Economics Bulletin

Volume 45, Issue 2

Civil conflict and food security in sub-Saharan Africa: the role of the democracy

Cyrille Dominick Bitting
University of Bertoua

Magloire Georges Sémé
University of Yaoundé 2

Henri Ngoa Tabi
University of Yaoundé 2

Abstract

The main objective of this study is to analyse the role of democracy in the relationship between civil conflict and food security in sub-Saharan Africa. The empirical analyses cover a sample of 30 sub-Saharan African countries over the years 2002-2017. To address endogeneity issues in the relationship between civil conflict and food security problem, the study uses a dynamic model based on a sequential linear panel data estimator and system Generalized Method of Moments. The main results obtained from econometrics analyses show that civil conflict has a significant negative influence on food security in sub-Saharan Africa. As regards the role of democracy, the results show that democracy breaks the negative influence of civil conflict on food security. Otherwise, the results also show that GDP per capita, readiness and arable land positively affect food security, while total population has a negative effect on it in sub-Saharan Africa.

Citation: Cyrille Dominick Bitting and Magloire Georges Sémé and Henri Ngoa Tabi, (2025) "Civil conflict and food security in sub-Saharan Africa: the role of the democracy", *Economics Bulletin*, Volume 45, Issue 2, pages 678-695
Contact: Cyrille Dominick Bitting - bittingcyrille@gmail.com, Magloire Georges Sémé - magloireseme635@gmail.com, Henri Ngoa Tabi - ngoa_henri@yahoo.fr.
Submitted: February 08, 2022. **Published:** June 30, 2025.

1. Introduction

Achieving food security is a top global priority. This is reflected in its prominent place in global development policies (Adong et al., 2021; Mkandawire & Aguda, 2009). Ranked as the first Millennium Development Goal (MDG[1]) and the second Sustainable Development Goal (SDG[2]), reducing food insecurity remains one of the greatest challenges facing humanity in the 21st century.

Since 2014, the number of people affected by hunger in the world has been increasing. In 2019, nearly 750 million people were at risk of extreme food insecurity, of which nearly 135 million were classified as being in crisis (FAO et al., 2019). Similarly, the frequency of violent conflict and conflict-related deaths has also increased in recent years. Indeed, historical analysis shows that they have increased from their lowest levels of 33 and 19601, respectively, in 2006, to 49 and 102000, respectively, in 2016 (Allansson et al., 2019). The strong correlation between conflict and food security is striking. Indeed, all 22 countries classified by FAO as 'Protracted Crisis' in 2019 were engaged in violent conflict at that time (FAO et al., 2020; FSIN, 2020). This correlation is confirmed by the Russian-Ukrainian conflict, which seriously affects global food security in general and African food security in particular (Balma et al., 2022). According to the Food and Agriculture Organization of the United Nations (FAO), the number of undernourished people in the world will increase from 7.6 million to 13.1 million, with knock-on effects on food availability and prices, which will rise by between 8 and 22 percent (FAO, 2022).

Empirical analysis of the link between civil conflict and food security reveals a two-way causal relationship (Brück & d'Errico, 2019; Martin-Shields & Stojetz, 2019). On the one hand, there is work that has demonstrated the impact of conflict on food security (Munoz-Mora, 2016; Rockmore, 2015; Teodosijevic, 2003; Verwimp & Munoz-Mora, 2013) and on the other hand, work that demonstrates the impact of food security on conflict (Humphreys & Weinstein, 2008; Ida, 2020; Mitchell et al., 2015; Omenma et al., 2020). This bidirectionality of the relationship is one cause of the endogeneity bias that is the main statistical threat to identifying a causal effect of violent conflict on food security and vice versa (Martin-Shields & Stojetz, 2019).

Civil conflict and food insecurity are most prevalent in regions of the world with a high degree of fragility. Sub-Saharan Africa is one of the most vulnerable regions, with an increase in the number of civil conflicts and 54% of the world's people in food crisis live there (FSIN, 2020). Despite these findings, very few scientific works on the relationship between these conflicts and food security have been conducted concerning this region. Most of these are case studies for example Kah (2017) about Nigeria, Chen et al. (2018) for Sudan, Mercier et al. (2016) for Uganda and even less took a very regional approach (e.g., Smith (2014) and Raleigh et al. (2015)).

An in-depth analysis of the effect of civil conflict on food security reveals that the quality of institutions plays an important role. According to Zhou (2017), institutional quality could offer new insights into the intractable food security problem facing the world today. Indeed, much work has demonstrated the positive impact of good institutional quality on food security (Marson et al., 2020; Slimane et al., 2017). Most of this work has focused on Kaufmann's governance indicators (see Kaufmann et al. (2010)), leaving aside the role of democracy, which

[1] MDG1: reduce by half the number of hungry people in the world between 1990 and 2015.

[2] SDG2: eliminate hunger and famine, ensure food security, improve nutrition and promote sustainable agriculture.

has a significant influence on food security (Harris, 2014; Mukherjee, 2004; Rossignoli & Balestri, 2018).

This study aims to fill this gap by analysing the role of democracy in the relationship between civil conflict and food security in sub-Saharan Africa. The contribution of this paper is twofold. Firstly, this article uses two robust estimation techniques, GMM model and sequential model, controlling for the endogeneity bias of the relationship between civil conflict and food security. Secondly, this paper incorporates the quality of institutions into the analysis by examining the role that democracy plays in the link between civil conflict and food security.

The rest of this paper is organised as follows. Section 2 present the literature review. Section 3 describes the data and methodological approach, while Section 4 discusses the results and Section 5 concludes.

2. Literature Review

The relationship between civil conflict and food security is considered one of the strongest, consistent, and most robust associations in the existent literature on civil war (Brück & d'Errico, 2019). This section summarises the robust findings from quantitative analyses of the bi-directional relationship between civil conflict and food security that account for endogeneity concerns and the role of democracy in this relationship.

2.1.The impacts of civil conflict on food security

The analysis of the effect of civil conflict on food security is in line with the literature on the determinants of food security. Several causes of food security are identified. These are economic (Kavallari et al., 2014), demographic (Ehrlich et al., 1993), institutional (Rossignoli & Balestri, 2018), climatic (Connolly-Boutin & Smit, 2016), and geographical (Pollard et al., 2014). In addition to these factors, civil conflict is presented in recent literature as an important factor in understanding the dynamics of food security. These conflicts affect food production and consumption on the one hand, and the nutritional status of populations on the other.

Food production is a fundamental factor in global food security. Conflicts have a substantial impact on food production due to their negative effects on labour supply, access to land and access to capital (Munoz-Mora, 2016; Rockmore, 2015). And on the other hand, because of the looting and destruction of farms (Kah, 2017). A study by Teodosijevic (2003) on a sample of 38 countries compares agricultural productivity growth rates in peacetime and wartime. He finds that agricultural productivity growth is significantly reduced in wartime compared to peacetime. The negative effects of conflict on production also affect consumption through reduced availability, lower consumer spending and higher food prices (Martin-Shields & Stojetz, 2019). It is worth noting that in times of war the level of consumption of the population is greatly reduced as farms and food stocks are often looted to ensure the survival of armed groups (Justino & Stojetz, 2018). Work by Teodosijevic (2003) and Jeanty and Hitzhusen (2006) on samples from 38 and 73 developing countries respectively reveals that the experience of conflict is associated with a reduction in daily energy supply.

In terms of the effect of conflict on nutritional status, a large body of literature has identified the negative effects of exposure to conflict on the nutritional status of children. The most commonly used indicators measuring nutritional status are the height-for-age (HAZ) score and the weight-for-age (WAZ) score (Leroy et al., 2015). A low HAZ or WAZ score is associated with chronic or acute malnutrition. Using the difference-in-difference impact assessment methodology, Bundervoet et al. (2009) find that children aged 0 to 5 years born in areas affected by civil conflict violence have significantly lower HAZ scores than children born in peaceful

areas of Rwanda. Similar studies analysing the effect of conflict on child anthropometry have found similar results for Ethiopia, Côte d'Ivoire, Eritrea, Colombia, India, Iraq and Mexico (Akresh et al., 2012, 2012; Arcand et al., 2015; Duque, 2016; Guerrero-Serdan, 2009; Minoiu & Shemyakina, 2014; Nasir, 2016; Tranchant et al., 2014). Furthermore, work by Camacho (2008) shows that exposure of pregnant women to violent conflict results in lower birth weights in Colombia. Similar results were also found for Brazil, Mexico, Nepal, Kashmir and Palestine (Brown, 2018; Foureaux & Manacorda, 2016; Mansour & Rees, 2012; Valente, 2011).

2.2.The impacts of food security leading to civil conflict

In the search for the causes of civil conflict, researchers and practitioners have recently begun to study the consequent impacts of food insecurity on conflict in a comparative and rigorous manner (for a broad and excellent overview see for example the work of Koren and Bagozzi, (2016). The impact of food insecurity on conflict operates at two levels. At the individual and household level, where food insecurity increases anti-social behaviour, and at the regional or national level, where low agricultural production and rising food prices generate conflict.

Analysis at the individual level shows that food insecurity or the threat of it can motivate individuals to engage in peace-threatening comportment by increasing anti-social behaviour (Martin-Shields & Stojetz, 2019). Empirical tests of these motivations face two major difficulties. First, they are very complex and therefore difficult to measure. Second, it is empirically difficult to disentangle alternative mechanisms that are not directly related to food insecurity. Despite these difficulties, the first empirical evidence comes from the work of Humphreys and Weinstein (2008) who show through an original survey of ex-combatants that armed groups sometimes target recruits through basic needs, providing them with food, shelter and physical security. More recently, the study by Omenma et al. (2020) examining member recruitment strategies in two violent extremist organisations, namely Al-shabaab and Boko Haram show that poverty and food insecurity are the main drivers for recruitment. The work of Arjona et al. (2015) has also led to similar results for Colombia.

Analysis at the regional and national levels shows that food insecurity affects conflict through production variation and price increases. More generally, decreases in agricultural productivity can directly activate societal grievances through increased hunger, migration and widening social inequalities (Freeman, 2017; Raleigh, 2010). Through market mechanisms, a drop in production usually leads to a rise in prices. Numerous studies have analysed how rising food prices promote urban-social unrest and conflict at national (Chen et al., 2018; Diamond, 2005) and global levels (Bellemare, 2015; Berazneva & Lee, 2013; Hendrix et al., 2009). In the African context, there is considerable evidence of positive feedback between food prices and conflict (Chen et al., 2018; Messer & Cohen, 2015; Raleigh et al., 2015; Smith, 2014).

2.3.Civil conflict, democracy and food security

The international community has widely supported the promotion of democratic regimes to achieve the social outcomes of peaceful development such as the reduction of hunger and the promotion of food security (Rossignoli & Balestri, 2018). The Rome Declaration on World Food Security, from the 1996 Food Summit, states: “Democracy, the promotion of all human rights and fundamental freedoms, including the right to development, and the full and equal participation of men and women are essential to achieving sustainable food security for all”.

The analysis of the transmission channels of the effect of civil conflict on food security clearly shows that the quality of institutions in general and democracy, in particular, plays an important role in this relationship. Indeed, a large body of literature shows the adverse effects of conflict on the quality of institutions, including democracy (Anugwom, 2000; Aslaksen & Torvik, 2007; Grosjean, 2014; Voors & Bulte, 2014). For example, the work of Aslaksen & Torvik (2007) shows that democracy is among the key dimensions of institutional quality that are particularly affected by high levels of civil conflict. Indeed, the author shows that civil conflict increases political instability, which hinders the expansion of democracy. Sen's (1981) pioneering study of the relationship between democracy and famine has changed the way researchers analyse the issue, with particular emphasis on the role played by democratic functioning. The work of Sen (2001) and Howe and Devereux (2004) shows that responsive mechanisms supported by fair and periodic elections and a free press are valuable in addressing food insecurity.

Moreover, there is ample evidence that democracy increases food security in sub-Saharan Africa (Harris, 2014; Mukherjee, 2004; Rossignoli & Balestri, 2018). This relationship is based on three main theoretical perspectives. First, it is argued that democratic institutions activate positive food security outcomes due to electoral competition (Harris, 2014). Second, it is shown that political freedoms as mechanisms of political accountability allow vulnerable and marginalised people to have a voice that could support greater responsiveness of political elites to achieve desirable social outcomes (Hughes & Tripp, 2015). Third, an indirect link between democracy and food security through increased economic growth is hypothesised (Acemoglu et al., 2014). In sum, a process towards democracy, which implies improved inclusiveness, can have a mitigating effect on the negative impact of civil conflict on food security.

3. Data and Methodological Approach

3.1.Data and Description of the variables

To assess the role of democracy on the effect of civil conflict on food security, we use a set of variables from different sources. Our sample covers a sample of 30 sub-Saharan African countries over the period 2002-2017 (see appendices A3 for the list of countries). The choice of the country sample is justified by the unavailability of data for some African countries. The study period is justified by the availability of data on civil conflict, which is limited to the year 2017.

3.1.1. Dependent variable

Our dependent variable is food security measured by the dietary energy supply used in the estimation of the prevalence of undernourishment obtained from FAO (FAOSAT, 2022). In the literature, this variable is used as a proxy of food security in the studies of Abbott et al. (2017) and Osabohien et al. (2018).

3.1.2. Independent variables of interest

Civil conflict: conflict is defined as "a contested incompatibility that concerns government and/or territories where the use of armed force between two parties results in at least 25 battle-related deaths in a calendar year" (Gleditsch et al., 2002; Shawn et al., 2022). Specifically, civil conflicts or internal conflict are those between a state or government and an internal opposition group without the intervention of other states (Pettersson & Wallensteen, 2015). The conflict data used is derived from the PRIO/Uppsala database where the civil conflict is measured by the frequency of occurrence of violence and the use of armed force between two parties result in at least 25 battle-related deaths in a calendar year.

Democracy: it refers to the perception of democracy in country from one year to another (Teorell et al., 2018). The democracy index derived from the V-dem database and measured by a scale between 0 and 1, where 0 is the least democratic and 1 the most democratic.

3.1.3. Control variables

GDP per capita: is captured by the sum of gross value added by all resident producers in the economy plus any product taxes and minus any subsidies not included in the value of the products. The GDP data are in constant 2015 prices, expressed in United States dollars. The literature shows that an increase in GDP per capita improves the food security of population (Manap & Ismail, 2019).

Population: capture by the total population. This indicator according to the World Bank is based on the de facto definition of population, which counts all residents regardless of legal status or citizenship. According to Malthus (1798) and Bremner (2012) total population growth negatively affects food security.

Readiness: capture the capacity to implement policies that can improve its resilience. This variable is obtained by the simple arithmetic mean of 9 indicators that cover economic, social, and governance aspects. It is about doing business, political stability and nonviolence, control of corruption, rule of law, regulatory quality, social inequality, ICT infrastructure, and innovation. Data are normalized from 0 (low readiness) to 1 (high readiness). According to Glaros et al. (2021) readiness should increase food security.

Table 1 provides summary statistics of the variables used, while appendices A1 and A2 present the description and sources of the variables and correlation matrix respectively. The table shows that from 2002 to 2017, the average level of dietary energy in our sample is 2344.612. For the civil conflict, we note an average of 8.322 with a standard deviation of 1.384. This standard deviation is low, which shows that the variable varies little and can be qualified as invariant. Furthermore, we note that the variables Readiness and Democracy are also practically invariant as they have low standard deviations of 0.272 and 0.377 respectively. Concerning, the rest of the variables, they have an average of 1721.317, 5858217 and 25508656 for GDP per capita, arable land and population respectively.

Table I: descriptive statistics

Variable	unit	Obs	Mean	Std. Dev.	Min	Max
Dietary energy	Kcal/cap/day	464	2344.612	298.841	1569	2976
Civil conflict	Index	464	8.322	1.384	2.958	11.083
GDP per capita	USD	464	1721.317	2202.417	194.873	9879.385
Readiness	Index	464	0.272	0.06	0.112	0.434
Arable land	Km2	455	5858217	7039433.4	182000	37000000
Population	Person	464	25508656	32034471	1254454	1.909e+08
Democracy	index	464	0.377	0.485	0	1

Source: Author's computation

3.2.Empirical Strategies

Our empirical strategy is based on two estimation techniques, namely the Generalized Method of Moments (GMM) and the Sequential method. The GMM estimator allows us to estimate the direct and indirect effects of civil conflict on food security. The sequential method allows us to resolve the low variation of our variable of interest and to correct for possible endogeneity and heterogeneities between the countries in our panel.

To analyse the effects of civil conflicts on food security, we specify the following dynamic panel model:

$$Diet_{it} = \alpha_0 + \alpha_1 Diet_{it-1} + \alpha_2 Conflict_{it} + \alpha_3 X_{it} + \lambda_i + \mu_t + \varepsilon_{it} \quad (1)$$

Where $Diet_{it}$ is the amount of food energy in country *i* at time *t*, $Conflict_{it}$ is the civil conflict for country *i* at time *t*, *X* the vector of control variables, λ_i is the unobserved country fixed effects. μ_t is the fixed effects and $\varepsilon_{it}$is the error term. In addition to the direct effect of civil conflict on food security described above in equation (1), the effect can also be observed through indirect channels. As mentioned at the beginning of this paper, we test the indirect link, through an interaction between the civil conflict indicator and the democracy indicator. The non-linear specification of the equation is:

$$Diet_{it} = \alpha_0 + \alpha_1 Diet_{it-1} + \alpha_2 Conflict_{it} + \alpha_3 Demo_{it} + \alpha_4 (Conflict_{it} \times Demo_{it}) + \alpha_5 X_{it} + \lambda_i + \mu_t + \varepsilon_{it} \quad (2)$$

In this equation, we introduce an interaction term to account for the non-linear effect exerted by the democracy variable ($Demo_{it}$). This specification of equation (2) allows us to check whether, beyond a certain level, the democracy variable becomes more or less important in determining the marginal effect of civil conflict on food security. We estimate equations (1) and (2) by the generalized method of moments system developed by Roodman (2009), Arellano and Bover (1995) and Blundell and Bond (1998).

First, the GMM estimator considers the dynamic nature of the model and the potential endogeneity of some right-hand side variables in estimating the relationship between civil conflict and food security. Second, the GMM estimator also takes into account biases that arise due to country-specific effects. Third, GMM also avoids problems of simultaneity or reverse causality. The GMM technique comes in two versions: the difference GMM where lagged levels of the explanatory variables are used as instruments and the system GMM where a combination of different regression and level regression is used. However, Bond et al (2001) recommended that the GMM system estimator developed by Arellano and Bover (1995) and Blundell and Bond (1998) can considerably improve the efficiency and avoid the problem of weak instruments in the GMM first difference estimator developed by Arellano and Bond (1991). However, Windmeijer (2005) has shown from Monte Carlo simulations that the estimated asymptotic standard deviations of the two-stage GMM estimator can be biased downwards in a finite sample. To eliminate the possibility of such a bias, we use the correction procedure proposed by Windmeijer (2005). The consistency of the GMM estimator depends on two things: the validity of the assumption that the error term is not serially correlated (AR (2)) and the validity of the instruments (Hansen test). Too many instruments can seriously weaken and bias the Hansen over-identification restrictions test and therefore the rule of thumb is that the number of instruments should be less than the number of countries (Roodman, 2009).

Although equation (2) resolves some of the individual and time specificities, it remains limited as it does not address the low variation of our conflict indicator. To circumvent this drawback, we rely on the recent sequential linear panel data (SLPD) estimator consisting of a two-step procedure to identify the coefficients of time-invariant rectifiers (Kripfganz & Schwarz, 2019). In the first step, we estimate the coefficients from time-varying regressors. Then, we compute the estimation residuals from the first step, which we regress on the time-invariant rectifiers in the second step. Unlike traditional techniques, this estimator performs the identification using instrumental variables (Haussman & Taylor, 1981) before adjusting the second-stage standard errors to account for any estimation errors in the first stage (Kripfganz & Schwarz, 2019). The specification of this model can be written as follows:

$$Diet_i = Diet_{i-1} + X_i\alpha + Conflict_i\gamma + \varepsilon_i,\ with\ \varepsilon_i = \alpha_i\iota_T + \mu_i \quad (3)$$

Where $Diet_i = (Diet_{i1}, Diet_{i2}, \dots, Diet_{iT})$, ι_T is a unit vector (T, 1). With this model, we have two matrices defined as: $W_{yxi} = (X_i)$ the matrix of our time-varying variables, where coefficients $\theta = \beta'$ are estimated in the first step and $W_{yxfi} = W_{xyi}, Conflict_i$ is is the final matrix of coefficients to be estimated.

4. Results and Discussions

4.1.Primary Results

Although our empirical choice is based on the GMM method and the sequential estimator, we start our analysis using the Ordinary Least Squares (OLS) method which is the simplest and most ideal when the different assumptions are verified. This method has also been used by Jeanty and Hitzhusen (2006) who analyse the effect of civil conflict on food security in developing countries. The results are contained in Table 2 below.

Table II: Results of the panel model with OLS

	dependent variable: Dietary Energy				
	(1)	(2)	(3)	(4)	(5)
Civil conflict	-0.00752*	-0.00913**	-0.0332***	-0.0276***	-0.0322***
	(0.00421)	(0.00434)	(0.00454)	(0.00507)	(0.00507)
GDP per capita(ln)		0.0413***	0.0312***	0.0361***	0.0403***
		(0.00628)	(0.00523)	(0.00509)	(0.00466)
Readiness (ln)			0.294***	0.277***	0.266***
			(0.0257)	(0.0260)	(0.0258)
Arable land (ln)				0.0162***	0.0865***
				(0.00343)	(0.00806)
Population(ln)					-0.0833***
					(0.00957)
Constant	7.814***	7.540***	8.201***	7.857***	8.171***
	(0.0355)	(0.0511)	(0.0800)	(0.121)	(0.129)
Comments	464	464	464	455	455
R-squared	0.007	0.091	0.304	0.326	0.395

Source: Author's computation. **Note:** Robust standard errors are shown in parentheses. (***,**,*) indicate statistical significance and rejection of the null hypothesis at 1%, 5% and 10% levels, respectively.

The table is 2 built around columns5. In column (1) we present the direct effect of civil conflict on food security. The coefficient associated with internal conflict is negative and statistically significant at the 10% level. This result suggests that an increase in civil conflict by one unit will lead to a reduction in food security (quantity of food energy) by 0.00752 units, all else being equal. From column to2 column5, we phase in the control variables in line with the related literature on food security. The choice of this strategy is to check whether our result is sensitive to the addition of the variables. We find that the result remains unchanged, which shows that it is not sensitive to the addition of the additional variables. Concerning the control variables, we note that all have the expected signs. GDP per capita, arable land and resilient policies have a positive and statically significant effect at the 1% level while total population growth has a negative and statistically significant effect at the 1% level in column5.

4.2.Results of the Sequential method and GMM

Even though the results estimated by OLS provide evidence that civil conflict reduces food security in sub-Saharan Africa, the results may be biased and inconsistent due to the presence of endogeneity (reverse causality, omitted variables and measurement error) or the low variation of the variables of interest in this study. To overcome this, we use the sequential method developed by Kripfganz and Schwarz (2019) to address the problem of specificity of our variables and possible endogeneity. The use of variables with low variation had already been used in both macroeconomic and institutional work in which group-level effects are important in explaining economic development. For example, Kilishi et al. (2013) studies the growth performance of Sub-Saharan African countries by introducing a regional dummy variable into his dynamic panel data model. We are particularly interested in this estimation technique for the low variation character of our variable of interest (civil Conflict). The estimation is done in two steps: in the first step, only the estimated coefficients are considered; in the second step, time-invariant variables are estimated according to the validation conditions of the method. In addition, standard fixed-effects estimators are not applicable because the time-invariant rectifiers are perfectly collinear with the unit-specific dummy variables. When the time dimension is short, they also suffer from the well-known bias in dynamic panel data models (Nickell, 1981). Therefore, we will make use of the Generalized Method of Moments (GMM) proposed by Arellano and Bover (1995) and Blundell and Bond (1998) which is another technique that allows us to overcome the endogeneity problem. The results of these methods are included in Table 3 below:

Table III: Results of the panel model with Sequential linear and GMM estimator

Dependent variable: Dietary Energy(ln)			
	sequential method		GMM
L.lnDietary			0.862***
			(0.0253)
Civil conflict		-0.0207***	-0.00578**
		(0.00765)	(0.00287)
GDP per capita(ln)	0.0433***		0.0153*
	(0.0154)		(0.00808)
Readiness	0.0866***		0.0566***
	(0.0268)		(0.00955)
Arable land (ln)	0.177**		0.0265*
	(0.0714)		(0.0139)
Population(ln)	-0.0705**		-0.0537***
	(0.0298)		(0.00948)
Constant	7.551***	0.173***	1.087***
	(0.273)	(0.0656)	(0.206)
Observations	455	455	399
Number of countries	29	29	29
Instruments			16
AR(1)			0.000
AR(2)			0.222
Hansen OIR			0.443

Source: Author's computation. **Note:** Robust standard errors are shown in parentheses. (***,**,*) indicate statistical significance and rejection of the null hypothesis at 1%, 5% and 10% levels, respectively.

Table 3 is composed of three columns. Columns 1 and 2 present the results of the effect of civil conflict on food security estimated using the sequential method. As presented above, this estimation is done in two steps. In the first step (1), we estimate the relationship between our variant variables (control variables) and food security. The results show that GDP per capita, readiness and arable land positively affect food security, while total population has a negative effect. Indeed, the positive sign of GDP per capita means that increasing per capita income increases food security. This is because an increase in income increases people's purchasing power, which increases their access to and use of food (Manap & Ismail, 2019). The positive sign of the readiness policy index means that an increase in the resilience of countries increases food security in those countries (Glaros et al., 2021). Concerning the amount of arable land, notice that it has a positive influence on food security. This could be explained by the fact that the availability of arable land favours agricultural production, which increases food availability (Nath et al., 2015). On the other hand, the total population has a negative influence on food security. This result corroborates with the Malthusian theory which shows that there is an intrinsic divergence between population growth and subsistence growth (Malthus, 1798). Empirically, these results are consistent with those of Bremner (2012) who finds that population growth reduces food security in Sub-Saharan Africa.

In the second step (2), we estimate the invariant regressors (civil conflict and food security). We find that civil conflict reduces food security which confirms our previous results. This result is in line with the work of Ujunwa et al. (2019) who demonstrated that conflict reduces food security in West Africa.

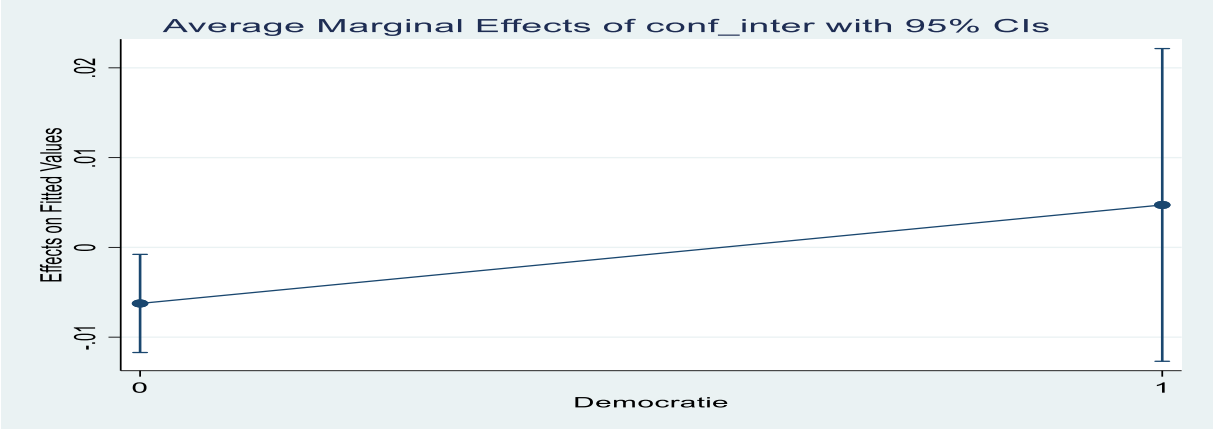
Column 3 presents the results of the relationship between civil conflict and food security, estimated by the generalized method of moments (GMM). Although the previous results provide evidence that civil conflict has a negative effect on food security, the results may be biased and inconsistent due to the presence of endogeneity (reverse causality, omitted variables and measurement error).

The results are presented in the table below. Overall, the results of the diagnostic tests show that our models are well specified. The Hansen test does not reject the validity of the instruments, and the lack of second-order serial correlation is not rejected. The results of the GMM system estimates generated a maximum of 16 instruments, which is less than the number of countries, so our results are valid. Concerning the coefficient associated with civil conflict, we note that it retains its previously obtained sign and is statistically significant at the 5% threshold. Overall, the empirical results in the table above are consistent with our previously presented results.

4.3.Does democracy matter?

Based on the literature on the role of democracy in the relationship between civil conflict and food security, one would expect that in highly democratic countries, the effect of conflict on food security would be less. Figure 1 below relates the effect of civil conflict on food security to democracy. It can be seen that in countries with low democracy, there is less food security due to civil conflict, while in countries with high democracy the opposite is true.

Figure 1: the relationship between democracy, civil conflict and food security



Source: Author's computation

Empirically we present the result in table 4 below which presents the relationship between civil conflict and the quality of institutions, especially democracy. The results in this table show that civil conflicts have a negative and statistically significant effect. But when democracy is present, there is an inverse but non-significant effect. This result suggests that democracy is a good indicator of governance that can help mitigate the effect of civil conflict on food security. Indeed, this can be justified by the fact that democracy increases political freedoms and responsibilities that allow vulnerable and marginalized people to participate in the choice of political elites that could achieve desirable social outcomes such as the absence of civil conflict and food security of populations. This result is in line with the work of Rossignoli and Balestri (2018) Balestri (2018) and Mukherjee (2004) who show that democracy improves food security.

Table IV: Marginal effects resulting from the GMM model estimation

Dependent variable: Dietary Energy(ln)	
	Marginal effect
L.lnDietary	0.909***
	(0.0427)
Civil conflict	-0.00624**
	(0.00279)
GDP per capita(ln)	0.0126
	(0.0118)
Readiness	0.0355*
	(0.0188)
Arable land (ln)	0.0282*
	(0.0153)
Population(ln)	-0.0368**
	(0.0179)
Democratic	-0.119
	(0.0952)
Civil Conflict##Democratic	0.0110
	(0.00968)
Constant	0.791***
	(0.281)
Observations	399
Number of countries	29

Instruments	16
AR(1)	0.001
AR(2)	0.131
Hansen OIR	0.362

Source: Author's computation. **Note:** Robust standard errors are shown in parentheses. (***,**,*) indicate statistical significance and rejection of the null hypothesis at 1%, 5% and 10% levels, respectively.

In order to deepen our analyses, we are currently examining which dimensions of food security are most affected by democracy and civil conflict. Table 5 presents the results of the estimates for the four dimensions of food security, namely access (column 1), availability (column 2), utilisation (column 3) and stability (column 4). The variables, food price index, average food energy intake, prevalence of undernourishment and variability of per capita food production are used as proxies for the different dimensions of food security respectively. The analysis of the coefficients reveals that internal conflicts negatively influence all dimensions of food security except the utilization dimension. Similarly, we find that democracy plays a moderating role in this relationship. Indeed, a good practice of democracy contributes to limiting the negative effects of civil conflict on the availability and stability dimensions of food security. We can therefore conclude that the results are robust for these two dimensions of food security.

Table V: effect of civil conflict and democracy on food security dimension

	(1) Access	**(2) Availability**	**(3) Utilization**	**(4) Stability**
L.Access	0.8665***			
	(0.0194)			
L.Availability		0.9882***		
		(0.0134)		
L.Utilization			0.8857***	
			(0.0346)	
L.Stability				0.0934*
				(0.0477)
Civil conflict	-0.0007**	-0.0009***	-0.0004	-0.1483**
	(0.0159)	(0.0003)	(0.0205)	(0.0688)
Democratic	0.0866**	0.0000	0.0360*	5.3109***
	(0.3696)	(0.0059)	(0.3515)	(1.3121)
Civil Conflictr##Democratic	-0.0012	0.0000	-0.0189	0.6444*
	(0.0423)	(0.0006)	(0.0437)	(0.1361)
GDP per capita (ln)	0.0073	0.0005	-0.0298	0.3223*
	(0.0365)	(0.0008)	(0.0429)	(0.1595)
Arable land (ln)	-0.1448***	-0.0004	-0.2130***	0.7702***
	(0.0361)	(0.0016)	(0.0349)	(0.2347)
Readiness	-0.0565	0.0071***	-0.0910	-1.0891**
	(0.0858)	(0.0019)	(0.0614)	(0.4730)
Population (ln)	0.1464***	0.0001	0.2179***	-0.8525***
	(0.0485)	(0.0016)	(0.0420)	(0.2546)
Constant	0.2354	0.1103	-0.0724	1.9180
	(0.6335)	(0.1017)	(0.6359)	(3.4420)
Observations	399	399	315	399

Number of countries	29	29	23	29
Instruments	22	18	16	22
AR(1)	0.041	0.000	0.009	0.009
AR(2)	0.217	0.845	0.203	0.123
Hansen OIR	0.128	0.152	0.273	0.335

Source: Author's computation. **Note:** Robust standard errors are shown in parentheses. (***,**,*) indicate statistical significance and rejection of the null hypothesis at 1%, 5% and 10% levels, respectively.

5. Conclusion

This study is being carried out in a context where the African continent is generally experiencing an upsurge in food insecurity and an increase in the frequency of conflicts. It therefore aims to analyse the role of democracy in the relationship between civil conflict and food security in sub-Saharan Africa. The data used are from a sample of 30 sub-Saharan African countries over the period 2002-2017. To address the endogeneity problem in the relationship between civil conflict and food security, the linear sequential estimator and the method of generalized moments were used. The econometric results show that civil conflict has a significant negative influence on food security in sub-Saharan Africa. Concerning the role of democracy, the results show that it allows for a positive influence in the relationship between civil conflict and food security as its interaction reverses the negative sign of civil conflict to positive even if the coefficient remains insignificant. The results also show that, with the exception of the utilization dimension, civil conflict significantly reduces all dimensions of food security. However, good democratic practice helps to limit these negative effects. The analysis supports the idea that building more inclusive institutions, through a process of transition to democracy, can support the improvement of food security, by promoting the dimensions of food availability and stability.

In a context where civil conflict in Africa is one of the main obstacles to achieving food security, the results of this research provide a new basis on which civil conflict policies in Africa and globally can be built to reduce the level of conflict and promote food security. Several policy implications may follow from these results. National and international policymakers should focus on the quality of institutions in general and democracy, in particular, to reduce the risk of conflict and improve food security. In the event of a conflict, policymakers should support food security, stimulate post-conflict recovery and respond to fluctuations in world food prices.

References

Abbott, M., Bazilian, M., Egel, D., & Willis, H. H. (2017) "Examining the food–energy–water and conflict nexus" *Current Opinion in Chemical Engineering*, *18*, 55-60.

Acemoglu, D., Gallego, F. A., & Robinson, J. A. (2014) "Institutions,human capital, and development" *Annual Review of Economics*, *6*, 875-912.

Adong, A., Kornher, L., Kiptoo Kirui, O., & von Braun, J. (2021) "Conflict exposure and food consumption pathways during and after conflict: Evidence from Northern Uganda" *World Development*, *147*, 105636.

Akresh, R., Lucchetti, L., & Thirumurthy, H. (2012) "Wars and child health: Evidence from the Eritrean–Ethiopian conflict" *Journal of Development Economics*, *99*(2), 330-340.

Allansson, M., Melander, E., & Themnér, L. (2019) "Organized violence, 1989-2016" *Journal of Peace Research*, *54*(4), 574-587.

Anugwom, E. (2000) "Ethnic conflict and democracy in Nigeria: The marginalisation question" *Journal of Social Development in Africa*, *15*(1), 61-78.

Arcand, J.-L., Rodella-Boitreaud, A.-S., & Rieger, M. (2015) "The Impact of Land Mines on Child Health: Evidence from Angola" *Economic Development and Cultural Change*, *63*(2), 249-279.

Arellano, M., & Bover, O. (1995) "Another look at the instrumental variable estimation of error-components models" *Journal of Econometrics*, *68*(1), 29-51.

Arjona, A., Kasfir, N., & Mampilly, Z. (2015) *Rebel governance in civil war*, Cambridge University Press.

Aslaksen, S., & Torvik, R. (2007) "A theory of civil conflict and democracy in rentier State" *The scandinavian Journal of Economics*, *108*(4), 571-585.

Balma, L., Heidland, T., Jävervall, S., Mahlkov, H., Mukasa, A. N., & Woldemichael, A. (2022) "Long-run impacts of the conflict in Ukraine on food security in Africa" Kiel Policy Brief, No. Ukraine Special 1, Kiel Institute for the World Economy (IfW Kiel), Kiel.

Bellemare, M. F. (2015) "Rising food prices, food price volatility, and social unrest" *American Journal of Agricultural Economics*, *97*(1), 1-21.

Berazneva, J., & Lee, D. R. (2013) "Explaining the African Food Riots of 2007–2008: An empirical analysis" *Food Policy*, *39*, 28-39.

Blundell, R., & Bond, S. (1998) "Initial conditions and moment restrictions in dynamic panel data models" *Journal of Econometrics*, *87*(1), 115-143.

Bremner, J. (2012) "Population and food security: Africa's challenge″ (Policy Brief). Population Reference Bureau.

Brown, I. A. (2018) "Assessing eco-scarcity as a cause of the outbreak of conflict in Darfur: A remote sensing approach" *International Journal of Remote Sensing*, *31*(10).

Brück, T., & d'Errico, M. (2019) "Food security and violent conflict: Introduction to the special issue" *World Development*, *117*, 167-171.

Bundervoet, T., Verwimp, P., & Akresh, R. (2009) "Health and civil war in rural Burundi" *Journal of Human Resources*, *44*(2), 536-563.

Camacho, A. (2008) "Stress and birth weight: Evidence from terrorist attacks" *American Economic Review*, *98*(2), 511-515.

Chen, J., Kibriya, S., Bessler, D., & Price, E. (2018) "The relationship between conflict events and commodity prices in Sudan" *Journal of Policy Modeling*, *40*(4), 663-684.

Connolly-Boutin, L., & Smit, B. (2016) "Climate change, food security, and livelihoods in sub-Saharan Africa" *Regional Environmental Change*, *16*(2), 385-399.

Diamond, J. (2005) *Collapse: How societies choose to faill or succeed*, Penguin Books.

Duque, V. (2016) "Early-life conditions, parental investments, and child development: Evidence from a violent conflict" Working paper.

Ehrlich, P. R., Ehrlich, A. H., & Daily, G. C. (1993) "Food security, population and environment" *Population and Development Review*, *19*(1), 1-32.

FAO. (2022) *Information Note: The importance of Ukraine and the Russian Federation for global agricultural markets and the risks associated with the current conflict*, Food and Agriculture Organization of the United Nations.

FAO, IFAD, UNICEF, WFP, & WHO. (2019) *The state of food security and nutrition in the world. Safeguarding against economic slowdownws and downturns*, FAO.

FAO, IFAD, UNICEF, WFP, & WHO. (2020) *The state of food security and nutrition in the world 2020. Transforming food systems for affordable healthy diets*, FAO.

Foureaux, K., & Manacorda, M. (2016) "Violence and birth outcomes: Evidence from Homicides in Brazil" *Journal of Development Economics*, *119*(3), 16-33.

Freeman, L. (2017) "Environmental Change, Migration, and Conflict in Africa: A critical examination of the interconnections" *Journal of Environment and Development*, *26*(4), 351-374.

FSIN. (2020) *Global Report on food crises*, Food Security Information Network.

Glaros, A., Alexander, C., Koberinski, J., Scott, S., & Quilley, S. (2021) "A systems approach to navigating food security during COVID-19: Gaps, opportunities, and policy supports" *Journal of Agriculture, Food Systems, and Community Development*, *10*(2), 211-223.

Gleditsch, N. P., Wallensteen, P., Eriksson, M., Sollenberg, M., & Strand, H. (2002) "Armed conflict 1946–2001: A new dataset" *Journal of Peace Research*, *39*(5).

Grosjean, P. (2014) "Conflict and social and political preferences: Evidence from world war II and civil conflict in 35 Euroean Countries" *Comparative Economic Studies*, *56*, 424-451.

Guerrero-Serdan, G. (2009) "The effects of the war in Iraq on nutrition and health: An analysis using anthropometric outcomes of children" HiCN Working Paper 55.

Harris, K. (2014) "Bread and Freedom: Linking Democracy and Food Security in Sub-Saharan Africa" *African Studies Quarterly*, *15*(1), 23.

Haussman, J. A., & Taylor, W. E. (1981) "A generalized specification test" *Economics Letters*, *8*(3), 239-245.

Hendrix, C. S., Haggard, S., & Magaloni, B. (2009) "Grievance and opportunity: Food prices, political regime, and protest" In Conference paper at the international studies association convention 2009.

Howe, P., & Devereux, S. (2004) "Famine Intensity and Magnitude Scales: A Proposal for an Instrumental Definition of Famine" *Disasters*, *28*(4), 353-372.

Hughes, M. M., & Tripp, A. M. (2015) "Civil war and trajectories of change in Women's political representation in Africa, 1985-2005" *Social Forces*, *93*(4), 1513-1540.

Humphreys, M., & Weinstein, J. M. (2008) "Who fights? The determinants of participation in civil war" *American Journal of Political Science*, *52*(2), 436-455.

Ida, R. (2020) "Food security and domestic instability: A review of the literature" *Terrorism and Political Violence*, *32*(5), 921-948.

Jeanty, P. W., & Hitzhusen, F. (2006) *Analyzing the effects of conflicts on food security in developing countries: An instrumental variable panel data approach*, American Agricultural Economics Association Annual Meeting, California.

Justino, P., & Stojetz, W. (2018) "On the legacies of wartime governance households in conflict network" HICN Working Paper 263.

Kah, H. K. (2017) "Boko Haram is losing, but so is food production: conflict and food insecurity in Nigeria and Cameroon" *Africa Development*, *42*(3), 177-196.

Kaufmann, D., Kraay, A., & Mastruzzi, M. (2010) "Response to "what do the Worldwide governance indicators measure?" *European Journal of Development Research*, *22*(1), 55-58.

Kavallari, A., Fellmann, T., & Gay, S. H. (2014) "Shocks in economic growth = shocking effects for food security?" *Food security*, *6*, 567-583.

Kilishi, A. A., Yaru, M. A., & Yakubu, A. T. (2013) "Institutions and economic performance in Sub-Saharan: A dynamic panel data analysis" *Journal of African Development*, *15*(2), 91-119.

Koren, O., & Bagozzi, B. E. (2016) "From global to local, food insecurity is associated with contemporary armed conflicts" *Food Security*, *8*(5), 999-1010.

Kripfganz, S., & Schwarz, T. (2019) "Estimation of linear dynamic panel data models with time-invariant regressors" *Journal of Applied Econometrics*, *34*(4), 526-546.

Leroy, J. L., Ruel, M., Frongillo, E. A., Harris, J., & Ballard, T. J. (2015) "Measuring the Food Access Dimension of Food Security: A Critical Review and Mapping of Indicators" *Food and Nutrition Bulletin*, *36*(2), 167-195.

Malthus, T. (1798) *An essay on the principle of population*, Norton Critical editions.

Manap, N. M. A., & Ismail, N. W. (2019) "Food security and economic growth" *International Journal of Modern Trends in Social Sciences*, *2*(8), 108-118.

Mansour, H., & Rees, D. I. (2012) "Armed conflict and birth weight: Evidence from the Al-Aqsa Intifada" *Journal of Development Economics*, *99*(1), 190-199.

Marson, T. A., Subramaniam, Y., & Subramaniam, T. (2020) "Thirunaukarasau subramanian, institutional quality and fodd security" *The Singapore Economic Review*.

Martin-Shields, C. P., & Stojetz, W. (2019) "Food security and conflict: Empirical challenges and future opportunities for research and policy making on food security and conflict" *World Development*, *119*, 150-164.

Mercier, M., Ngenzebuke, R. L., & Verwimp, P. (2016) "Violence exposure and welfare over time: Evidence from the Burundi civil war" HICN Working Paper 198.

Messer, E., & Cohen, M. J. (2015) "Breaking the Links Between Conflict and Hunger Redux: Breaking the Links Between Conflict and Hunger Redux" *World Medical & Health Policy*, *7*(3), 211-233.

Minoiu, C., & Shemyakina, O. N. (2014)" Armed conflict, household victimization, and child health in Côte d'Ivoire" *Journal of Development Economics*, *108*, 237-255.

Mitchell, D., Hudson, D., Post, R., Bell, P., & Williams, R. B. (2015) "Food security and conflict" *Frontiers of Economics and Globalization*, *15*, 1574-8715.

Mkandawire, P., & Aguda, N. (2009) "Characteristics and determinants of food insecurity in Sub-Saharan Africa" In *Environment and health in Sub-Saharan Africa: Managing and Emerging Crisis* (p. 3-23). Springer.

Mukherjee, S. (2004) "Blame the rulers, not the rain: Democracy and food security in Zambia and Zimbabwe" In *Strengthening parliamentary democracy in SADC countries: Swaziland country report*. South African Institute of International Affairs.

Munoz-Mora, J. C. (2016) "Fighting while talking: Assessing the impact of civil war on agriculture" Working paper.

Nasir, M. (2016) "Violence and child health outcomes: Evidence from the Mexican drug war" HICN Working Paper 208.

Nath, R., Luan, Y., Yang, W., Yang, C., Chen, W., Li, Q., & Cui, X. (2015) "Changes in Arable Land Demand for Food in India and China: A Potential Threat to Food Security" *Sustainability*, *7*(5), 5371-5397.

Nickell, S. (1981) "Biases in dynamic models with fixed effects" *Econometrica*, *49*(6), 1417-1426.

Omenma, J. T., Abada, I. M., & Omenma, Z. O. (2020) "Boko Haram insurgency: A decade of dynamic evolution and struggle for a caliphate" *Security Journal*, *33*, 376-400.

Osabohien, R., Osabuohien, E., & Urhie, E. (2018) "Food security, Institutional framework and technology: Examinig the nexus in Nigeria Using ARLD approach" *Current Nutrition & Food Science*, *14*, 154-163.

Pettersson, T., & Wallensteen, P. (2015) "Armed conflicts, 1946-2014" *Journal of Peace Research*, *52*(4), 536-550.

Pollard, C. M., Landrigan, T. J., Ellies, P. L., Kerr, D. A., Lester, M. L. U., & Goodchild, S. E. (2014) "Geographic factors as determinants of food security: A Western Australian food pricing and quality study" *Asia Pacific Journal of Clinical Nutrition*, *23*(4), 703-713.

Raleigh, C. (2010) "Political marginalization, climate change, and conflict in African Sahel States" *International Studies Review*, *12*(1), 69-86.

Raleigh, C., Choi, H., & Kniveton, D. (2015) "The devil is in the details: An investigation of the relationships between conflict, food price and climate accros Africa" *Global Environmental Change*, *32*, 187-199.
Rockmore, M. (2015) "Conflict and agricultural portfolios: Evidence from Northern Uganga" Working paper.
Roodman, D. (2009) "A note on the theme of too many instruments" *Oxf. Bull. Econ. Stat.*, *71*(1), 135-158.
Rossignoli, D., & Balestri, S. (2018) "Food security and democracy: Do inclusive institutions matter?" *Canadian Journal of Development Studies*, *39*(2), 215-233.
Sen, A. (1981) *Poverty and Famines: An Essay on Entitlements and Deprivation*, Oxford University Press.
Sen, A. (2001) *Development as Freedom* (2nd ed), Oxford University Press.
Shawn, D., Pettersson, T., & Oberg, M. (2022) "Organized violence 1989-2021 and drone warfare" *Journal of Peace Research*, *59*(4).
Slimane, M. B., Huchet-Bourdon, H., & Zitouna, M. H. (2017) "Sectoral FDI and food security in Developing Countries: Does institutional quality matter?" Working paper.
Smith, T. (2014) "Feeding unrest: Disentangling the causal relationship between food price shocks and sociopolitical conflict in urban Africa" *Journal of Peace Research*, *51*(6), 679-695.
Teodosijevic, S. B. (2003) "Armed conflicts and food security" ESA Working Paper, no 03-11.
Tranchant, J.-P., Justino, P., & Müller, C. (2014) "Political violence, drought and child malnutrition: Empirical evidence from Andhra Pradesh, India" HICN Working Paper 173.
Ujunwa, A., Okoyeuzu, C., & Kalu, E. U. (2019) "Armed Conflict and Food Security in West Africa: Socioeconomic Perspective" *International Journal of Social Economics*, *46*(2), 182-198.
Valente, C. (2011) "Children of the revolution: Fetal and child health amidst violent civil conflict" University of York Working Paper 12/11.
Verwimp, P., & Munoz-Mora, J. C. (2013) "Returning home after civil war: Food security, nutrition and poverty among burundian household" HICN Working Paper 123.
Voors, M. J., & Bulte, E. H. (2014) "Conflict and the evolution of institutions: Ubundling institutions at the local level in Burundi" *Journal of Peace Research*, *51*(4).
Windmeijer, F. (2005) "A finite sample correction for the variance of linear efficient two-step GMM estimators" *Journal of Econometrics*, *126*(1), 25-51.
Zhou, Z. Y. (2017) *Food insecurity in Asia: Why institutions matter*, Asian De velopment Bank.

Appendix

A1: Description and sources of variables

Variables	Description	Sources
Dietetic Energy	Dietary energy supply used in the estimation of prevalence of undernourishment (kcal/cap/day)	FAO (2021)
Internal Conflict	Index measuring internal conflicts	PRIO (2019)
GDP per capita	Gross Domestic Product per Capita. Data are in constant 2010 U.S. dollars	WDI (2021)
Readiness	Index measuring the country's capacity to implement policies that can improve its resilience	WDI (2021)

Arable Land	Area of arable land (hectare)	WDI (2021)
Population	Total population (person)	WDI (2021)
Democracy	Index measuring the level of democracy	V-dem (2019)

Note: WDI=World development Indicator, PRIO= Peace Research Institute Olso, FAO=Food and Agriculture Organisation for the United States Nations.

A2: correlation analysis

Variables	DE	IC	GDP	RED	AL	POP	DEM
DE	1.000						
IC	-0.079	1.000					
GDP	0.302	0.179	1.000				
RED	0.403	0.498	0.395	1.000			
AL	0.279	-0.401	-0.028	-0.071	1.000		
POP	0.149	-0.403	-0.027	-0.100	0.886	1.000	
DEM	-0.014	0.304	0.137	0.355	-0.319	-0.286	1.000

Note: DE=Dietetic Energy, IC=Internal Conflict, GDP=Gross Domestic Product per Capita, RED=Readiness, AL=Arable Land, POP=Population DEM=Democracy.

A3: List of sample countries

Angola, Botswana, Burkina Faso, Cameroon, Congo, Congo Democratic Republic, Ivory Coast, Ethiopia, Gabon, Gambia, Ghana, Guinea-Bissau, Kenya, Liberia, Madagascar, Malawi, Mali, Mozambique, Niger, Nigeria, Senegal, Sierra Leonne, Somalia, South Africa, Sudan, Tanzania, Togo, Uganda, Zambia, Zimbabwe.