

# Food Insecurity and Political Violence in Sub-Saharan Africa (and the MENA Region)

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# Motivation

- Climate security debate fraught with assumptions and claims
- Available evidence offers mixed evidence for a climate-conflict link
  - 2007 special issue of *Political Geography*
  - 2012 special issue of *Journal of Peace Research*
- Most quantitative comparative research studies major, state-based armed conflict
- Most quantitative comparative research focuses on direct effects of climate variability or environmental conditions – little consideration of possible mechanisms and importance of context

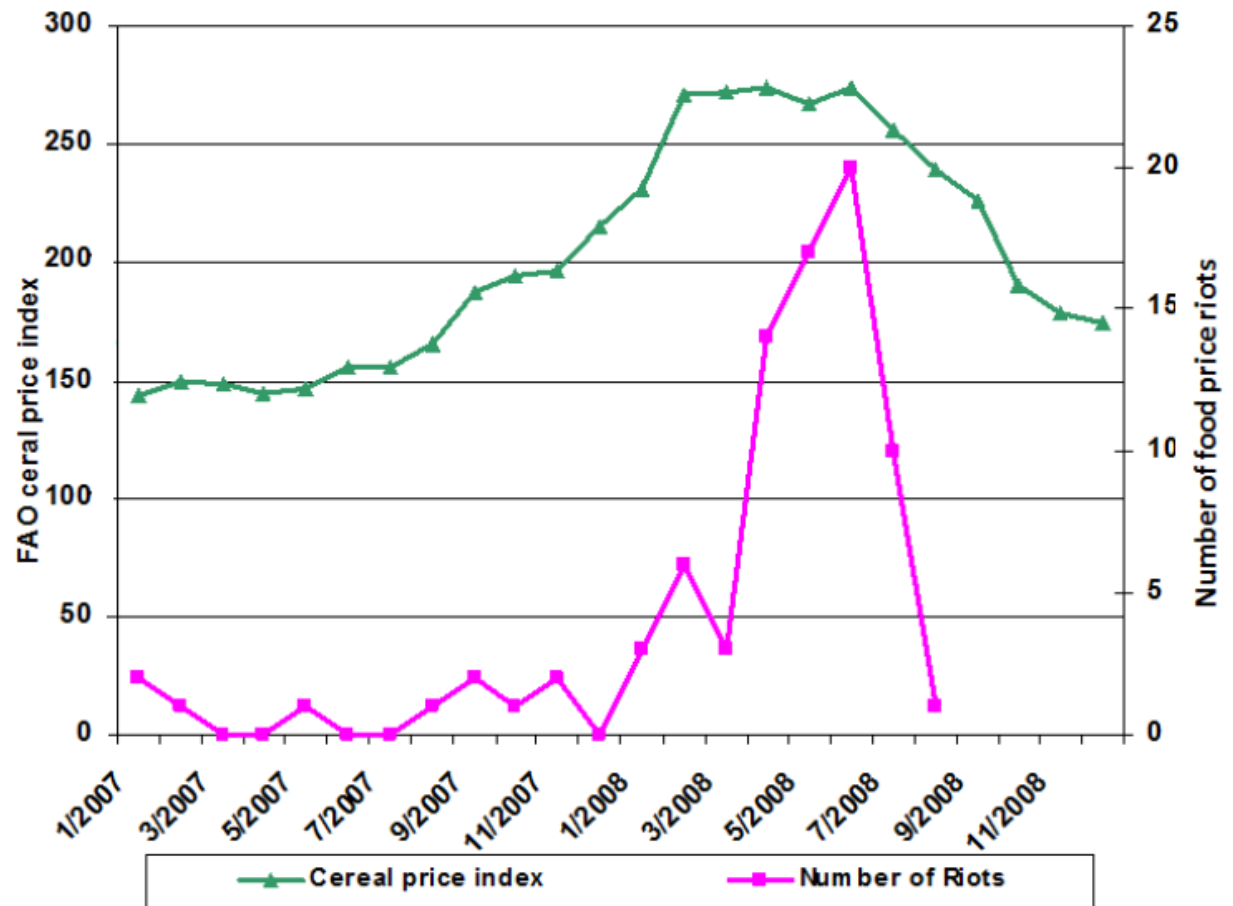
# Food insecurity as intermediate link?

- “There is a clear linkage between hunger and conflict; food security and peace in Africa”
  - José Graziano da Silva, FAO Director-General (FAO 2012)
- “Why are these riots happening? The human instinct is to survive, and people are going to do no matter what to survive. And if you're hungry you get angry quicker”
  - Arif Husain, senior food security analyst, World Food Program (NYT 2008)
- “What makes wars start? Fights over water. Changing patterns of rainfall. Fights over food production, land use”
  - Margaret Beckett, then Foreign Secretary, UK (UNSC 2007)
- “The nomads sometimes steer their herd into our farms and destroy our crops. This drives us crazy and we fight them”
  - Yusuf Bala Sheshe, farmer in Jigwa State, Northern Nigeria (IRIN 2008)

# WDR 2011 on food price and riots



Figure 1 Food prices and rioting, 2007-08




Source: Brinkman, H-J and CS Hendrix. 2010. Food insecurity and conflict: Applying the WDR framework, *World Development Report 2011 Background Paper*.

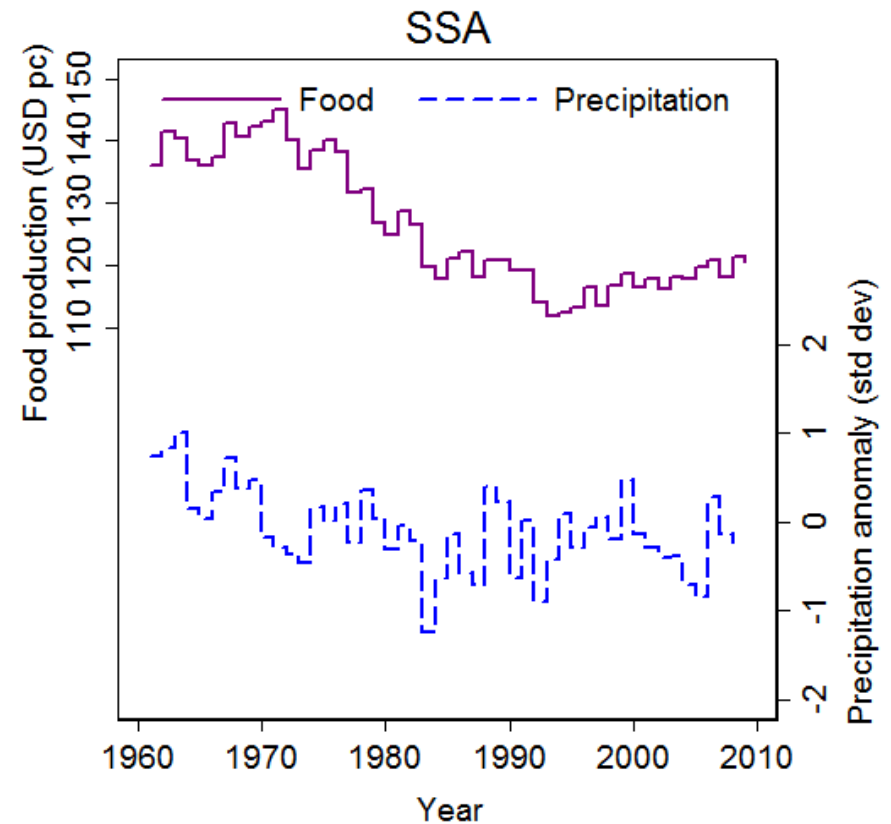
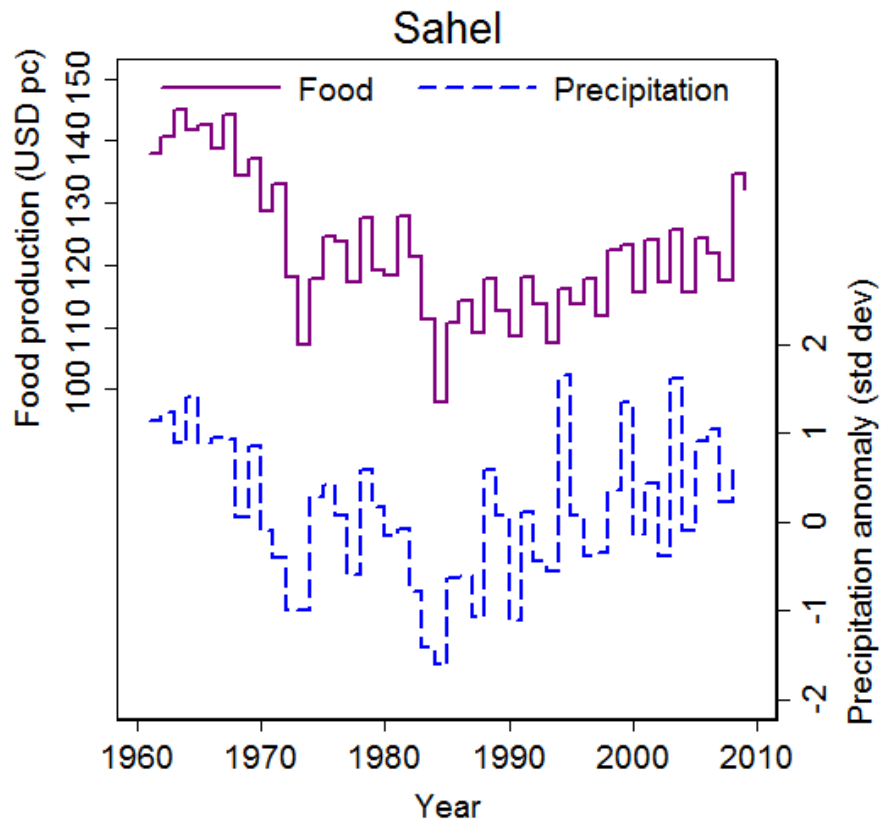
Purpose of study is simple and straight-forward:

Is political violence more prevalent or more severe during times of increasing food insecurity?

# Research design

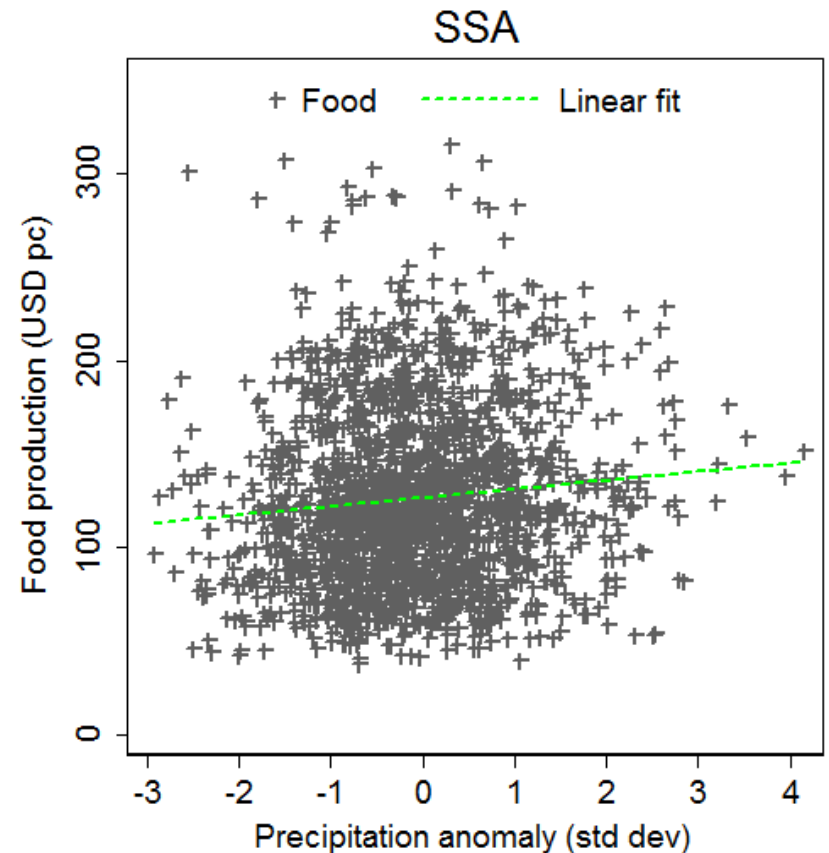
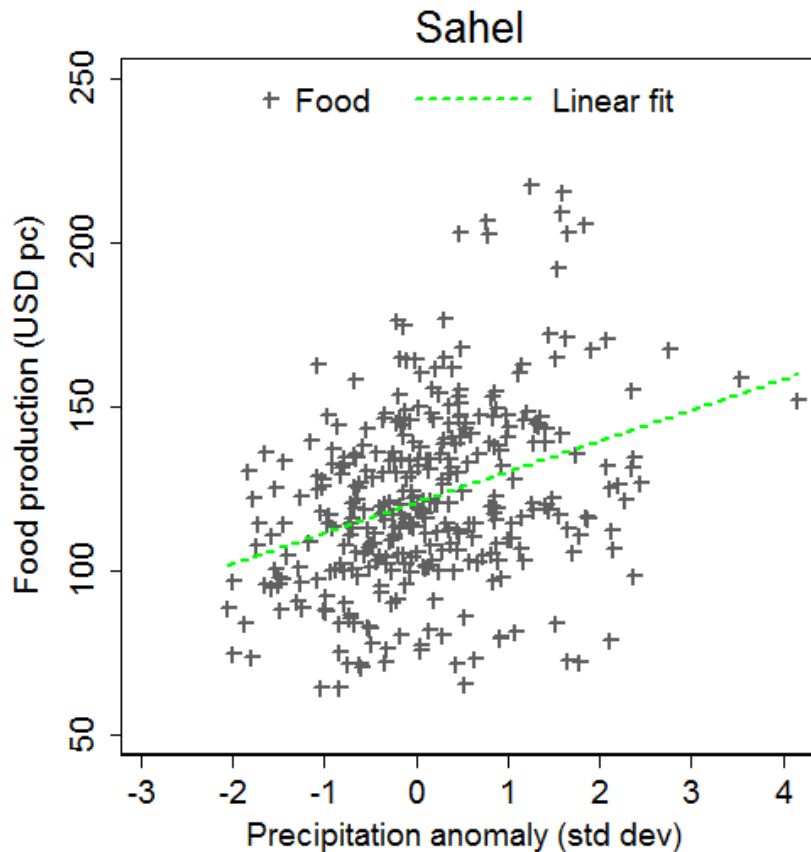
- Quantitative analysis of political violence in SSA post-independence
  - Dependent variables
    - Civil conflict (onset, incidence, severity)
    - Non-state conflict (incidence, severity)
    - One-sided violence (incidence, severity)
    - Social unrest (event count; separate for food-related events)
  - Explanatory variables
    - Rainfall variability
    - Food production p.c.
    - Crops production p.c.
    - Cereals production p.c.
  - Standard controls plus time trends and fixed effects
    - Separate analyses for (a) Sahel and (b) most climate-sensitive countries
-  **NEW!** Separate analysis for MENA region

# Rainfall and food production over time



Source: Gridded monthly precipitation data from the Center for Climatic Research, University of Delaware; food production statistics from the UN's Food and Agriculture Organization (FAO)

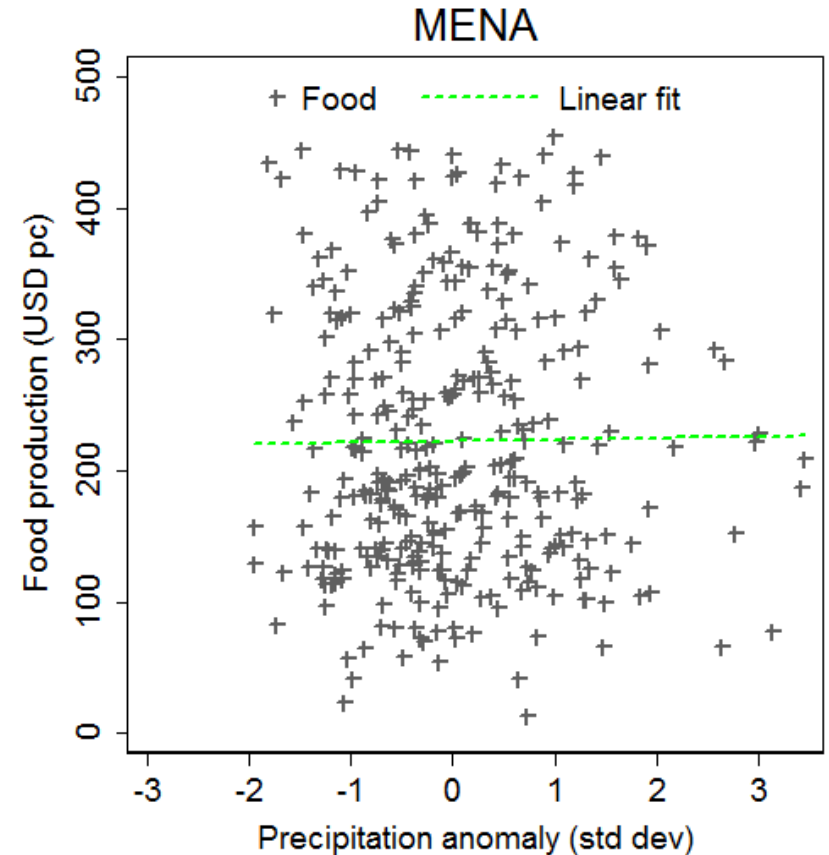
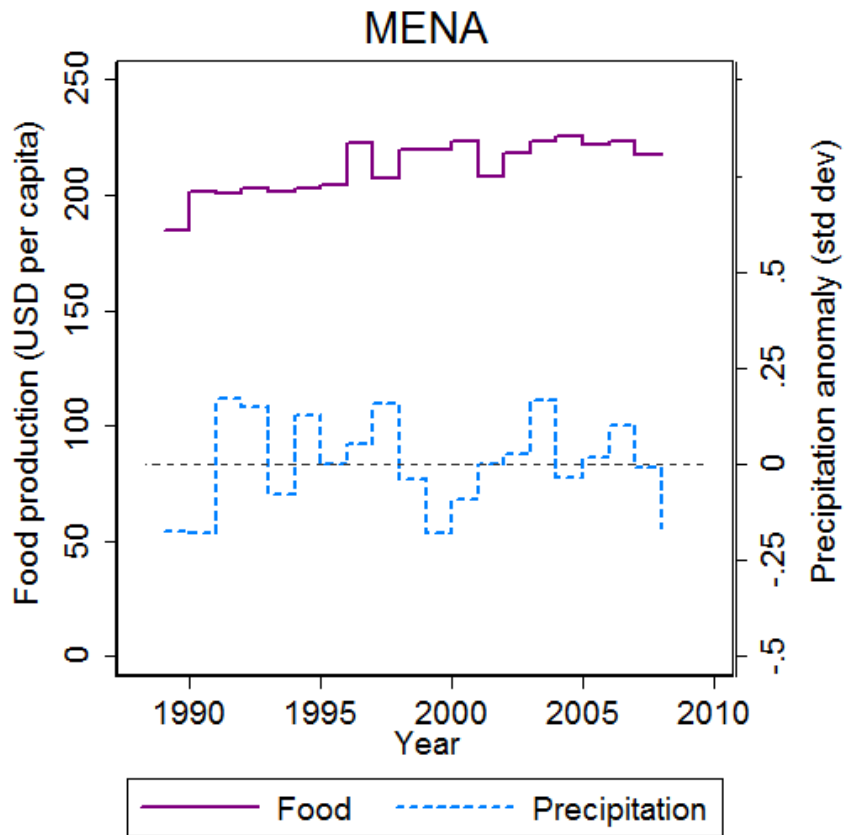
# Rainfall and food production by country



Source: Gridded monthly precipitation data from the Center for Climatic Research, University of Delaware; food production statistics from the UN's Food and Agriculture Organization (FAO)



# So, what about the MENA region?



Source: Gridded monthly precipitation data from the Center for Climatic Research, University of Delaware; food production statistics from the UN's Food and Agriculture Organization (FAO)

# Determinants of food productivity, 1961–2009

VARIABLES	(SSA)	(Sahel)
	FE OLS Food pc	FE OLS Food pc
Precipitation anomaly	2.101** (0.260)	7.381** (0.742)
Precipitation anomaly sq.	-0.424** (0.153)	-2.011** (0.436)
Civil conflict	-3.106** (0.816)	0.364 (1.991)
Time	-0.012 (0.021)	-0.030 (0.052)
Food production lag	0.876** (0.012)	0.742** (0.033)
Constant	16.918** (1.766)	33.303** (4.609)
R-squared	0.802	0.706
Observations	1,805	329

Standard errors in parentheses

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

# Civil conflict onset, SSA 1961–2009

VARIABLES	(1) Logit Onset	(2) FE OLS Onset	(3) Logit Onset	(4) FE OLS Onset	(5) Logit Onset	(6) FE OLS Onset	(7) Logit Onset	(8) FE OLS Onset
Precipitation $t$	0.114 <sup>†</sup> (0.111)	0.019 <sup>°</sup> (0.043)						
Precipitation $t-1$	-0.054 <sup>†</sup> (0.090)	-0.004 <sup>°</sup> (0.043)						
Food production pc $t-1$			-0.004 (0.003)	0.000 (0.000)				
Crops production pc $t-1$					-0.005 (0.003)	0.000 (0.000)		
Cereals production pc $t-1$							-0.015* (0.008)	0.001 (0.001)
Ln GDP pc $t-1$	-0.191 (0.209)	-0.018 (0.017)	-0.101 (0.206)	-0.014 (0.017)	-0.147 (0.174)	-0.016 (0.017)	-0.177 (0.184)	-0.017 (0.017)
Ln population $t-1$	0.306** (0.103)	0.004 (0.016)	0.333** (0.084)	0.015 (0.016)	0.350** (0.086)	0.015 (0.016)	0.346** (0.084)	0.013 (0.016)
Political exclusion $t-1$	1.157** (0.441)	0.007 (0.023)	1.120** (0.423)	0.009 (0.023)	1.190** (0.413)	0.009 (0.023)	1.174** (0.447)	0.005 (0.023)
Sahel	0.490* (0.248)		0.435* (0.217)		0.321 (0.237)		0.581* (0.232)	
Constant	-5.398** (1.237)	0.057 (0.200)	-5.842** (1.223)	-0.082 (0.191)	-5.685** (1.158)	-0.052 (0.182)	-5.678** (1.173)	-0.036 (0.179)
Observations	1,805	1,805	1,862	1,862	1,862	1,862	1,862	1,862

Note: Robust standard errors in parentheses; peace years and three natural cubic splines estimated but not shown;

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

† Rainfall deviation (std dev)

° Rainfall level (1,000 mm)

# Non-state conflict, SSA 1990–2009

VARIABLES	(25)	(26)	(27)	(28)	(29)	(30)	(31)	(32)
	Logit NS conflict	FE OLS NS conflict	Logit NS conflict	FE OLS NS conflict	Logit NS conflict	FE OLS NS conflict	Logit NS conflict	FE OLS NS conflict
Precipitation $t$	0.224 <sup>†</sup> (0.118)	0.108 <sup>°</sup> (0.089)						
Precipitation $t-1$	0.101 <sup>†</sup> (0.120)	0.010 <sup>°</sup> (0.090)						
Food production pc $t-1$			0.007 (0.004)	-0.001 (0.001)				
Crops production pc $t-1$					-0.004 (0.004)	-0.001 (0.001)		
Cereals production pc $t-1$							-0.035* (0.015)	0.000 (0.002)
Ln GDP pc $t-1$	-0.300 (0.197)	0.026 (0.054)	-0.471 (0.262)	0.005 (0.051)	-0.188 (0.162)	0.014 (0.053)	-0.166 (0.183)	-0.004 (0.051)
Ln population $t-1$	0.809** (0.184)	0.013 (0.069)	0.753** (0.185)	-0.076 (0.064)	0.804** (0.154)	-0.073 (0.064)	0.873** (0.186)	-0.074 (0.064)
Political exclusion $t-1$	0.840 (0.609)	0.128* (0.059)	1.026 (0.548)	0.140* (0.057)	0.913 (0.565)	0.142* (0.057)	0.735 (0.596)	0.143* (0.057)
Sahel	-0.295 (0.479)		-0.030 (0.439)		-0.163 (0.437)		0.332 (0.426)	
Constant	-7.893** (2.711)	-0.277 (0.663)	-7.304** (2.672)	0.817 (0.600)	-8.376** (2.167)	0.734 (0.599)	-9.002** (2.585)	0.790 (0.600)
Observations	778	778	835	835	835	835	835	835

Note: Robust standard errors in parentheses; time-lagged DV estimated but not shown;

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

† Rainfall deviation (std dev)

° Rainfall level (1,000 mm)

# One-sided violence, SSA 1990–2009

VARIABLES	(33)	(34)	(35)	(36)	(37)	(38)	(39)	(40)
	Logit OS violence	FE OLS OS violence	Logit OS violence	FE OLS OS violence	Logit OS violence	FE OLS OS violence	Logit OS violence	FE OLS OS violence
Precipitation $t$	-0.221 <sup>†</sup> (0.152)	-0.015 <sup>°</sup> (0.100)						
Precipitation $t-1$	-0.005 <sup>†</sup> (0.118)	0.103 <sup>°</sup> (0.101)						
Food production pc $t-1$			-0.001 (0.003)	-0.001 (0.001)				
Crops production pc $t-1$					-0.002 (0.002)	-0.001 (0.001)		
Cereals production pc $t-1$							-0.034* (0.017)	-0.004 (0.002)
Ln GDP pc $t-1$	-0.271 (0.143)	-0.015 (0.060)	-0.266 (0.163)	-0.012 (0.057)	-0.264 (0.142)	-0.002 (0.058)	-0.263 (0.141)	-0.011 (0.056)
Ln population $t-1$	0.455** (0.118)	-0.157* (0.077)	0.369** (0.094)	-0.226** (0.070)	0.378** (0.100)	-0.222** (0.070)	0.464** (0.138)	-0.220** (0.070)
Political exclusion $t-1$	1.673** (0.586)	0.053 (0.066)	1.781** (0.559)	0.059 (0.063)	1.791** (0.550)	0.062 (0.063)	1.683** (0.567)	0.063 (0.063)
Sahel	0.635 (0.379)		0.505 (0.321)		0.474 (0.325)		0.940* (0.402)	
Constant	-5.242** (1.732)	1.540* (0.750)	-4.418** (1.481)	2.298** (0.667)	-4.447** (1.481)	2.186** (0.666)	-4.815** (1.758)	2.199** (0.665)
Observations	778	778	835	835	835	835	835	835

Note: Robust standard errors in parentheses; time-lagged DV estimated but not shown;

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

† Rainfall deviation (std dev)

° Rainfall level (1,000 mm)

# Social unrest, SSA 1991–2009

VARIABLES	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
	NBREG SCAD	FE NBREG SCAD	NBREG SCAD	FE NBREG SCAD	NBREG SCAD	FE NBREG SCAD	NBREG SCAD	FE NBREG SCAD
Precipitation $t$	0.030 <sup>†</sup> (0.033)	0.171 <sup>°</sup> (0.212)						
Precipitation $t-1$	-0.038 <sup>†</sup> (0.038)	-0.083 <sup>°</sup> (0.216)						
Food production pc $t-1$			0.003 (0.002)	-0.002 (0.001)				
Crops production pc $t-1$					0.000 (0.002)	-0.003 (0.001)		
Cereals production pc $t-1$							-0.004 (0.004)	-0.010* (0.005)
Ln GDP pc $t-1$	-0.173* (0.073)	0.085 (0.091)	-0.211** (0.081)	0.142 (0.094)	-0.159* (0.074)	0.144 (0.090)	-0.156* (0.075)	0.105 (0.084)
Ln population $t-1$	0.283** (0.083)	0.295** (0.074)	0.269** (0.079)	0.296** (0.072)	0.281** (0.085)	0.314** (0.073)	0.295** (0.083)	0.304** (0.072)
Political exclusion $t-1$	-0.045 (0.225)	0.111 (0.127)	-0.010 (0.210)	0.074 (0.127)	-0.028 (0.208)	0.092 (0.125)	-0.037 (0.208)	0.071 (0.128)
Sahel	-0.022 (0.165)		0.027 (0.147)		0.045 (0.170)		0.075 (0.143)	
Constant	-0.142 (0.885)	-2.652** (0.965)	-0.073 (0.835)	-2.763** (0.906)	-0.284 (0.866)	-2.951** (0.911)	-0.347 (0.873)	-2.652** (0.879)
Observations	738	720	795	776	795	776	795	776

Note: Robust standard errors in parentheses; time-lagged DV estimated but not shown;

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

† Rainfall deviation (std dev)

° Rainfall level (1,000 mm)

# Food-related unrest, SSA 1991–2009

VARIABLES	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)
	NBREG SCAD Food	FE NBREG SCAD Food	NBREG SCAD Food	FE NBREG SCAD Food	NBREG SCAD Food	FE NBREG SCAD Food	NBREG SCAD Food	FE NBREG SCAD Food
Precipitation $t$	-0.156 <sup>†</sup> (0.101)	0.015 <sup>°</sup> (0.758)						
Precipitation $t-1$	-0.012 <sup>†</sup> (0.117)	1.110 <sup>°</sup> (0.714)						
Food production pc $t-1$			0.009** (0.003)	0.003 (0.004)				
Crops production pc $t-1$					0.008** (0.003)	0.005 (0.003)		
Cereals production pc $t-1$							-0.002 (0.016)	-0.037* (0.016)
Ln GDP pc $t-1$	0.106 (0.201)	-0.174 (0.350)	-0.107 (0.174)	-0.347 (0.320)	0.014 (0.135)	-0.467 (0.297)	0.153 (0.166)	-0.110 (0.311)
Ln population $t-1$	0.670** (0.164)	0.610* (0.267)	0.625** (0.148)	0.591** (0.209)	0.595** (0.157)	0.551** (0.210)	0.679** (0.178)	0.684** (0.219)
Political exclusion $t-1$	-0.497 (0.593)	-0.861 (0.546)	-0.523 (0.600)	-0.849 (0.493)	-0.662 (0.591)	-0.878 (0.495)	-0.531 (0.609)	-0.782 (0.488)
Sahel	0.825 (0.431)		0.802 (0.492)		0.914* (0.453)		0.664 (0.478)	
Constant	-8.631** (2.029)	-5.558 (3.111)	-7.817** (1.677)	-3.742 (2.623)	-8.067** (1.906)	-2.758 (2.534)	-8.953** (1.818)	-5.058 (2.627)
Observations	738	558	795	589	795	589	795	589

Note: Robust standard errors in parentheses; time-lagged DV estimated but not shown;

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

† Rainfall deviation (std dev)

° Rainfall level (1,000 mm)

# Political violence, MENA 1989–2009

VARIABLES	(41) FE OLS CW Onset	(42) FE OLS CW Onset	(43) FE OLS NS fatal	(44) FE OLS NS fatal	(45) FE OLS OS fatal	(46) FE OLS NS Fatal
Precipitation $t-1$ <sup>°</sup>	-0.223 (0.219)		0.428 (1.103)		-1.193 (1.312)	
Food production pc $t-1$		-0.000 (0.000)		0.000 (0.002)		-0.001 (0.002)
Political exclusion $t-1$	-0.175 (0.180)	-0.150 (0.176)	2.554** (0.894)	2.528** (0.873)	-5.776** (1.119)	-5.647** (1.094)
Constant	0.178* (0.082)	0.172 (0.090)	-0.281 (0.400)	-0.231 (0.442)	2.435** (0.488)	2.463** (0.542)
Observations	324	340	324	340	324	340

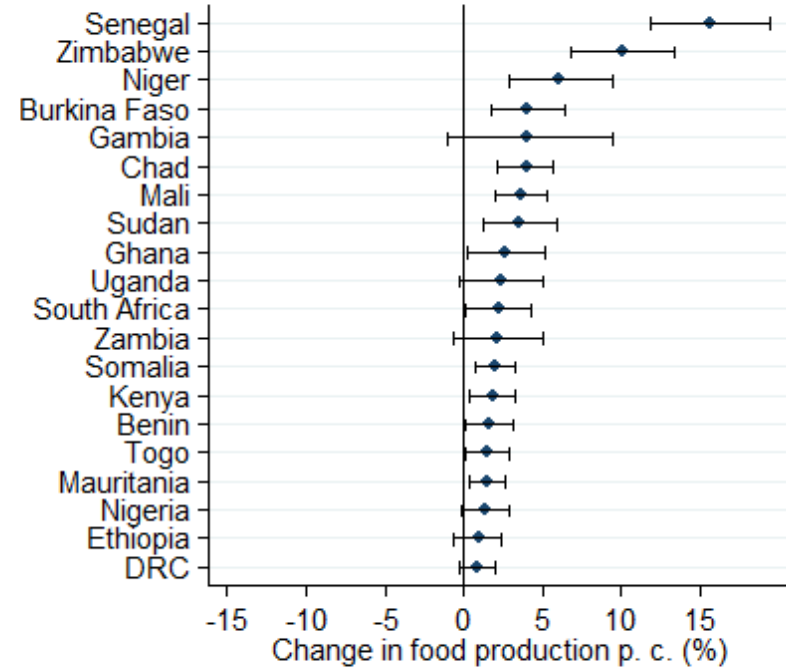
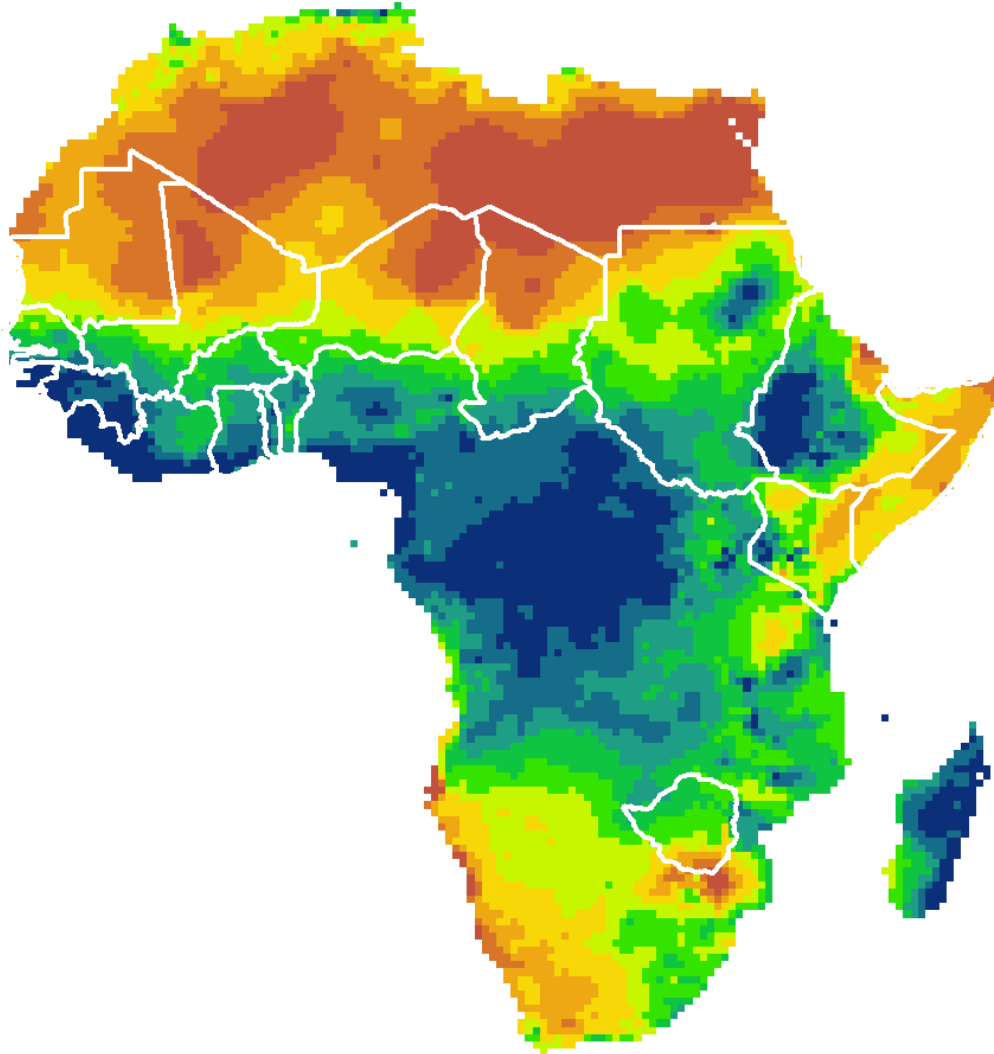
*Note:* Robust standard errors in parentheses; time-lagged DV estimated but not shown;

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

<sup>°</sup> Rainfall level (1,000 mm)



# Identifying climate-sensitive subset



# Results for climate-sensitive subset

TBA

# Preliminary conclusions

- Food productivity strongly linked to weather patterns in SSA...
  - Correlation especially pronounced in the Sahel
- ...but little indication that rainfall anomalies increase risk or severity of political violence in SSA (or the Sahel)
- Little evidence that agricultural deficit increases political violence
  - Some estimates suggest opposite relationship is more likely
  - Possible exception for cereals production, but results are sensitive to model specification and type of violence
- For MENA region, food production is relatively insensitive to weather patterns and political violence is not related to either phenomenon
- NB: These general conclusions should not be taken to indicate that drought and food scarcity can never be a significant source of conflict

Thank you for your patience

# Weather patterns and conflict in the Sahel

Conflict type	Dry	Normal	Wet
Civil conflict onset 1961–2008	0.054 [N=93]	0.064 [N=141] ✗	0.046 [N=109]
Civil conflict battle deaths 1961–2008	406 [N=93]	492 [N=141] ✗	304 [N=109]
Non-state conflict 1989–2008	7 [N=33]	160 [N=62] ✗	59 [N=52]
One-sided violence fatalities 1989–2008	33 [N=33]	188 [N=62] ✗	99 [N=52]
Riots 1961–2007	0.043 [N=93]	0.080 [N=138] ✗	0.071 [N=98]
Guerrilla 1961–2007	0.108 [N=93]	0.174 [N=138] ✗	0.082 [N=98]
Social unrest events 1990–2008	2.97 [N=33]	4.25 [N=56]	7.43 [N=51] ✗
Food-related social unrest 1990–2008	0.273 [N=33]	0.357 [N=56]	0.431 [N=51] ✗
Food production per capita 1961–2008	109.2 [N=93]	124.4 [N=141]	131.2 [N=109]

*Note:* Dry year implies annual precipitation at least 0.5 std.dev below country mean (1961–90); wet year equals precipitation at least 0.5 std.dev above country mean