)	-0.0005** (0.0002)	-0.0004* (0.0002)
<i>Drought<sub>it</sub></i>	0.001* (0.0004)	0.0002 (0.0002)	0.001*** (0.0003)	0.0004* (0.0002)	0.001*** (0.0003)
<i>Temp. anom<sub>it</sub></i>	-0.0002 (0.0003)	-0.0003** (0.0002)	-0.0003 (0.0003)	-0.0005** (0.0002)	0.0002 (0.0002)
Observations	1,779,790	1,779,790	1,779,790	1,779,790	1,779,790
Sargan $\chi^2$	5335.49***	5172.7***	4926.19***	7427.42***	7011.34***
AR(1)	-4.184***	-4.920***	-7.707***	-5.820***	-9.209***

Standard errors in parentheses; two-way effects were included in each regression; instruments were  $t - 2$  to  $t - 5$  month lags for each respective dependent variable.

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

<sup>1</sup> Natural log

Table A5: Determinants of Repressive Violence in African Locations – GMMs (2013–2019)

	<b>State</b> (51)	<b>Rebel<sup>2</sup></b> (52)	<b>Militia</b> (53)	<b>Pol. Mil.</b> (54)	<b>Id. Mil.</b> <sup>3</sup> (55)
<i>ZDO events<sub>it</sub></i>	0.022* (0.011)	0.015 (0.015)	0.065 (0.040)	0.019 (0.014)	0.088 (0.062)
<i>NTL<sub>it</sub></i> <sup>1</sup>	0.0003** (0.0001)	-0.0004*** (0.0001)	0.001*** (0.0002)	0.001*** (0.0002)	0.00003 (0.0001)
<i>Population<sub>it</sub></i> <sup>1</sup>	0.004*** (0.0003)	0.002*** (0.0002)	0.007*** (0.001)	0.005*** (0.001)	0.003*** (0.0002)
<i>DV<sub>it-1</sub></i>	0.464*** (0.076)	0.452*** (0.098)	0.635*** (0.064)	0.675*** (0.065)	0.212*** (0.027)
<i>Prec. anom<sub>it</sub></i>	0.0001 (0.0003)	-0.001*** (0.0002)	-0.001 (0.001)	-0.0003 (0.0004)	-0.0003 (0.0003)
<i>Drought<sub>it</sub></i>	0.00001 (0.0003)	0.001*** (0.0002)	0.001* (0.0005)	0.0002 (0.0004)	0.001*** (0.0002)
<i>Temp. anom<sub>it</sub></i>	-0.0003 (0.0002)	-0.0004* (0.0002)	-0.001** (0.0005)	-0.001** (0.0004)	0.00003 (0.0002)
Observations	1,779,790	1,779,790	1,779,790	1,779,790	1,779,790
Sargan $\chi^2$	8482.07***	8642.07***	5172.15***	5349.74***	6502.74***
AR(1)	-4.829***	-5.570***	-8.592***	-7.730***	-6.028***

Standard errors in parentheses; two-way effects were included in each regression; instruments were  $t - 2$  to  $t - 5$  month lags for each respective dependent variable.

\*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$

<sup>1</sup> Natural log; <sup>2</sup>  $t - 3$ – $t - 5$  used as instruments; <sup>3</sup>  $t - 2$  to  $t - 4$  used as instruments.