

Can Peace Operations Mitigate the Effect of Armed Conflict on Malnutrition? Evidence from Côte d'Ivoire

Kyle Beardsley, PhD
Duke University

Jessica Beardsley, MS, RD, LDN
Independent Researcher

Abstract

Armed conflict increases food insecurity leading to malnutrition especially in women, but can peace operations mitigate the increased prevalence of malnutrition in conflict zones? This study uses women's nutrition outcomes – key indicators of societal health and peace potential in a community – as a lens through which to understand the downstream, long-term, consequences of exposures to violence both with and without the presence of UN peacekeepers. Comparing data of adult women in Côte d'Ivoire from the Demographic and Health Surveys (DHS), across two waves that cover pre-conflict and post-conflict periods, shows that peace-operation deployments mitigated the relationship between conflict and malnutrition. Exposure to armed conflict in the absence of peace operations is associated with an increased propensity for underweight, while exposure to armed conflict in the presence of peacekeeping troops is *not* associated with an increased propensity for underweight. A cross-national analysis using data from the Food and Agriculture Organization (FAO) also confirms that food security, as well as cereal and meat production, in the wake of conflict improve with peace-operation deployments.

Keywords: malnutrition, food security, peacekeeping, armed conflict, Côte d'Ivoire

Introduction

In April 2016, the United Nations General Assembly proclaimed the UN Decade of Action on Nutrition from 2016 to 2025, with aspirations to enable all people to have access to healthier and more sustainable diets and to eradicate malnutrition worldwide (GA/11770). Malnutrition is the imbalance or deficiency in a person’s nutrient or caloric intake, and malnutrition’s community effects, as determined by the World Health Organization (WHO), include higher rates of infectious and chronic disease, decreased economic growth, reduced education potential and increased violence.¹ This paper asks whether and how UN peace operations can be an important component of international action against malnutrition in communities affected by armed conflict.

Armed conflict, through both environmental destruction and interruptions in governance and economic activity, has long-term impacts on food insecurity and thus malnutrition.² For example, the war in Ethiopia led to significant restrictions in the distribution of food aid, caused farmers to miss the planting season in 2021, and reduced consumer access to food markets – all contributing to a food security crisis for about 4 million people (IPC 2021). Malnutrition, in turn, contributes to increased risk of political violence.³ In this sense, malnutrition serves as one pathway of what Collier (2003) calls the “conflict trap”: violence increases the propensity for malnutrition, which thereby fosters further armed violence.

¹ See <https://www.who.int/news-room/questions-and-answers/item/malnutrition>.

² See Aaby et al. (1999); Agadjanian & Prata (2002); Akresh et al. (2001); Akresh et al. (2012); Baez (2011); Boyden et al. (2002); Bundervoet (2009); Devkota & van Teijlingen (2010); Ghobarah et al. (2003); Guha-Sapir & D’Aoust (2011); Guha-Sapir et al. (2005); Iqbal (2006, 2010); Iqbal & Zorn (2010); Leaning & Guha-Sapir (2013); Lindstrom & Berhanu (1999); Li & Wen (2005); Malmros (1950); Mansour & Rees (2012); Minoiu & Shemyakina (2014); O’Hare & Southall (2007); Østby et al. (2018); Palmer et al. (2019); Urdal & Chi (2013); Von Grebmer et al. (2015).

³ See Hendrix and Brinkman (2013); Hendrix and Haggard (2015); Pinstrup-Andersen and Shimokawa (2008).

In 2018, the UN Security Council (UNSC) passed Resolution 2417, which calls attention to the relationship between armed conflict and food insecurity, condemns the use of famine as a weapon of war, and urges parties in conflict and Member States to take measures to address this problem. At a 2017 UNSC meeting, the UN Under-Secretary-General for Humanitarian Affairs and Emergency Relief Coordinator, stated that “Nearly two thirds of the world’s hungry live in countries in conflict. Nearly 500 million undernourished people – and almost 80 per cent of the world’s 155 million stunted children – live in countries affected by conflict” (S/PV.8213). Missing from the UNSC resolution, as well as much of the surrounding policy discussion, is guidance for the role that peace operations – the most resource demanding and intrusive form of involvement that the UN undertakes in conflict-affected countries – can play in mitigating the vicious cycle between armed violence and food insecurity.

Armed conflict presents unique and gendered challenges to communities and households such that the impact on women – the focus of our study – is especially pronounced (Plümper and Neumayer 2006; Urdal and Che 2013). Armed conflict and peace processes also present unique and gendered opportunities for women to be agents of peacebuilding (Anderson 2015; Rehn and Johnson Sirleaf 2002; Tripp 2015). Conflict resolution efforts related to international peacekeeping (peace operations) and peacebuilding⁴ would do well to address the gendered

⁴ *Peacekeeping operations* are defined by the deployment of military personnel with the consent of the conflict parties. They have mandates that differ from mission to mission, and they are one of multiple options that outside actors like the UN use to manage conflict and maintain peace. As such, the operations can be considered as part of the ecosystem of *international peacebuilding* efforts, co-occurring with other activities including conflict prevention, peacemaking and peace enforcement (Boutros-Ghali 1992). According to the UN (<https://peacekeeping.un.org/en/terminology>), “Peacebuilding aims to reduce the risk of lapsing or relapsing into conflict by strengthening national capacities at all levels for conflict management, and to lay the foundation for sustainable peace and development... The boundaries between conflict prevention, peacemaking, peacekeeping, peacebuilding and peace enforcement have become increasingly blurred. Peace operations are rarely limited to one type of activity. While UN [peacekeeping operations](#) are, in principle, deployed to support the implementation of a ceasefire or peace agreement, they are often required to play an active role in peacemaking efforts and may also be involved in early peacebuilding activities.”

legacies of violence, including food insecurity, if they are to break the conflict trap in the long run. When women face high risks of food insecurity in conflict affected countries, it is both indicative of ongoing peacebuilding failures and also a key barrier to future peacebuilding success. Emerging scholarship on peacebuilding has begun to uncover the importance of viewing environmental impact, food security and water security within peacebuilding initiatives through a gender lens (Ide et al. 2021). Existing work, however, has yet to systematically assess the impact of peace operations on food insecurity among women in conflict zones.

This paper focuses on the domain of nutrition outcomes – specifically the propensity for underweight among women – to compare the nutritional impact of armed violence with and without the deployment of peacekeeping personnel.⁵ It considers pathways by which armed conflict can exacerbate problems of food insecurity among women, with an emphasis on how conflict disrupts household economies and impedes food production and distribution. It then considers ways in which peace operations plausibly mitigate those challenges: by improving security, stimulating economic activity, and empowering women. Comparing data of adult women in Côte d’Ivoire from the Demographic and Health Surveys (DHS), across two waves that cover pre-conflict and post-conflict periods, finds an increased propensity for underweight in conflict zones that were not exposed to peacekeeping.⁶ The deployment of peace operations attenuated the impact of conflict: the conflict zones that were exposed to moderate and high numbers of peacekeeping troops were *not* associated with an increased propensity for underweight in women. A cross-national analysis further suggests that peace operations mitigate

⁵ Peace operations and peacekeeping missions are used synonymously here. The research design measures exposure to peace operations as a localized count of UN peacekeeping troops, but they should not be assumed to be operating independently of other activities related to peacebuilding, conflict prevention, peacemaking, or peace enforcement (Boutros-Ghali 1992).

⁶ The focus on women is justified based on the gendered nature of the mechanisms explored. The DHS data from Côte d’Ivoire also does not include the relevant biometric data for men in the sample, even though data from men would be informative (Marino et al. 2011).

the loss of grain and livestock production in countries that have experienced armed conflict, pointing to food production as a key mechanism linking armed conflict and peace-operation exposures to nutrition outcomes.

Motivation and Contribution

This study contributes to debates about whether and how peace operations can disrupt the conflict trap. In focusing on the nutrition outcomes of women, it identifies pathways by which peacekeeping and peacebuilding initiatives can address a key consequence of armed conflict – food insecurity of women – that if left unaddressed would indicate and contribute to peacebuilding failure. As Enloe (2013: 110) notes, a woman’s “economic independence and her physical health, security, and autonomy are mutually interdependent: curtail one, and you curtail the other.”⁷

Reducing malnutrition is a desirable goal for individuals and collectives. Poor nutrition increases stress and fatigue while also reducing the capacity for productive work. Food insecurity and undernourishment contribute to depression and anxiety while also depleting the ability to respond to stressful events. Being underweight impedes women’s productivity and exacerbates risk of illness, and adequate nutrition while supporting maternal health also improves school and education performance as well as supporting robust immune systems (World Health Organization 2016).⁸ In the aggregate, malnutrition and food insecurity predispose communities to political instability and armed violence (Hendrix and Brinkman 2013; Hendrix and Haggard 2015; Pinstруп-Andersen and Shimokawa 2008). In order to attenuate malnutrition in low income countries, strategies must focus on the root cause of social inequalities, the Social

⁷ Quoted in Pruitt (2016).

⁸ See <https://www.prb.org/resources/nutrition-of-women-and-adolescent-girls-why-it-matters/>

Determinants of Health (SDOH), including societal violence and gender disparities (Miani et al. 2021; Perez-Escamilla et al. 2018).⁹

Can international peacekeeping assist in mitigating the harmful impact of conflict on food insecurity and malnutrition? Walter et al. (2021) summarize recent studies of the efficacy of peace operations toward a number of peaceful outcomes. Specific to the outcomes of interest in this paper, a few studies have quantitatively investigated the potential public-health contributions of peace operations (Benson et al. 2020; Bove et al. 2022; Caruso et al. 2017; Gizelis and Cao 2019; Lindberg Bromley and von Uexkull 2021).¹⁰

While the bulk of the quantitative studies have found that peace operations, on average, are associated with positive improvements on a variety of outcomes, the qualitative evidence offers abundant critique of peace-operation performance (Autesserre 2010; Howard 2008; Jett 2000; Kuperman 2008; Paris 2004; Von Billerbeck 2016). It is not hard to identify peace operations that have been mired by dysfunction. International peacekeeping has a tainted reputation in the domain of public health outcomes as examples such as UN-peacekeeper culpability in the spread of cholera in Haiti in the 2010's loom large. Critics of peace operations have pointed out ways in which they prey on vulnerable populations or otherwise make it more difficult for peace to fall on a broken polity because they shape the incentives of the armed actors in ways that encourage escalation rather than de-escalation.¹¹ From these studies, the trajectories of violence and health broadly defined might be expected to trend worse after a peace operation.

⁹ SDOH includes factors in the environment described in five domains: Economic Stability, 2) Education Access and Quality, 3) Health Care Access and Quality, 4) Neighborhood and Built Environment, and 5) Social and Community Context (Bartley et al. 2006; Lucyk & McLaren 2017).

¹⁰ Of these, only Gizelis & Cao (2019), Bove et al. (2022) and Caruso et al. (2017), discussed later, relate to food insecurity but not specifically among women. Tangentially, Stephenson & Zanotti (2012) consider the relevance of NGOs as peacebuilding actors affecting health outcomes.

¹¹ See Thakur et al. (2007); Di Salvatore (2018); Greig & Diehl (2005); Hultman (2010); Karim & Beardsley (2016, 2017); Kathman & Wood (2011); Kuperman 2008; Nordås & Rustad (2013); Werner & Yuen (2005).

In other contexts, peace operations might be considered fairly irrelevant to the trajectory of a polity that has experienced armed conflict.¹² For example, Mvukiyehe & Samii (2018) find that the UN peacekeeping mission in Liberia did not add much to build the local capacity for peace beyond what was already present. Sambanis (2008) also cautions that peace operations may produce observable peace dividends of peace only in the short run. Whether and how peace operations can mitigate the impact of armed conflict on food insecurity is thus not obvious from existing work.

Mechanisms and Hypotheses

We consider the mechanisms by which armed conflict leads to malnutrition in women in conflict-affected communities and then consider how peace operations can mitigate those perverse effects. The mechanisms considered here are neither mutually exclusive nor exhaustive. They are mechanisms well understood from existing literature of dietetics and human security that also can be studied using available data. The empirical analysis below and in the online appendix explores some of the posited pathways and also recognizes a number of challenges in isolating mechanisms that are overlapping and observationally equivalent.

Our analysis measures malnutrition in terms of underweight, though it is important to recognize that malnutrition is defined more broadly to include deficiencies, excesses or imbalances in energy or nutrient intake. We focus on underweight because it is measurable using the DHS data and comports well as an outcome of the proposed mechanisms below.¹³ We use a

¹² The evidence suggests, however, that peacekeeping missions tend to go to more severe and difficult-to-resolve cases: peace operations serve more as harbingers of challenges ahead rather than harbingers of certain resolution (Fortna 2008; Gilligan & Stedman 2003; Gilligan & Sergenti 2008; Melander 2009; Mullenbach 2005; Ruggeri et al. 2018).

¹³ We also considered obesity as an outcome, especially due to the potential links between trauma-related stress and changes in metabolism that are conducive to obesity (Epel et al. 2000; Zhang et al. 2014; Zukowska-Grojec, 1995), as well as the potential for individuals to prefer calorie-dense and nutrient poor options in times of food insecurity

conventional definition of underweight from the WHO: having a Body Mass Index (BMI) below 18.5 kg/m². Although individuals can be healthy with BMIs outside the “normal” range, we take increases in the prevalence of underweight in a population to be indicative of nutritional challenges that communities face.

Household-Economy Disruptions

Some mechanisms by which armed conflict shapes malnutrition occur at the level of the household, in terms of which households have access to adequate food. Most directly, loss of income makes it more difficult for members of a household to afford and access adequate nutrition. Examining the effects of the exposure to violence in Côte d’Ivoire on child stunting rates, Minoiu and Shemyakina (2014) find that children from households that experienced economic losses during the conflict were especially likely to experience stunting.

Female-headed households – which tend to increase as a result of war – have been found to be especially food insecure (Felker-Kantor and Wood 2012).¹⁴ In such households, women take on more responsibilities, but without the benefit of more wages or resources. As Rehn and Johnson Sirleaf (2002: 123) tell it, “Women carry the burden of domestic work, and during conflict their unpaid labour becomes even more complex and demanding... They may spend hours hunting for firewood and carrying water. Very often they take on additional roles and responsibilities, performing ‘men’s’ work as well as their own. They farm land even though they

(Briers et al. 2006; Hunter-Adams et al. 2019; Redman, et al 2009; Weyer et al. 1999; Wilde and Peterman 2006). The results, presented in the online appendix, failed to observe similar relationships with obesity as found with underweight, even when considering deaths of close family members as a measure of trauma. This is consistent with studies finding a heterogenous relationship between food insecurity and obesity -- the link is most strong in the developed world and in urban environments, where there is greater access to calorie-dense yet nutrient-poor food (Wu et al. 2019; Keino et al. 2014; Monteiro et al. 2004; Ramsay 2018; Rosen and Shapouri 2008).

¹⁴ Note, however, that female-headed households with low income tend to do better in maintaining food security for children in the households (Kennedy and Peters 1992).

cannot legally possess it.” The inability for women to own the land on which they depend for subsistence makes women in female-headed households particularly food insecure in the wake of war (Karuru and Yeung 2016). Rehn and Johnson Sirleaf (2002: 130) describe a woman in Liberia, whose family’s land passed to her brother-in-law after her husband died in the war: “This land feeds my family. What if he wants to sell it? How will we survive? ... I will fight for my land even if I have to die. Because if I lose this land my whole family will die.” Yet increasing the extent to which women control crop production has shown to enhance food production in Côte d’Ivoire (CARE 2022).

War also affects reproductive patterns, such that the size of households and the number of mouths to feed can shift. Urdal and Che (2013) argue that armed conflict tends to increase fertility in underdeveloped countries.¹⁵ If households increase in size while wages decline during armed conflict, food insecurity will worsen. Indeed, Wambogo et al. (2018) find that severe food insecurity (SFI) is correlated with the number of children in the household.

Still another disruption to household economies relates to wars’ impact on population displacements. As wars displace people from their homes, patterns of local food insecurity can change rapidly, particularly in households that take in those who have been displaced. In a study of Guinea-Bissau, where aid was provided to refugee communities but not to local residents in the areas to which the refugees were displaced, Aaby (1999) finds that malnutrition and mortality increased amongst non-refugee residents. Baez (2011) similarly finds that the influx of refugees into Tanzania greatly worsened health outcomes among the refugee-hosting communities. Akresh et al. (2012) and Bundervoet et al. (2009) conclude that population displacements during the Ethiopian-Eritrean war and the Burundian civil war help explain increases in child stunting as

¹⁵ Lindstrom and Berhanu (1999), however, find that fertility declined in the wake of war and famine in Ethiopia.

a result of the respective conflicts. Since women are more likely to displace than men (Urdal and Che 2013), and, as discussed below, women in households that are hosting displaced individuals are more likely to prioritize the health of children and men, women are particularly susceptible to food insecurity created by population displacements. Tying these different disruptions to household economies together, increases in food insecurity in communities affected by conflict can lead to caloric deficits, manifested in a growing prevalence of underweight women.

Food Production and Distribution

Other mechanisms by which conflict increases the prevalence of malnutrition pertain to disruptions in food production and distribution.¹⁶ The 2015 Global Hunger Index emphasizes that armed conflict contributes to food insecurity, famines and malnutrition across the globe (Von Grebmer et al. 2015). Armed conflict can reduce access to nutritious food in a number of ways as we shall discuss. Some of these harmful effects of armed conflict are unintentional, collateral damage of war, but oftentimes it is *intentional* as the armed actors use famine as a weapon.¹⁷

Most directly, armed conflict can lead to the environmental destruction of farm and pastureland, and the inability for farmers to access land that is contested or filled with unexploded ordnance, as witnessed recently in Ethiopia (IPC 2021). As another direct mechanism, Bundervoet et al. (2009) highlight crop theft by armed actors as an explanation for heightened rates of child stunting in the midst of armed conflict in Burundi.¹⁸ Moreover, armed

¹⁶ The Food and Agriculture Organization (FAO) defines food insecurity as the ability at all times to access sufficient, safe and nutritious food (FAO 2006).

¹⁷ See Seshagiri (1979).

¹⁸ War can also impact pastoral raids (Schilling et al. 2012) and the ability for households to use livestock holdings as buffers against crop failures (Verpoorten 2009).

conflicts interfere with the ability for food producers to connect with consumers, especially when violence targets civilian infrastructure (Sowers and Weinthal 2021). Rehn and Johnson Sirleaf (2002: 37), for example, blame armed actors for restricting food aid to civilians in Angola in the 1980s and 90s. More indirectly, O'Hare and Southall (2007) find that armed conflict in sub-Saharan Africa is associated with increased defense expenditure and decreased health expenditure, which helps account for elevated levels of malnutrition. Also, armed conflict can reduce community resilience in the wake of environmental disasters, contributing to food insecurity by degrading socio-economic resources, infrastructure and state capacity to implement disaster recovery (Buhaug and von Uexkull 2021; Peters 2021; Schilling et al. 2012; Weinthal and Sowers 2021).

The impact of armed conflict on food insecurity via disruptions in food production and distribution, furthermore, is mediated by gender inequalities.¹⁹ Worldwide, over 150 million more women than men experience food insecurity (CARE 2022), and a study across sub-Saharan Africa found that women were at higher risk for SFI than men (Wambogo et al. 2018). When food becomes scarce, women tend to sacrifice their own nutrition for others. For example, Akresh et al. (2011) find that Rwandan households prioritized adequate nutrition for their boys over their girls in the face of crop failure. As another example of women sacrificing their own health and productivity for the health of males in the family, Rehn and Johnson Sirleaf (2002) report, "One woman whose child had been severely disabled by a landmine told us that her whole day is taken up with feeding and washing the child and helping him learn how to read." Tir and Bailey (2018) find that threats of armed conflict tend to lead to decreases in women's economic welfare as periods of crisis enhance adherence to traditional gender roles.

¹⁹ See Evans (2014) for a discussion on mechanisms by which economic insecurities can shape gendered norms around employment.

Combining these mechanisms, we expect armed conflict exposure to increase the potential for individuals, particularly women, to be underweight. Hypothesis 1 states the observable implication explicitly, recognizing that exposure is not binary but comes in gradations of severity.²⁰

Hypothesis 1: Women in communities which have experienced armed conflict are more likely to be malnourished as measured by underweight, and this effect increases with the severity of armed conflict.

The Mitigating Potential of Peace Operations

Peace operations can mitigate the posited links between armed conflict and women's nutrition outcomes in three ways. Most straightforward, peace operations can enhance security such that economic activity and access to food improve. Another way is by injecting new resources into the communities via "peacekeeping economies." Still another mechanism involves peace operations' impact on the economic, social and political empowerment of women. None of these mechanisms involve peace operations as direct providers of food to communities; they are downstream consequences of peace operations.²¹

First, the extent to which peace operations enhance security can bolster market forces and public institutions to undo some of war's local disruptions to food access and household economies. For example, Caruso et al. (2017) find that UN peacekeeper deployments increased

²⁰ As discussed below, exposure severity is measured as the (logged) number of battle-related fatalities that occurred in a community.

²¹ Improved nutrition outcomes, like other outcomes related to public health, may be *intended* outcomes of building fragile economic and public institutions especially after UNSCR 2417 (2018), but the mechanisms considered do not involve direct food-aid provision. Peace operations could play such a role, but this was not a point of operational emphasis in the mission to Côte d'Ivoire analyzed below.

cereal production in South Sudan, while Bove et al. (2022) find that the same peacekeeping mission helped increase economic consumption by reducing actual and perceived security threats. Also related, Gizelis and Cao (2019) find that peace operations reduce security concerns such that expectant mothers can better access antenatal care.²² Peace operations can also reduce security threats that inhibit the efforts of international aid organizations. For example, following a wave of armed violence in Côte d’Ivoire, Betsi et al. (2006) report that while the availability of health staff in three key regions decreased by over 70 percent from 2001 to 2004, the number of NGOs active in specifically addressing HIV/AIDS nearly doubled. Even when peace operations are not significant distributors of food, they have the potential to bolster food security by enhancing the ability of government actors, aid organizations and bilateral donors to provide food aid, humanitarian relief and medical care.²³ Harrowell and Özerdem (2019), for example, uncover the potential for peacebuilding actors to enhance resiliency to environmental disasters by integrating post-disaster reconstruction and post-conflict reconstruction efforts. That refugees can in some cases have greater access to maternal and reproductive healthcare than host populations (Urdal and Che 2013) demonstrates the capacity for international peacebuilding activities to mitigate the gendered public health consequences of population displacements. Rehn and Johnson Sirleaf (2002: 44) relatedly highlight UN-led refugee assistance efforts in Guinea that contributed to increases in food production by local farmers.

Second, scholarship has also explored localized economic booms around peace operations’ military bases and civilian headquarters – “peacekeeping economies” – which tend to be sources of local security as well as generators of employment and skills training (Aning &

²² Moreover, related to the mechanism of peacekeeping economies, Gizelis and Cao (2019) also consider the potential for peace operations to more directly increase the medical services available to communities.

²³ See, however, Campbell (2018) for discussion of challenges endemic in such collaboration.

Edu-Afful 2013; Beber et al. 2017, 2019; Bell et al. 2018; Caruso et al. 2017; Jennings 2015, 2016, 2018; Jennings & Bøås 2015; Thakur et al. 2007). Edu-Afful and Aning (2015: 400) highlight the potential for peacekeeping economies to especially increase the economic opportunities for women in jobs pertaining to “services, enterprise support, entertainment, training and the hospitality industry.” As an example, Rehn and Johnson Sirleaf (2002) highlight a woman working with the UN mission in Kosovo, “who was able to support her family with her earnings as a translator in the peacekeeping mission.” As another example, Rehn and Johnson Sirleaf (2002: 132) highlight UNIFEM’s programs working with Liberian refugees: “In Côte d’Ivoire and Ghana UNIFEM provided Liberian refugee women with skills training in non-traditional sectors like construction and brickmaking. These women have built their own houses, schools, dormitories and even women’s centres in the refugee camps.” We acknowledge the reality that peacekeeping economies also have an association with sex work and other forms of exploitation. We later discuss the need to identify means of bolstering food security and economic opportunities while avoiding harmful, gendered dependencies and exploitation.

Third, peace operations have potential to empower women in conflict affected areas. Peace operations, especially when there is sufficient representation of women and institutional features that address gender inequalities, can stimulate women’s employment in the security sector and other non-traditional sectors, as well as facilitate political reforms that empower women (Pruitt 2016; Huber and Karim 2018; Karim and Beardsley 2017). Peace operations also can work with local women and the organizations women lead to prioritize initiatives that address the gendered consequences of armed violence pertaining to food insecurity. For instance, Gizelis (2011: 528) highlights how UN peacebuilding in Liberia supported efforts to “gender mainstream agricultural policies and assess the impact of gendered policies in improving

productivity – for example, the support to the cassava farmers in Nimba county and the implementation of gender-sensitive programmes in agriculture.” The empowerment and health of women, in turn, is crucial for an efficacious peacebuilding process. That is, peacebuilding processes that incorporate the wellbeing of women are more likely to succeed because women are engines of change in their communities (Gizelis 2009, 2011; Gizelis and Krause 2015), and they will be better able to invest in the health of their community if they do not need to address critical threats to their own health. Consequently, the potential for UN peace operations to successfully build peace is conditional on women’s social status; when women have a relatively high social status in places like West Africa, the peace operations have better ability to leverage the women’s social networks as active agents of conflict management and reconstruction (Gizelis 2009, 2011).

Turning to observable implications of the three mechanisms, the size of the local footprint of a peace operation matters to the extent to which it enhances local security, catalyzes economic activity and empowers women. Variation in the equipping and resourcing of an operation can shape the outcomes, i.e., under-funded peace operations struggle to fulfill their mandates.²⁴ Indeed, recent studies have found that peacekeeping missions with more troops enhance cooperation with the peace operation and stanch the severity of battle-related and one-sided violence (Hultman et al. 2013; Hultman et al. 2014; Kathman & Wood 2016; Ruggeri et al. 2013). Moreover, the extent to which jobs are created and demand increases for local goods depends on the size of the forces deployed to a local context. This all leads to a testable expectation that the extent to which a local community is exposed to a peace operation –

²⁴ See Howard (2019) for a nuanced approach to understanding how peace operations wield power with and without resources.

specifically related to the size of the peace operation and the community's proximity – can reduce the potential for armed conflict to lead to malnutrition in that community.

Hypothesis 2: Exposure to peace operations decreases the impact of armed conflict on propensity for malnourishment as measured by underweight.

Evidence from Côte d'Ivoire

We examine evidence for the hypotheses in the context of Côte d'Ivoire, which experienced two major waves of violence in the past 20 years: a violent insurgency from 2002 to 2004, and post-election violence from 2010 to 2011. The first wave of violence escalated after years of tension and land competition between groups in the South and groups in the North, who had experienced restrictions in their enfranchisement and rights to land ownership (Balcells 2017; Chirot 2006; Woods 2003). This civil war led to over 1,000 fatalities, based on data from the Uppsala Conflict Data Programme. In addition, estimates from Chirot (2006) and Betsi et al. (2006) suggest that the conflict displaced over a million people, nearly 50 percent of the adult-aged population. The second wave of violence ignited because of the unwillingness of President Laurent Gbagbo to step down after he lost an election to Alassane Ouattara, who then directed an offensive, with the help of French forces (Operation Licorne), against the forces loyal to Gbagbo. This second wave of violence also contributed to over 1,000 fatalities, and some estimates place it at more than 3,000, with the key distinction that this second wave of violence involved much higher rates of civilian victimization (Balcells 2017). Both waves of violence entailed massive shifts in land occupation and widespread reductions in food-crop production, natural resource

mismanagement, and detrimental implications for food insecurity (Human Rights Watch 2013; Yoboué 2016).

The United Nations Operation in Côte d'Ivoire (UNOCI) deployed in 2004 and remained until 2017. With a mandate primarily as an interpositional force to separate the armed actors, the initial deployments were spread throughout the interior of the country specifically within a “Zone of Confidence” established from 2004-2007²⁵ – and along the Liberian border (S/2018/958). Smidt (2020) finds that UNOCI-led intergroup dialogues had a significant effect in reducing levels of violence in Côte d'Ivoire. The UN’s documentation of the UNOCI mission does not indicate that it provided direct provision of food, and Bellamy and Williams (2012) report that UNOCI did not play a direct role in assisting humanitarian relief organizations. So, any impact of peacekeeping on malnutrition should be interpreted as indirect – for example, via the bolstering of security, the resettlement of displaced persons, the generation of local peacekeeping economies, and the empowerment of women.

We chose Côte d'Ivoire as an example of a modern multidimensional peace operation because it offers sufficient data to have pre-conflict and post-conflict snapshots of malnutrition prevalence. Using statewide FAO food-security data, the prevalence of undernourishment among women in Côte d'Ivoire was 20.5% in 2002, increased to 23% by 2010 and later fell to 19.2% in 2017.²⁶ This pattern is consistent with a general expectation that armed conflict exposure increases food insecurity. Coincidentally, Côte d'Ivoire was one of the co-sponsors of UNSCR 2417 and has played an important role in bringing the problem of conflict-related food insecurity to the attention of the international community.

²⁵ The analyses below remain robust while controlling for locations within the Zone of Confidence.

²⁶ <https://knoema.com/atlas/C%3%b4te-dIvoire/Prevalence-of-undernourishment>

Anecdotally, UNOCI played an important role in mitigating key food-security disruptions from the armed violence. Land displacement featured prominently in the violence in Côte d’Ivoire, with direct implications for food insecurity among the displaced households. Human Rights Watch (2013), for example, documented widespread occurrences of land occupants seizing or destroying the crops that displaced landowners had planted in western Côte d’Ivoire during the 2010-2011 conflict. In response, UNOCI facilitated land dispute resolution, an important first step toward addressing the link between conflict and food insecurity (Smidt 2020). UNOCI also played a central role in the resettlement of up to 80,000 internally displaced persons and over 70,000 refugees (Novoseloff 2018). Bellamy and Williams (2012: 272-3) note that “UNOCI’s role in relation to humanitarian assistance was largely focused on the protection and return of displaced persons in the west of the country and malnutrition in parts of the country’s north,” but also that the UN’s humanitarian agencies were able to achieve much of the needed relief efforts without substantial direct UNOCI assistance. As a result, Bellamy and Williams (2020: 271) judge UNOCI’s efforts to reduce malnutrition as a “qualified success.”

Novoseloff (2018: 24) quotes an NGO representative as saying, “UNOCI has overall brought a lot to the people and the local communities when it provided a number of services..” Gilder (2020) notes that UNOCI’s engagement improved throughout the course of its deployment. Important to the specific provision of public health, UNOCI helped implement about 1,025 quick-impact projects during the course of the mission, with some of the projects focused on the renovation of health centers (S/2018/958). Moreover, UNOCI played an important role in facilitating the return of civil servants, which is a crucial step in restoring food-assistance services in the wake of conflict (Novoseloff 2018).

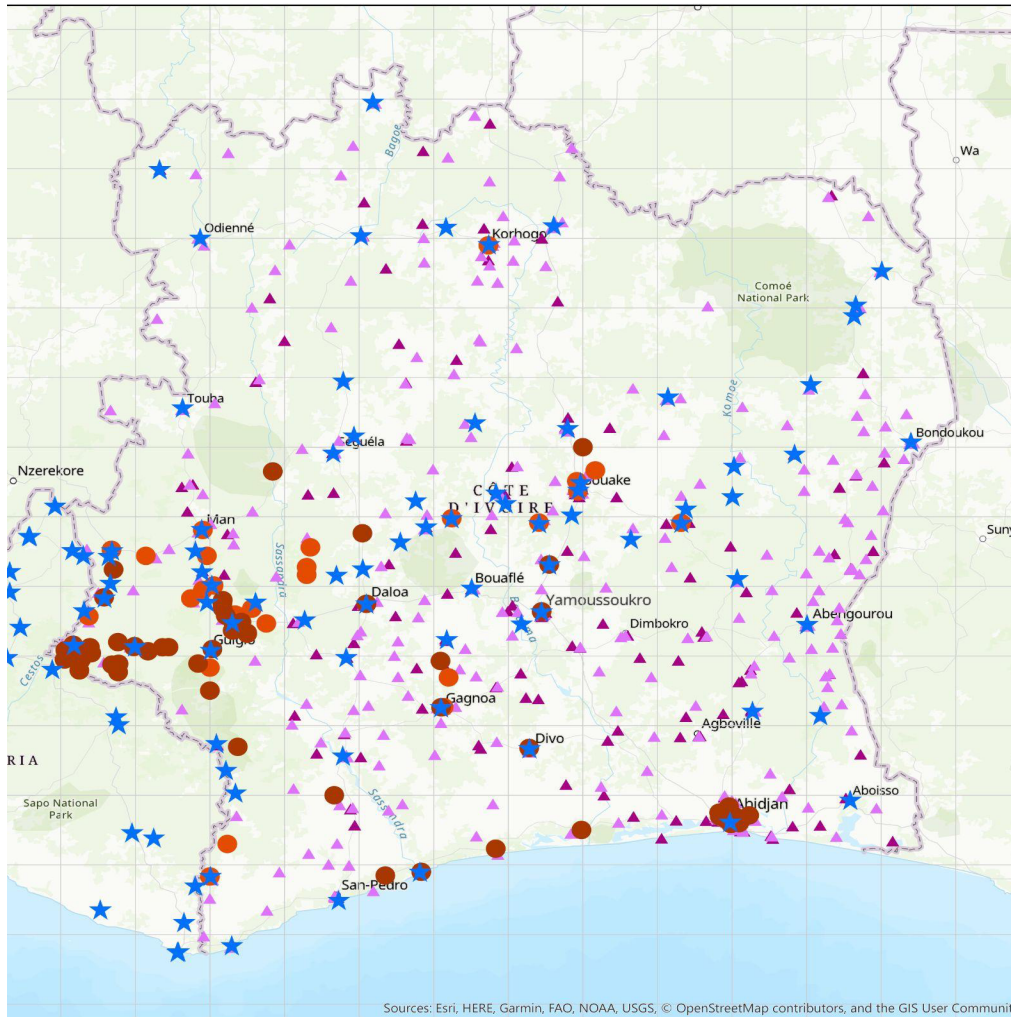
Quantitative Analysis

We further examine representative samples of women (15-49 years of age) in Côte d'Ivoire. Compared to an analysis of national health outcomes, a subnational quantitative analysis of individual-level health outcomes provides its own advantages. We can more directly match individuals' or communities' conflict and peace-operation exposure to the outcomes they experience – we would know if the individuals experiencing a change in health outcomes reside in communities that were actually proximate to conflict and peace-operation deployments.

Following Østby et al. (2018), and Gizelis and Cao (2019), DHS data can be used to measure malnutrition. Much of the existing work on the localized effects of armed conflict focus on short-term impacts on child nutrition. In this study, we consider the potential for armed conflict to have lasting, community-wide effects that are manifested in adult women's nutrition outcomes. We use two complete waves of DHS surveys in Côte d'Ivoire that provide a pre- and post-conflict glimpse of the communities. One wave was conducted in 1994, and another was conducted in 2011 to 2012. The sampled individuals in each wave are different. In the latter wave it was possible for communities to be exposed to armed violence and the peace operation.

We examine changes in the risk for Ivorian women to be underweight as a function of their exposures to armed conflict with and without peacekeeping deployments. Data on conflict locations and timing come from the UCDP GED data (Sundberg & Melander 2013), and data on the locations of peace operation deployments come from the GEO-PKO (v. 2.1) data. (Cil et al. 2020). Both data sources provide aggregated information at the level of PRIO Grids (Tollefsen et al. 2012), which are 0.5 degrees latitude by 0.5 degrees longitude cells (approximately 50km by 50km squares at the equator), with yearly totals. The DHS data provide location information of the sampled communities that have been randomly adjusted by up to 2 km for urban locations

and up to 10 km for rural locations; sampled communities are determined to be exposed to armed conflict and peacekeeping based on the Grid-level information related to armed conflict locations and peacekeeping deployments.²⁷



- ★ UNOCI Peacekeeping Location
- 2010-11 Conflict
- 2002-04 Conflict
- ▲ 2011-12 DHS Wave Location
- ▲ 1994 DHS Wave Location

Figure 1: Map of Côte d'Ivoire with PRIO Grids; exposures to conflict and peacekeeping; and DHS survey locations

²⁷ For exposure to peace operations, as well as neighboring-cell exposure to peace operations, we include information from the peace-operation deployments in Liberia (UNMIL) in addition to the information from UNOCI, since peace operations have the potential to affect cross-border conflict and peace dynamics (Beardsley 2011).

Figure 1 depicts a map of Côte d’Ivoire, with the PRIO Grids, the DHS survey locations and the exposures to the two periods of violence as well as the peace operation. Of the 113 PRIO Grid cells covering Côte d’Ivoire, 34 experienced battle-related violence between 1994 and 2012, 48 experienced the deployment of peacekeeping troops, and 24 experienced both battle-related violence and peacekeeping. Most PRIO Grids contain at least one survey location in both the 1994 and 2011/2012 waves.

With these data, we modify the estimators used by Bundervoet et al. (2009), Akresh et al. (2011, 2012) and Minoiu and Shemyakina (2014), which analyzed the relationship between exposure to armed conflict and child stunting.

$$Pr(M_{igw} = 1) = F[\alpha_g + \delta_w + \beta_1(ConflictExposure_{gw}) + \beta_2(PKOExposure_{gw}) + \beta_3(ConflictExposure_{gw} * PKOExposure_{gw}) + \gamma X_{igw} + \varepsilon_{igw}]$$

In this equation, M_{igw} is a dichotomous variable of whether an individual i in PRIO Grid g at wave w is malnourished (underweight), where wave pertains to whether the observation is from the 1994 wave or the 2011/2012 wave. The probability of an individual experiencing malnutrition ($Pr(M_{igw} = 1)$) is a function of PRIO Grid dummies (α_g), wave dummies (δ_w), the interaction between the PRIO Grid’s exposure to battle deaths ($ConflictExposure_{gw}$) and peacekeeping troops ($PKOExposure_{gw}$), and a set of control variables (X_{igw}).²⁸ $F[z]$ is either a linear probability model or the logistic function – we run both to demonstrate robustness.

$ConflictExposure$ and $PKOExposure$ are zero in the first wave, and in the PRIO Grids that did not experience, respectively, armed conflict or peacekeeping. β_3 is the coefficient of

²⁸ If $ConflictExposure_{gw}$ were measured as a dichotomous indicator, it would reduce to the “ConflictProvince; x Exposure_i” term in Bundervoet et al. (2009).

greatest interest, as it estimates the extent to which peacekeeping exposure conditions the marginal effect of conflict exposure. As Bundervoet et al. (2009) note, this model with two-way fixed effects is causally identified if a parallel-trends assumption holds – if the individuals in PRIO Grids exposed to violence or peacekeeping would have experienced similar changes in malnutrition between waves as those in the unexposed PRIO Grids if they actually were left unexposed. Still, if the peace operations tended to deploy to the PRIO Grids that were better suited to reductions in malnutrition between waves, an observed correlation between peace-operation deployment and better nutrition outcomes would be spurious. We do not think it is likely that peace operations tended to deploy in this manner, given that the existing scholarship has shown that peace operations tend to deploy to the areas where peaceful outcomes are in greatest jeopardy (Ruggeri et al. 2018). We show in the online appendix that the changes in malnutrition between the 1994 DHS wave and a smaller wave conducted in 1998 to 1999, which still preceded the armed violence and the peacekeeping, are very similar regardless of whether exposure to peacekeeping eventually occurred or not.²⁹ We also use this 1998/1999 wave to conduct a placebo test below.

The models use the DHS sample weights to harness the sample design’s representativeness of the population.³⁰ The estimation of the standard errors accounts for the DHS sample design that first stratifies on urban/rural categories, then randomly selects

²⁹ When comparing the 1994 wave to the 1998-99 wave in an OLS regression, the differences in the changing propensities for malnutrition are statistically insignificant for the Grids that received peace operations in comparison to the Grids that did not.

³⁰ To pool the two waves, the DHS sample weights were re-weighted using the population of women aged 15-49 years old in Côte d’Ivoire from the *World Population Prospects 2019*, compiled by the UN Population Division (POP/DB/WPP/Rev.2019/POP/F08-3). The 1995 population number was used for the 1994 wave, and the 2010 population number was used for the 2011-12 wave.

communities (clusters) within each stratum and then randomly selects households within the communities.³¹

The determination of underweight is based on respondent information in the DHS data, with a BMI below 18.5 kg/m² defining underweight per WHO definitions. The height and weight measurements that are used to compute BMI were collected by the DHS survey personnel for every second household in the two survey waves used in this study.

The key explanatory variables are battle-related fatalities and peacekeeping troop deployments and their interaction. Battle-related fatalities are measured as the natural log of the summed totals since 1989, and troop deployments are measured as the natural log of the summed totals since 2004.³² Some models, presented in the online appendix, account for the fact that the 2010-2011 period of violence could have differently shaped public health than the prior period, and the violence in the second period could have occurred after the peacekeeping exposure.³³ Other models, also presented in the appendix, add a dummy variable for UN Police (UNPOL) deployments in case UNPOL activity shapes malnutrition differently than troop deployments.

We focus on four PRIO Grid-level control variables that are included in each model. We account for differences in economic development that could contribute to both trajectories of food insecurity across the waves and to the likelihood of armed violence. We use the average nighttime light emission as a measure of local economic development from the DMSP-OLS Nighttime Lights Time Series (Version 4) night lights data, aggregated to the PRIO Grid level,

³¹ The estimation was performed using the Stata SVY functions.

³² One is added before taking the natural logs. Note that the peacekeeping totals are not counts of separate peacekeepers deployed, as a contingent of, say, 1000 troops that stays in a location for multiple years will contribute 1000 toward the total for each year of deployment. This measure captures community exposure to peacekeeping in ways that would be missed if only the maximum deployment values, without accounting for duration, were used.

³³ The summed battle-related fatalities between 1989 and 2009 are separated from the fatalities between 2010 and 2012; moreover, the summed peacekeeping troops deployed between 2004 and 2009 are separated from the summed troops between 2010 and 2012. We do not find distinguishable differences in the effects of conflict on malnutrition when comparing the two different periods of violence.

which uses data from Elvidge et al. (2014).³⁴ We also control for the proportion of months in the year in which the local PRIO Grid experienced a drought (Gutman 1999), since Rustad (2020) finds that drought can also affect nutrition outcomes.

Variables related to nearby violence and peacekeeping are included as well because the impact of armed conflict and peacekeeping in one community may spillover into nearby areas. The locations of the armed actors are not confined to the battle locations, and the peacekeepers patrol locations far away from their bases. We thus control for the (logged) summed number of battle-related fatalities in adjacent PRIO Grid cells, as well as the (logged) summed number of peacekeeping troops in adjacent cells.

Also included are individual-level control variables as a robustness check.³⁵ Using the DHS data, additional variables control for respondent age (which correlates with BMI), time in minutes to the nearest water source (accounting for additional variation in infrastructure development), respondent education (relating to human capital that can add to crisis resilience), whether the respondent is a “visitor” to this location (accounting for displacement and whether respondents potentially were not exposed to the community-level indicators of conflict and peacekeeping troops), and whether the respondent is either pregnant or has given birth in the past two months (affecting BMI independent of nutritional health). Table 1 presents the descriptive statistics for all of the variables used in the analyses.

³⁴ The second-wave values of this variable are post-treatment; the models with this variable test mechanisms by which conflict and peace operations affect malnutrition independent of their effects on economic activity as captured via the night light data. Night-light emissions correlate with population, and further analyses show that controlling for 2005 grid-level population does not add explanatory value to the models, nor does it affect the results.

³⁵ As individual-level controls, we do not expect these to be strong confounders that would affect Grid-level patterns of exposure to violence and peacekeeping.

Table 1: Descriptive statistics

Outcome variable	N	Mean	SD	Range
Underweight	8,203	0.077	0.27	0 - 1
Independent variables				
Total battle deaths, logged	8,203	1.3	2.2	0 - 6.8
Total PKO troops, logged	8,203	2.5	3.7	0 - 9.9
Total neighbor battle deaths, logged	8,203	2.3	2.7	0 - 7.3
Total neighbor PKO troops, logged	8,203	4.2	4.3	0 - 10.2
Night lights	8,203	0.062	0.036	0.021 - 0.16
Drought	8,203	0.036	0.041	0 - 0.083
Pregnant or recent birth	8,203	0.17	0.37	0 - 1
Age	8,203	27.9	8.42	15 - 49
Time to water	8,086	10.9	20.7	0 - 360
Education	8,200	2.5	3.8	0 - 19
Visitor	8,203	0.040	0.20	0 - 1

Main Results

Table 2 provides the OLS regression results of the relationship between underweight and the interaction of local exposure to battle deaths and peacekeeping troops.³⁶ Model 1 is the base model, and Model 2 adds the individual-level control variables.

The results show that women in locations that experienced higher levels of battle-related violence but that did *not* have peacekeeping are significantly more likely to be underweight. We also observe that the relationship between underweight and armed conflict is mitigated amongst the women who reside in locations that had been exposed to higher numbers of peacekeeping

³⁶ The appendix provides tables with the full reporting of coefficient estimates. The results are robust with the use of logistic regression.

troops.³⁷ The results provide support for both of the hypotheses. Exposure to armed conflict in the absence of peace operations is associated with increases in the propensity for underweight, while exposure to armed conflict in the presence of peace operations is not associated with a higher propensity for underweight.

Table 2: Models of Underweight

	(1)	(2)
VARIABLES	Underweight	Underweight
ln(battle deaths)	0.0203*** (0.00637)	0.0210*** (0.00639)
ln(troops)	-2.44e-05 (0.00312)	-0.000646 (0.00318)
ln(battle deaths) x ln(troops)	-0.00166** (0.000704)	-0.00167** (0.000713)
Base controls	Yes	Yes
PRIO Grid dummies	Yes	Yes
Wave dummy	Yes	Yes
Individual-level controls	No	Yes
Observations	8,203	8,083

Standard errors in parentheses
 *** p<0.01, ** p<0.05, * p<0.1

Figure 2 presents the marginal effect of battle deaths and peacekeeping troops on underweight, from Model 1. At low levels of peacekeeping, we see that a surveyed woman's probability of underweight more than doubles when residing in a location that had been exposed

³⁷ In a model presented in the appendix (Table A5), the impact of exposure to the peace operations persists even if the peace operation is no longer present and has been absent for at least two years at time of the 2011-2012 survey wave.

to the maximum amount of battle-related violence when compared to locations that had not experienced any violence.³⁸ At moderate and high levels of peacekeeping, the impact of armed conflict on the likelihood of an underweight respondent is of smaller magnitude and not statistically significant. That is, higher levels of peacekeeping substantially and significantly reduces the marginal effect of conflict on malnutrition.

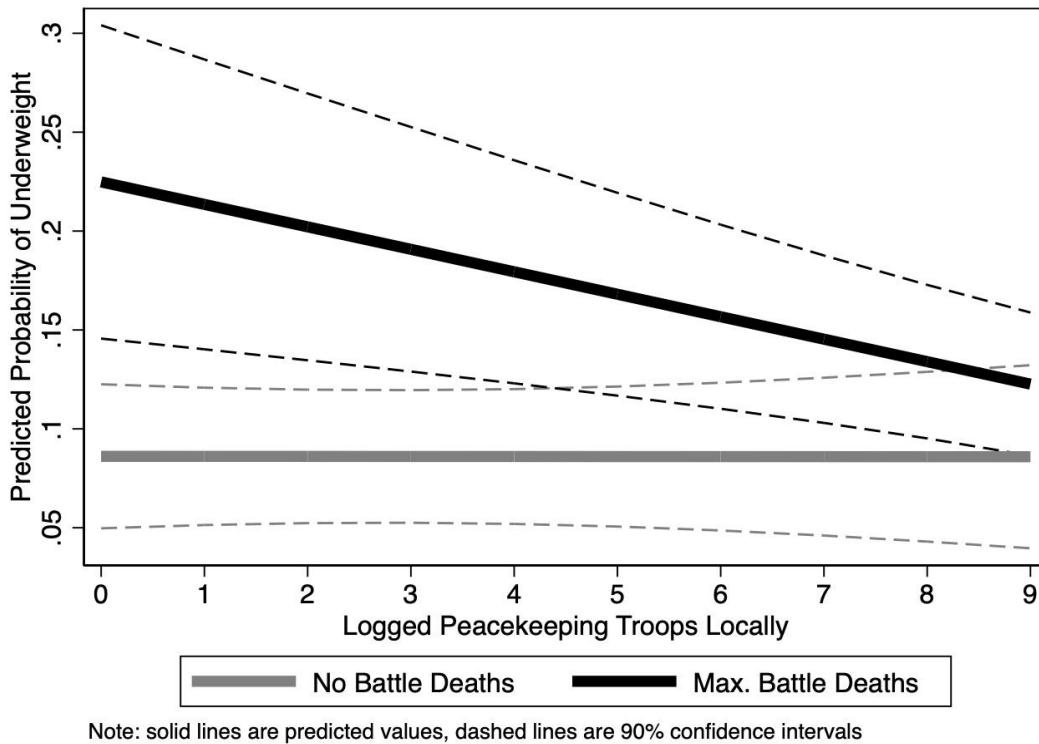


Figure 2: Propensity for underweight as a function of battle deaths and peacekeeping

Further analyses presented in the online appendix are inconclusive in pinning down the mechanisms by which UNOCI helped mitigate the relationship between conflict exposure and malnutrition.

³⁸ The maximum amount of violence is 926 battle deaths in a PRIO Grid cell over the course of the conflict.

Placebo Test

We use data from a smaller DHS wave that was conducted in 1998 to 1999 to run a placebo test. If it really is the exposures to armed conflict and peacekeeping that explain the changes in the propensities for underweight, and not unobservable trends in the locations that experienced the armed conflict and peacekeeping, we should not observe the same patterns in a 1994 to 1998/1999 comparison as we observe in a 1994 to 2011/2012 comparison. That is, we run the same model as above (Model 1 of Table 2) with the 1998/1999 data replacing the 2011/2012 data, but with the 2011/2012 Grid-level exposures to armed conflict and peacekeeping used as if they were the 1998/1999 values.

Table 3: Placebo Test

VARIABLES	(1) Underweight
In(battle deaths, placebo)	0.00487 (0.00807)
In(troops, placebo)	0.00293 (0.00385)
In(battle deaths, placebo) x In(troops, placebo)	-0.000916 (0.000979)
Base controls	Yes
PRIO Grid dummies	Yes
Wave dummy	Yes
Observations	6,523

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 3 presents the results of this placebo test. We do not observe that the eventual exposures to armed conflict and peacekeeping are significantly correlated with the changes in propensities for underweight from 1994 to 1998/1999. It is unlikely that the effects that we observe above are a product of a violation in the parallel trends assumption – we do not find evidence that there were existing trends in underweight among the communities which were eventually exposed to armed conflict and peacekeeping.

Cross-National Analysis with a Focus on Food Production

Do the results from Côte d’Ivoire generalize to other countries? An aggregated, cross-national research design faces a number of challenges, including an ecological inference problem in which the countries that experienced conflict and peacekeeping may experience changes in levels of malnutrition in populations that are unaffected by conflict or peacekeeping. Yet finding an effect of conflict on indicators of food security that is conditioned by peace operation deployments would be suggestive of the generalizability of our results from Côte d’Ivoire. Moreover, the cross-national analysis provides an opportunity to probe additional mechanisms by which armed conflict and peacekeeping exposures could shape crop yields and livestock production.

The cross-national analysis uses data from the FAO, combined with data from the Uppsala Conflict Data Programme on Battle-Related Fatalities (version 19.1) and a dichotomous variable of the presence of a UN or regional peacekeeping mission.³⁹ The country-year data cover 2000-2017. The key explanatory variable is each country’s exposure to violence during the

³⁹ The peacekeeping variable excludes political and observer missions, which do not have similar footprints or mandates as the types of peace operations relevant to the proposed mechanisms.

previous ten years – a ten-year rolling sum of battle-related fatalities.⁴⁰ One outcome of interest is the change in the FAO measure of *energy adequacy*, defined as the ratio of the caloric supply for each country and the caloric needs for each country, measured as a three-year moving average.⁴¹ For example, the population of Côte d’Ivoire relies on cassava, plantain, rice and maize for the majority of its caloric needs; however, these do not provide adequate protein and to be properly nourished the population must also have access to other protein sources such as meat, eggs, and legumes (Sahoré et al. 2017). In addition to change in energy adequacy, we further consider changes in cereal and meat production as outcome variables related to intermediate pathways.

We use country-level, fixed-effects linear regression with the outcomes measured in differences to estimate the relationships between changes in the food-insecurity outcome variables and the interaction of battle-related fatalities (logged) and the presence of a peacekeeping operation. In addition to country fixed effects, which control for country-specific and time-constant factors related to overall development and cultural heterogeneity, our cross-national analysis includes as control variables the lagged level and change in GDP per capita (logged), to account for levels and changes in the overall health of the economy that should be separated from changes in food insecurity. We also control for the lagged level and change in urban population ratio, given the expectation that obesity rates, which can co-occur with malnutrition, tend to be higher in more urban areas (Keino et al. 2014; Rosen and Shapouri 2008).

⁴⁰ We use armed conflict data going back to at least 1990 to calculate these rolling sums.

⁴¹ This is defined by the FAOSTAT project (<http://www.fao.org/faostat/en/#data/FS>) as: “The indicator expresses the Dietary Energy Supply (DES) as a percentage of the Average Dietary Energy Requirement (ADER). Each country's or region's average supply of calories for food consumption is normalized by the average dietary energy requirement estimated for its population to provide an index of adequacy of the food supply in terms of calories.”

Table 4: Cross-National Models of Food Insecurity

	(1)	(2)	(3)
VARIABLES	Energy adequacy, change	Cereal production, change	Meat production, change
ln(battle deaths)	-0.0567** (0.0242)	-57,118** (24,920)	-4,130* (2,204)
Peace operation	-0.530** (0.254)	-136,760 (117,164)	-14,399 (10,205)
ln(battle deaths) x peace operation	0.0544 (0.0358)	39,774* (23,053)	2,924* (1,600)
Development and urban controls	Yes	Yes	Yes
Country dummies	Yes	Yes	Yes
Observations	2,678	2,865	3,058

Standard errors in parentheses

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

Table 4 presents the estimated coefficients for these models. We find some support for the expectation that the prevalence of energy adequacy decreases in the wake of armed violence, and the decrease is mitigated by the presence of peacekeeping.⁴² We see even stronger associations between increases in the production of cereal and meat and the interaction of conflict and peacekeeping, suggesting that crop and livestock destruction and protection are key mechanisms that explain how war can affect malnutrition and how peacekeeping can mitigate the

⁴² The coefficient on the interaction term is approaching statistical significance, at p=0.13.

harmful impact. The results suggest that the relationships observed in the Côte d’Ivoire study generalize to the cross-national context. Moreover, we see evidence of mechanisms related to food production and distribution, such that peace operations help restore cereal and meat production when they are typically depleted in the wake of armed conflict.

Conclusions

Peace-operation deployments can interrupt a vicious cycle in which conflict leads to poor health outcomes in women, who, as essential peacebuilding agents, become less able to contribute to the rebuilding of economic, social and political institutions. Our findings uncover how peace operations help interrupt the “conflict trap” via improvements in nutrition outcomes for women in conflict-affected communities. Healthy women can better contribute to economic production – especially agricultural production – as well as the building of social and political institutions that are essential for peaceful dispute resolution. Moreover, there is abundant evidence showing a positive relationship between women’s empowerment and peaceful outcomes (Cohen and Karim 2022).

The results of this study are likely understated. To the extent that peace operations reduce the harmful effects of violence (Hultman et al. 2014), the full positive impact of peacekeeping should be even greater if we could measure the violence that was prevented and thus unable to contribute to malnutrition in the first place.

The cross-national analysis provides evidence that peace operations can be helpful in restoring crop and livestock production after armed violence. Additional analysis of local food production and distribution data could uncover how these effects play out differently depending on the particularities of food production and distribution in different countries. For example, a

specific dynamic amidst the violence in Côte d'Ivoire – where agricultural productivity is dominated by cocoa and coffee production (Yoboué 2016) – involved new land occupants replacing foodstuffs production with cocoa plants that cannot be used for food consumption (Human Rights Watch 2013). Micro-level food production data would better capture how exposure to conflict and peacekeeping shaped such crop substitution.

The presence of peacekeepers thus contributes to a virtuous circle, especially when considering work by Gordon and Young (2017), which found that exposure to security and relief activities, but not abuse, by the UN mission in Haiti led to greater willingness among the population to cooperate with the mission. As peace operations contribute to the wellbeing of the local populations, the local populations become less prone to armed violence and more willing to continue working with the peace operations. Mandates for development and peacebuilding programs in conflict affected communities would do well to mainstream food security and direct more resources toward mitigating the impact that conflict has on household economies, as well as on food production, food distribution and food-security resiliency to environmental disasters.

We must not lose track, however, of the potential for gains in food security via peacekeeping economies to entail public health and normative concerns. Jennings (2010) uncovers the role that peacekeeping economies have in spurring sex tourism, as host-country individuals – mostly women and girls – have economic incentives to serve as sex workers in areas where peacekeepers are deployed. Related, Beber et al. (2017, 2019) highlight that transactional sex between women in host countries and peacekeeping personnel was common in the case of Liberia, which implies that some of the economic opportunities for women in the context of peacekeeping economies could have negative implications for public health, individual wellbeing, and gender power imbalances. Edu-Afful and Aning (2015) also find that

the peacekeeping economies tend to entrench gender hierarchies related to expectations of women's roles, as well as to exacerbate economic inequalities (also see Aning and Edu-Afful 2013). Jennings (2015, 2016, 2018) and Jennings & Bøås (2015) similarly find that peacekeeping economies are founded on transactional exchanges with local populations that detracts from the roles that peace operations have as primary instruments of protection. Specific to Côte d'Ivoire, and consistent with concerns regarding peacekeeper exploitation and abuse, the need for peacekeeping assistance in bolstering food security opened up the potential for exploitation, as a food-for-sex scandal in 2009 led to the repatriation of 16 UNOCI peacekeepers (Global Peace Operations Review 2012).

In order to fully realize the downstream benefits to peace operations in light of these concerns, practitioners should not lose track of the importance of empowering women in conflict-affected communities as agents. Peacekeeping economies need not put women's wellbeing at risk. Through prioritizing education and skills training, and through contracting directly with women – even helping them establish their own businesses – peace operations can equip women to self-advocate and leave them more self-sufficient than before the peacekeepers deployed.

Works Cited

- Aaby, Peter, Joaquim Gomes, Manuel Fernandes, Queba Djana, Ida Lisse, and Henrik Jensen. "Nutritional status and mortality of refugee and resident children in a non-camp setting during conflict: follow up study in Guinea-Bissau." *Bmj* 319, no. 7214 (1999): 878.
- Anderson, Miriam J. *Windows of Opportunity: How Women Seize Peace Negotiations for Political Change*. Oxford University Press, 2015.
- Agadjanian, V., & Prata, N. (2002). "War, peace, and fertility in Angola." *Demography*, 39, 215–231.
- Akresh, Richard, Philip Verwimp, and Tom Bundervoet. "Civil war, crop failure, and child stunting in Rwanda." *Economic Development and Cultural Change* 59, no. 4 (2011): 777-810.
- Akresh, Richard, Leonardo Lucchetti, and Harsha Thirumurthy. "Wars and child health: Evidence from the Eritrean–Ethiopian conflict." *Journal of development economics* 99, no. 2 (2012): 330-340.
- Aning, Kwesi, and Fiiifi Edu-Afful. "Unintended impacts and the gendered consequences of peacekeeping economies in Liberia." *International Peacekeeping* 20, no. 1 (2013): 17-32.
- Autesserre, Séverine. *The Trouble with the Congo: Local Violence and the Failure of International Peacebuilding*. Cambridge University Press, 2010.
- Baez, Javier E. "Civil wars beyond their borders: The human capital and health consequences of hosting refugees." *Journal of Development Economics* 96, no. 2 (2011): 391-408.
- Balcells, Laia. *Rivalry and Revenge*. Cambridge University Press, 2017.
- Bartley, Mel, J. Ferrie, S. M. Montgomery, M. Marmot, and R. G. Wilkinson. "Social determinants of health." *The Solid Facts. Copenhagen: Centre for Urban Health World Health Organization Regional Office for Europe* (2006): 1-32.
- Beardsley, Kyle. "Peacekeeping and the contagion of armed conflict." *The Journal of Politics* 73, no. 4 (2011): 1051-1064.
- Beber, Bernd, Michael J. Gilligan, Jenny Guardado, and Sabrina Karim. "Peacekeeping, compliance with international norms, and transactional sex in Monrovia, Liberia." *International Organization* 71, no. 1 (2017): 1-30.
- Beber, Bernd, Michael J. Gilligan, Jenny Guardado, and Sabrina Karim. "The Promise and Peril of Peacekeeping Economies." *International Studies Quarterly* 63, no. 2 (2019): 364-379.

- Bellamy, Alex J., and Paul D. Williams. "Local politics and international partnerships: The UN operation in Côte d'Ivoire (UNOCI)." *Journal of International Peacekeeping* 16, no. 3-4 (2012): 252-281.
- Bell, Sam R., Michael E. Flynn, and Carla Martinez Machain. "UN Peacekeeping Forces and the Demand for Sex Trafficking." *International Studies Quarterly* 62, no. 3 (2018): 643-655.
- Benson, Michelle, Christopher Newton, Chhandosi Roy, and Colin Tucker. "Can UN Peacekeeping Improve Health Outcomes Long After the Shooting Stops?" Paper presented at Peace Science Society (International). Online Conference, November 2020.
- Betsi, Nicolas Alain, B. G. Koudou, Guéladio Cissé, A. B. Tschannen, A. M. Pignol, Y. Ouattara, Z. Madougou, M. Tanner, and Jürg Utzinger. "Effect of an armed conflict on human resources and health systems in Côte d'Ivoire: prevention of and care for people with HIV/AIDS." *AIDS care* 18, no. 4 (2006): 356-365.
- Boutros-Ghali, Boutros. "An agenda for peace: Preventive diplomacy, peacemaking and peace-keeping." Report of the Secretary-General pursuant to the statement adopted by the Summit Meeting of the Security Council on 31 January 1992. SC Doc. S/24111, 17 June 1992.
- Bove, Vincenzo, Jessica Di Salvatore, and Leandro Elia. "UN Peacekeeping and Households' Well-Being in Civil Wars." *American Journal of Political Science* 66, no. 2 (2022): 402-417.
- Boyden, Jo, Joanna de Berry, Thomas Feeny, and Jason Hart. "Children affected by armed conflict in South Asia: A review of trends and issues identified through secondary research." *Afghan Digital Libraries* (2002).
- Briers, Barbara, Mario Pandelaere, Siegfried Dewitte, and Luk Warlop. "Hungry for money: The desire for caloric resources increases the desire for financial resources and vice versa." *Psychological Science* 17, no. 11 (2006): 939-943.
- Buhaug, Halvard, and Nina von Uexkull. "Vicious circles: violence, vulnerability, and climate change." *Annual Review of Environment and Resources* 46 (2021): 545-568.
- Bundervoet, Tom, Philip Verwimp, and Richard Akresh. "Health and civil war in rural Burundi." *Journal of human Resources* 44, no. 2 (2009): 536-563.
- Campbell, Susanna P. *Global Governance and Local Peace: Accountability and Performance in International Peacebuilding*. Cambridge University Press, 2018.
- CARE. Food Security and Gender Equality: A synergistic understudied symphony. (2022) <https://www.care.org.au/wp-content/uploads/2022/08/Final-Version-Food-Security-and-Gender-Equality-2-1.pdf>

- Caruso, Raul, Prabin Khadka, Ilaria Petrarca, and Roberto Ricciuti. "The economic impact of peacekeeping. Evidence from South Sudan." *Defence and Peace Economics* 28, no. 2 (2017): 250-270.
- Chirot, Daniel. "The debacle in Côte d'Ivoire." *Journal of Democracy* 17, no. 2 (2006): 63-77.
- Cil, Deniz, Hanne Fjelde, Lisa Hultman, and Desirée Nilsson. "Mapping blue helmets: introducing the geocoded peacekeeping operations (Geo-PKO) dataset." *Journal of Peace Research* 57, no. 2 (2020): 360-370.
- Cohen, Dara Kay, and Sabrina M. Karim. "Does more equality for women mean less war? Rethinking sex and gender inequality and political violence." *International organization* 76, no. 2 (2022): 414-444.
- Collier, Paul. *Breaking the Conflict Trap: Civil War and Development Policy*. World Bank Publications, 2003.
- Devkota, Bhimsen, and Edwin R. van Teijlingen. "Understanding effects of armed conflict on health outcomes: the case of Nepal." *Conflict and Health* 4, no. 1 (2010): 20.
- Di Salvatore, Jessica. "Obstacle to Peace? Ethnic geography and effectiveness of Peacekeeping." *British Journal of Political Science* (2018): 1-21.
- Edu-Afful, Fiifi, and Kwesi Aning. "Peacekeeping Economies in a Sub-Regional Context: The Paradigmatic Cases of Liberia, Sierra Leone and Côte d'Ivoire." *Journal of Intervention and Statebuilding* 9, no. 3 (2015): 391-407.
- Elvidge, Christopher D., Feng-Chi Hsu, Kimberly E. Baugh and Tilottama Ghosh (2014). "National Trends in Satellite Observed Lighting: 1992-2012." *Global Urban Monitoring and Assessment Through Earth Observation*. Ed. Qihao Weng. CRC Press.
- Enloe, Cynthia. *Seriously!: Investigating Crashes and Crises as if Women Mattered*. University of California Press, 2013.
- Epel, Elissa S., Bruce McEwen, Teresa Seeman, Karen Matthews, Grace Castellazzo, Kelly D. Brownell, Jennifer Bell, and Jeannette R. Ickovics. "Stress and body shape: stress-induced cortisol secretion is consistently greater among women with central fat." *Psychosomatic medicine* 62, no. 5 (2000): 623-632.
- Evans, Alice. "'Women Can Do What Men Can Do': The causes and consequences of growing flexibility in gender divisions of labour in Kitwe, Zambia." *Journal of Southern African Studies* 40, no. 5 (2014): 981-998.
- FAO, Policy Brief. "Food security." *Policy Brief* 2 (2006): 1-4.

- Felker-Kantor, Erica, and Charles H. Wood. "Female-headed households and food insecurity in Brazil." *Food Security* 4, no. 4 (2012): 607-617.
- Fortna, Virginia Page. *Does Peacekeeping Work?: Shaping Belligerents' Choices after Civil War*. Princeton University Press, 2008.
- Ghobarah, Hazem Adam, Paul Huth, and Bruce Russett. "Civil wars kill and maim people—long after the shooting stops." *American Political Science Review* 97, no. 2 (2003): 189-202.
- Gilder, Alexander. "The Local Turn and the Framing of UNOCI's Mandated Activities by the UN." *Journal of International Peacekeeping* 23, no. 3-4 (2020): 226-248.
- Gilligan, Michael J., and Ernest J. Sergenti. "Do UN interventions cause peace? Using matching to improve causal inference." *Quarterly Journal of Political Science* 3, no. 2 (2008): 89-122.
- Gilligan, Michael, and Stephen John Stedman. "Where do the peacekeepers go?." *International Studies Review* 5, no. 4 (2003): 37-54.
- Gizelis, Theodora-Ismene. "Gender empowerment and United Nations peacebuilding." *Journal of Peace Research* 46, no. 4 (2009): 505-523.
- Gizelis, Theodora-Ismene. "A country of their own: Women and peacebuilding." *Conflict Management and Peace Science* 28, no. 5 (2011): 522-542.
- Gizelis, Theodora-Ismene, and Xun Cao. "A Security Dividend Peacekeeping and Maternal Health Outcomes and Access." *Journal of Peace Research* (2019).
- Gizelis, Theodora-Ismene, and Jana Krause. "Exploring gender mainstreaming in security and development 1." In *Gender, Peace and Security*, pp. 165-184. Routledge, 2015.
- Global Peace Operations Review. "Côte d'Ivoire." https://peaceoperationsreview.org/wp-content/uploads/2014/10/2012_argpo_cote_divoire_mr.pdf. (2012): accessed 6 January 2022.
- Gordon, Grant M., and Lauren E. Young. "Cooperation, information, and keeping the peace: Civilian engagement with peacekeepers in Haiti." *Journal of Peace Research* 54, no. 1 (2017): 64-79.
- Greig, J. Michael, and Paul F. Diehl. "The peacekeeping–peacemaking dilemma." *International Studies Quarterly* 49, no. 4 (2005): 621-645.
- Guha-Sapir, Debarati, and Olivia D'Aoust. "Demographic and health consequences of civil conflict." (2011). World Bank.
- Guha-Sapir, Debarati, Willem Gijsbert van Panhuis, Olivier Degomme, and Vicente Teran. "Civil conflicts in four African countries: a five-year review of trends in nutrition and mortality." *Epidemiologic Reviews* 27, no. 1 (2005): 67-77.

- Guttman, Nathaniel B. "Accepting the Standardized Precipitation Index: A calculation algorithm." *Journal of the American Water Resources Association*, 35, no. 2 (1999): 311-322.
- Harrowell, Elly, and Alpaslan Özerdem. "Understanding the dilemmas of integrating post-disaster and post-conflict reconstruction initiatives: Evidence from Nepal, Sri Lanka and Indonesia." *International Journal of Disaster Risk Reduction* 36 (2019).
- Hendrix, Cullen, and Henk-Jan Brinkman. "Food insecurity and conflict dynamics: Causal linkages and complex feedbacks." *Stability: International Journal of Security and Development* 2, no. 2 (2013).
- Hendrix, Cullen S., and Stephan Haggard. "Global food prices, regime type, and urban unrest in the developing world." *Journal of Peace Research* 52, no. 2 (2015): 143-157.
- Howard, Lise Morjé. *UN Peacekeeping in Civil Wars*. Cambridge University Press, 2008.
- Howard, L. (2019). *Power in Peacekeeping*. Cambridge: Cambridge University Press.
- Huber, Laura, and Sabrina Karim. "The internationalization of security sector gender reforms in post-conflict countries." *Conflict Management and Peace Science* 35, no. 3 (2018): 263-279.
- Hultman, Lisa. "Keeping peace or spurring violence? Unintended effects of peace operations on violence against civilians." *Civil Wars* 12, no. 1-2 (2010): 29-46.
- Hultman, Lisa, Jacob Kathman, and Megan Shannon. "United Nations peacekeeping and civilian protection in civil war." *American Journal of Political Science* 57, no. 4 (2013): 875-891.
- Hultman, Lisa, Jacob Kathman, and Megan Shannon. "Beyond keeping peace: United Nations effectiveness in the midst of fighting." *American Political Science Review* 108, no. 4 (2014): 737-753.
- Human Rights Watch. "'That Land Is My Family's Wealth'." <https://www.hrw.org/report/2013/10/09/land-my-family-s-wealth/addressing-land-dispossession-after-cote-divoires-post> (2013), accessed 6 January 2022.
- Hunter-Adams, Jo, Jane Battersby, and Tolu Oni. "Food Insecurity in Relation to Obesity in Peri-urban Cape Town, South Africa: Implications for Diet-related Non-communicable Disease." *Appetite* 137 (2019): 244-249.
- Ide, Tobias, Carl Bruch, Alexander Carius, Ken Conca, Geoffrey D. Dabelko, Richard Matthew, and Erika Weinthal. "The past and future (s) of environmental peacebuilding." *International Affairs* 97, no. 1 (2021): 1-16.

- IPC. "Famine Review of the IPC Acute Food Insecurity Analysis: Conclusions and Recommendations for Tigray Region, Ethiopia." *Integrated Food Security Phase Classification* 42 (2021).
- Iqbal, Z. (2010). *War and the Health of Nations*. Stanford, CA: Stanford University Press.
- Iqbal, Zaryab. "Health and human security: The public health impact of violent conflict." *International Studies Quarterly* 50, no. 3 (2006): 631-649.
- Iqbal, Zaryab, and Christopher Zorn. "Violent conflict and the spread of HIV/AIDS in Africa." *The Journal of Politics* 72, no. 1 (2010): 149-162.
- Jennings, Kathleen M. "Unintended consequences of intimacy: political economies of peacekeeping and sex tourism." *International Peacekeeping* 17, no. 2 (2010): 229-243.
- Jennings, Kathleen M. "Life in a 'Peace-kept' city: encounters with the peacekeeping economy." *Journal of Intervention and Statebuilding* 9, no. 3 (2015): 296-315.
- Jennings, Kathleen M. "Blue helmet havens: Peacekeeping as bypassing in Liberia and the democratic Republic of the Congo." *International Peacekeeping* 23, no. 2 (2016): 302-325.
- Jennings, Kathleen M. "Peacekeeping as Enterprise: Transaction, Consumption, and the Political Economy of Peace and Peacekeeping." *Civil Wars* 20, no. 2 (2018): 238-261.
- Jennings, Kathleen M., and Morten Bøås. "Transactions and interactions: Everyday life in the peacekeeping economy." *Journal of Intervention and Statebuilding* 9, no. 3 (2015): 281-295.
- Jett, Dennis C. *Why Peacekeeping Fails*. New York: St. Martin's Press, 2000.
- Karim, Sabrina, and Kyle Beardsley. "Explaining sexual exploitation and abuse in peacekeeping missions: The role of female peacekeepers and gender equality in contributing countries." *Journal of Peace Research* 53, no. 1 (2016): 100-115.
- Karim, Sabrina, and Kyle Beardsley. *Equal Opportunity Peacekeeping: Women, Peace, and Security in Post-conflict States*. Oxford University Press, 2017.
- Karuru, Njeri and Louise Yeung. 2016. Integrating Gender into Post-Conflict Natural Resource Management, Governance, in *Natural Resources, and Post-Conflict Peacebuilding*, ed. C. Bruch, C. Muffett, and S. S. Nichols. London: Earthscan.
- Kathman, Jacob D., and Reed M. Wood. "Managing threat, cost, and incentive to kill: The short- and long-term effects of intervention in mass killings." *Journal of Conflict Resolution* 55, no. 5 (2011): 735-760.

- Kathman, Jacob D., and Reed M. Wood. "Stopping the killing during the “peace”: Peacekeeping and the severity of postconflict civilian victimization." *Foreign Policy Analysis* 12, no. 2 (2016): 149-169.
- Keino, Susan, Guy Plasqui, and Bart van den Borne. "Household Food Insecurity Access: A Predictor of Overweight and Underweight among Kenyan Women." *Agriculture & Food Security* 3, no. 1 (2014): 1-8.
- Kennedy, Eileen, and Pauline Peters. "Household food security and child nutrition: the interaction of income and gender of household head." *World development* 20, no. 8 (1992): 1077-1085.
- Kuperman, Alan J. "The moral hazard of humanitarian intervention: Lessons from the Balkans." *International Studies Quarterly* 52, no. 1 (2008): 49-80.
- Leaning, Jennifer, and Debarati Guha-Sapir. "Natural disasters, armed conflict, and public health." *New England Journal of Medicine* 369, no. 19 (2013): 1836-1842.
- Lindstrom, D. P., & Berhanu, B. (1999). The impact of war, famine, and economic decline on marital fertility in Ethiopia. *Demography*, 36, 247–261.
- Li, Q., & Wen, M. (2005). The immediate and lingering effects of armed conflict on adult mortality: A time-series cross-national analysis. *Journal of Peace Research*, 42, 471–492.
- Lucyk, K., and L. McLaren. "Taking stock of the social determinants of health: A scoping review." *PLoS ONE* 12, no. 5 (2017): e0177306.
- Malmros, Haqvin. "The relation of nutrition to health. A statistical study of the effect of the war time on arteriosclerosis, cardiosclerosis, tuberculosis and diabetes." *Acta Medica Scandinavica* 246 (1950).
- Mansour, Hani, and Daniel I. Rees. "Armed conflict and birth weight: Evidence from the al-Aqsa Intifada." *Journal of development Economics* 99, no. 1 (2012): 190-199.
- Marino, Maria, Roberta Masella, Pamela Bulzomi, Ilaria Campesi, Walter Malorni, and Flavia Franconi. "Nutrition and human health from a sex–gender perspective." *Molecular Aspects of Medicine* 32, no. 1 (2011): 1-70.
- Melander, Erik. "Selected to go where murderers lurk? The preventive effect of peacekeeping on mass killings of civilians." *Conflict Management and Peace Science* 26, no. 4 (2009): 389-406.
- Miani, Céline, Lisa Wandschneider, Jana Niemann, Stephanie Batram-Zantvoort, and Oliver Razum. "Measurement of gender as a social determinant of health in epidemiology—A scoping review." *PloS one* 16, no. 11 (2021).

- Minoiu, Camelia, and Olga N. Shemyakina. "Armed conflict, household victimization, and child health in Côte d'Ivoire." *Journal of Development Economics* 108 (2014): 237-255.
- Monteiro, Carlos Augusto, Wolney L. Conde, Bing Lu, and Barry M. Popkin. "Obesity and Inequities in Health in the Developing World." *International Journal of Obesity* 28, no. 9 (2004): 1181-1186.
- Mullenbach, Mark J. "Deciding to keep peace: An analysis of international influences on the establishment of third-party peacekeeping missions." *International Studies Quarterly* 49, no. 3 (2005): 529-555.
- Mvukiyehe, Eric, and Cyrus Samii. *Peacekeeping and Development in Fragile States: Micro-level Evidence from Liberia*. The World Bank, 2018.
- Nordås, Ragnhild, and Siri CA Rustad. "Sexual exploitation and abuse by peacekeepers: Understanding variation." *International Interactions* 39, no. 4 (2013): 511-534.
- Novoseloff, Alexandra. "The Many Lives of a Peacekeeping Mission: The UN Operation in Côte d'Ivoire." New York: International Peace Institute, June 2018.
- O'Hare, B. A. M., & Southall, D. P. (2007). First do no harm: The impact of recent armed conflict on maternal and child health in sub-Saharan Africa. *Journal of the Royal Society of Medicine*, 100, 564–570.
- Østby, Gudrun; Henrik Urdal; Andreas Forø Tollefsen; Andreas Kotsadam; Ragnhild Belbo & Christin Marsh Ormhaug (2018) Organized Violence and Institutional Child Delivery: Micro-Level Evidence from Sub-Saharan Africa, 1989–2014, *Demography* 55(4): 1295–1316.
- Palmer, Michael, Cuong Viet Nguyen, Sophie Mitra, Daniel Mont, and Nora Ellen Groce. "Long-lasting Consequences of War on Disability." *Journal of Peace Research* (2019).
- Paris, Roland. *At War's End: Building Peace after Civil Conflict*. Cambridge University Press, 2004.
- Perez-Escamilla, Rafael, Odilia Bermudez, Gabriela Santos Buccini, Shiriki Kumanyika, Chessa K. Lutter, Pablo Monsivais, and Cesar Victora. "Nutrition disparities and the global burden of malnutrition." *Bmj* 361 (2018).
- Peters, Laura ER. "Beyond disaster vulnerabilities: an empirical investigation of the causal pathways linking conflict to disaster risks." *International Journal of Disaster Risk Reduction* 55 (2021).
- Pinstrup-Andersen, Per, and Satoru Shimokawa. "Do poverty and poor health and nutrition increase the risk of armed conflict onset?." *Food Policy* 33, no. 6 (2008): 513-520.

- Plümper, Thomas, and Eric Neumayer. "The unequal burden of war: The effect of armed conflict on the gender gap in life expectancy." *International Organization* 60, no. 3 (2006): 723-754.
- Pruitt, Lesley J. *The Women in Blue Helmets: Gender, Policing, and the UN's First All-female Peacekeeping Unit*. Univ of California Press, 2016.
- Ramsay, Michèle et al. "Regional and sex-specific variation in BMI distribution in four sub-Saharan African countries: The H3Africa AWI-Gen study." *Global Health Action* 11, no. 2 (2018).
- Redman, Leanne M., Leonie K. Heilbronn, Corby K. Martin, Lilian De Jonge, Donald A. Williamson, James P. Delany, and Eric Ravussin. "Metabolic and behavioral compensations in response to caloric restriction: implications for the maintenance of weight loss." *PLoS One* 4, no. 2 (2009): e4377.
- Rehn, Elisabeth, and Ellen Johnson Sirleaf. "Women, war and peace." *New York: UNIFEM* (2002).
- Rosen, Stacey L., and Shahla Shapouri. "Obesity in the Midst of Unyielding Food Insecurity in Developing Countries." *Amber Waves* 6, no. 4 (2008): 10-15.
- Ruggeri, Andrea, Theodora-Ismene Gizelis, and Han Dorussen. "Managing mistrust: An analysis of cooperation with UN peacekeeping in Africa." *Journal of Conflict Resolution* 57, no. 3 (2013): 387-409.
- Ruggeri, Andrea, Han Dorussen, and Theodora-Ismene Gizelis. "On the frontline every day? Subnational deployment of United Nations peacekeepers." *British Journal of Political Science* 48, no. 4 (2018): 1005-1025.
- Rustad, Siri Aas, Elisabeth Lio Rosvold, and Halvard Buhaug. "Development Aid, Drought, and Coping Capacity." *The Journal of Development Studies* 56, no. 8 (2020): 1578-1593.
- Sahoré, Drogba Alexis, Olga Yolande Aké Ako, and Joachim Levry Abouattier. "Composition of the Daily Food Ration in Ivory Coast." *J. Pharm* 7 (2017): 12-14.
- Sambanis, Nicholas. "Short-and long-term effects of United Nations peace operations." *The World Bank Economic Review* 22, no. 1 (2008): 9-32.
- Seshagiri, Narasimhiah. *The Food Weapon*. National Book Trust, India, 1979.
- Schilling, Janpeter, Francis EO Opiyo, and Jürgen Scheffran. "Raiding pastoral livelihoods: motives and effects of violent conflict in north-western Kenya." *Pastoralism: Research, Policy and Practice* 2, no. 1 (2012): 1-16.
- Smidt, Hannah M. "United Nations peacekeeping locally: enabling conflict resolution, reducing communal violence." *Journal of Conflict Resolution* 64, no. 2-3 (2020): 344-372.

- Sowers, Jeannie, and Erika Weinthal. "Humanitarian challenges and the targeting of civilian infrastructure in the Yemen war." *International Affairs* 97, no. 1 (2021): 157-177.
- Stephenson, Max O., and Laura Zanotti. *Peacebuilding through Community-Based NGOs: Paradoxes and Possibilities*. Sterling, VA: Kumarian Press, 2012.
- Sundberg, Ralph, and Erik Melander. "Introducing the UCDP georeferenced event dataset." *Journal of Peace Research* 50, no. 4 (2013): 523-532.
- Tir, Jaroslav, and Maureen Bailey. "Painting too 'Rosie' a picture: The impact of external threat on women's economic welfare." *Conflict Management and Peace Science* 35, no. 3 (2018): 248-262.
- Tollefsen, Andreas Forø, Håvard Strand, and Halvard Buhaug. "PRIO-Grid: A unified spatial data structure." *Journal of Peace Research* 49, no. 2 (2012): 363-374.
- Thakur, Ramesh Chandra, Chiyuki Aoi, and Cedric De Coning, eds. *Unintended Consequences of Peacekeeping Operations*. Tokyo, Japan: United Nations University Press, 2007.
- Tripp, Aili Mari. *Women and Power in Postconflict Africa*. Cambridge University Press, 2015.
- Urdal, H., & Che, C. P. (2013). War and gender inequalities in health: The impact of armed conflict on fertility and maternal mortality. *International Interactions*, 39, 489–510.
- Verpoorten, Marijke. "Household coping in war-and peacetime: Cattle sales in Rwanda, 1991–2001." *Journal of Development Economics* 88, no. 1 (2009): 67-86.
- Von Billerbeck, Sarah BK. *Whose Peace?: Local Ownership and United Nations Peacekeeping*. Oxford University Press, 2016.
- Von Grebmer, Klaus, Jill Bernstein, Alex de Waal, Nilam Prasai, Sandra Yin, and Yisehac Yohannes. *2015 Global Hunger Index: Armed Conflict and the Challenge of Hunger*. Intl Food Policy Res Inst, 2015.
- Walter, Barbara F., Lise Morje Howard, and V. Page Fortna. "The extraordinary relationship between peacekeeping and peace." *British Journal of Political Science* 51, no. 4 (2021): 1705-1722.
- Wambogo, Edwina A., Hala Ghattas, Kenneth L. Leonard, and Nadine R. Sahyoun. "Validity of the food insecurity experience scale for use in sub-Saharan Africa and characteristics of food-insecure individuals." *Current Developments in Nutrition* 2, no. 9 (2018)
- Weinthal, Erika, and Jeannie Sowers. "Targeting infrastructure and livelihoods in the West Bank and Gaza." *International Affairs* 95, no. 2 (2019): 319-340.

- Werner, Suzanne, and Amy Yuen. "Making and keeping peace." *International Organization* 59, no. 2 (2005): 261-292.
- Wilde, Parke E., and Jerusha N. Peterman. "Individual weight change is associated with household food security status." *The Journal of nutrition* 136, no. 5 (2006): 1395-1400.
- World Health Organization. *The double burden of malnutrition: policy brief*. No. WHO/NMH/NHD/17.3. World Health Organization, 2016.
- Wu, Chang-Han, Chung-Ying Lin, Yi-Ping Hsieh, Carol Strong, Camilla Meshki, Yi-Ching Lin, and Meng-Che Tsai. "Dietary Behaviors Mediate the Association between Food Insecurity and Obesity among Socioeconomically Disadvantaged Youth." *Appetite* 132 (2019): 275-281.
- Yoboué, Koffi K. Michel. 2016. Stopping the Plunder of Natural Resources to Provide for a Sustainable Peace in Côte d'Ivoire, in *Governance, Natural Resources, and Post-Conflict Peacebuilding*, ed. C. Bruch, C. Muffett, and S. S. Nichols. London: Earthscan.
- Zhang, Lei, I-Chieh J. Lee, Rondaldo F. Enriquez, Jackie Lau, Laura H. Vähätalo, Paul A. Baldock, Eriika Savontaus, and Herbert Herzog. "Stress-and diet-induced fat gain is controlled by NPY in catecholaminergic neurons." *Molecular metabolism* 3, no. 5 (2014): 581-591.

Online Appendix

Replication data and syntax can be accessed on the author's website:
<https://sites.duke.edu/kcbeardsley/>

Table A1: Logistic Regression

VARIABLES	(1)	(2)
	Underweight	Underweight
ln(battle deaths)	0.325*** (0.104)	0.331*** (0.106)
ln(troops)	-0.00646 (0.0424)	-0.0130 (0.0438)
ln(battle deaths)*ln(troops)	-0.0272** (0.0110)	-0.0272** (0.0113)
ln(neighbor battle deaths)	-0.135** (0.0558)	-0.149** (0.0585)
ln(neighbor troops)	-0.0376 (0.0522)	-0.0379 (0.0517)
Night lights	30.88* (17.78)	31.29* (18.09)
Drought	-2.958* (1.751)	-3.096* (1.812)
2011-12 wave	-0.937 (1.026)	-0.863 (1.049)
Pregnant/recent birth		-0.664*** (0.152)
Age		-0.0336*** (0.00731)

Time to water		-0.00225	
		(0.00244)	
Education		-0.00658	
		(0.0146)	
Visitor		0.0490	
		(0.313)	
Constant	-3.395***	-2.338***	
	(0.395)	(0.466)	
<hr/>			
Observations	7,984	7,865	

Models include Grid dummies not shown

Standard errors in parentheses

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

Table A2: Comparing underweight in 1994 and 1998/1999 DHS waves, by PKO exposure

	(1)
VARIABLES	Underweight
No PKO exposure, 1994 wave	Reference
No PKO exposure, 1998/1999 wave	0.0124 (0.0144)
PKO exposure, 1994 wave	-0.000799 (0.0117)
PKO exposure, 1998/1999 wave	-0.00274 (0.0119)
Constant	0.0790*** (0.00968)
Observations	8,203

OLS regression
Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table A3: Different waves of violence

VARIABLES	(1) Underweight
ln(battle deaths, 89-09)	0.0145* (0.00820)
ln(troops, 04-09)	0.00419 (0.00374)
ln(battle deaths, 89-09)*ln(troops, 04-09)	-0.00169 (0.00128)
ln(battle deaths, 10-12)	0.0114 (0.00745)
ln(troops, 10-12)	-0.00393 (0.00408)
ln(battle deaths, 10-12)*ln(troops, 10-12)	-0.00139 (0.00128)
ln(neighbor battle deaths, 89-09)	-0.00756** (0.00379)
ln(neighbor troops, 04-09)	-0.000510 (0.00402)
ln(neighbor battle deaths, 10-12)	0.00120 (0.00505)
ln(neighbor troops, 10-12)	-0.00521 (0.00634)
Night lights	1.883 (1.248)
Drought	-0.221 (0.151)
2011-12 wave	-0.0452

	(0.0631)
Constant	0.0277
	(0.0460)
<hr/>	
Observations	8,203

Models include Grid dummies not shown
Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table A4: Controlling for UNPOL deployment

(2)	
VARIABLES	Underweight
ln(battle deaths)	0.0197*** (0.00632)
ln(troops)	-0.00309 (0.00362)
ln(battle deaths)*ln(troops)	-0.00194*** (0.000723)
UNPOL deployment	0.0486* (0.0256)
ln(neighbor battle deaths)	-0.00827** (0.00383)
ln(neighbor troops)	-0.00141 (0.00383)
Night lights	2.164** (0.991)
Drought	-0.159 (0.119)
2011-12 wave	-0.0815 (0.0659)
Constant	0.0394 (0.0301)
Observations	8,203

Models include Grid dummies not shown
Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Examination of Mechanisms

The arguments in the main text proposed mechanisms by which exposure to armed conflict could contribute to malnutrition. We focus here on the mechanisms related to disruptions to household economies through use of auxiliary analyses. Data on local interruptions to food production and distribution are not available.

Related to disruptions to household economies, we model as an intermediate variable whether the respondent receives income as compensation for work. We also use as intermediate variables the respondent's status as head of the household, whether the household has a woman as the head of the household, the number of children under five-years of age that the respondent has, and the size of the household. We also consider if a respondent is a "visitor" in the household, which is a potential indicator of whether the respondent was displaced in the conflict. We thus substitute dichotomous variables of these intermediate variables, from the DHS data, for the underweight outcome variable in separate regressions. If any of these variables have similar relationships with conflict and peace-operation exposure, we would also include them as additional explanatory variables to the base model in order to see if they can explain the associations between violence (and peacekeeping) and underweight.

Table A5: Women's Work as Intermediate Variable

VARIABLES	(1) Work	(2) Underweight
Work		-0.0343*** (0.00844)
ln(battle deaths)	0.0217 (0.0138)	0.0205*** (0.00634)
ln(troops)	0.00398 (0.00528)	-1.94e-05 (0.00316)
ln(battle deaths)*ln(troops)	-0.00281* (0.00158)	-0.00168** (0.000707)
ln(neighbor battle deaths)	0.00534 (0.00742)	-0.00880** (0.00388)
ln(neighbor troops)	-0.00706 (0.00657)	-0.00241 (0.00378)
Night lights	0.210 (2.566)	1.718* (0.985)
Drought	0.450** (0.223)	-0.165 (0.119)
2011-12 wave	-0.0597 (0.143)	-0.0538 (0.0647)
Constant	0.515*** (0.0481)	0.0281 (0.0246)
Observations	8,185	8,185

Models include Grid dummies not shown
Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table A5 presents the estimated coefficients for the models with women's work as an intermediate variable. While we observe, as expected in Model 2, that employment is negatively associated with underweight, the results from Model 1 are not consistent with what should be expected if women's work status is a pathway connecting conflict and peacekeeping exposures to underweight. In Model 1, we observe, unexpectedly, that higher levels of armed conflict exposure is associated with a *higher* propensity for employment, although the relationship is not statistically significant. Also unexpected is the finding that peacekeeping exposure mitigates any positive relationship that exists.

Turning to other mechanisms related to household disruptions, Table A6 presents models which consider as potential intermediate variables the respondent's head-of-household status, whether there is a female head of household, the number of children under five years of age in the household, the total household size, and whether the respondent is a visitor to the household. Models 1, 2, 3 and 5 do not indicate much of an impact of armed conflict or peacekeeping exposure on whether the respondent is the head of the household, whether there is any woman who is the head of the household, the number of children under five in the household, or whether the respondent is a visitor.

Table A6: Household attributes as intermediate variables

VARIABLES	(1) Head of HH	(2) Female Head of HH	(3) Children in HH under 5	(4) HH size	(5) Visitor
ln(battle deaths)	-0.00777 (0.00684)	-0.0152 (0.0138)	0.110 (0.0731)	0.695*** (0.259)	0.00852 (0.00644)
ln(troops)	-0.00228 (0.00326)	0.00519 (0.00576)	0.0267 (0.0389)	0.0648 (0.168)	-0.000986 (0.00202)
ln(battle deaths)*ln(troops)	0.000534 (0.000861)	0.000695 (0.00171)	-0.00452 (0.00912)	-0.0268 (0.0375)	-1.72e-06 (0.000780)
ln(neighbor battle deaths)	-0.00253 (0.00434)	-0.0112 (0.00784)	0.114*** (0.0385)	0.496*** (0.149)	-0.00769** (0.00298)
ln(neighbor troops)	0.000196 (0.00406)	-0.00102 (0.00621)	-0.0347 (0.0313)	-0.147 (0.113)	-0.000621 (0.00276)
Night lights	1.001 (1.280)	1.828 (2.166)	-39.65*** (12.81)	-99.42* (52.08)	0.164 (0.661)
Drought	-0.0319 (0.133)	-0.0302 (0.230)	-1.829 (1.423)	0.609 (5.162)	-0.0977 (0.0982)
2011-12 wave	0.0162 (0.0808)	0.0427 (0.119)	0.0768 (0.687)	-0.925 (2.625)	-0.0368 (0.0476)
Constant	-0.0292 (0.0267)	0.191*** (0.0441)		10.46*** (0.816)	0.0593*** (0.0195)
Observations	8,203	8,203	8,203	8,203	8,203

Models include Grid dummies not shown
Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

In Model 4, we observe that exposure to battle deaths, without peacekeeping, increases the overall household size. We also observe, however, that peacekeeping does not significantly mitigate that relationship. In models not shown, we do not observe that the increase in the size of the household significantly increases the potential for underweight. In total, we do not observe much evidence that the types of household disruptions measured across these variables are intermediate mechanisms by which conflict and peacekeeping exposure influence malnutrition.

Trauma as a Potential Mechanism

We also considered the potential for stress-induced trauma to operate as another mechanism by which conflict affects malnutrition. To measure trauma, we consider loss of close family members as intermediate variables. We use data on sibling mortality to code the number of siblings that have died in the last ten years, with the expectation that a loss of siblings relates to the level of trauma that a person has experienced. We also consider if the respondents are widows. Another variable counts the number of each respondent's children who have died. Finally, we code an aggregate dummy variable of whether the respondent has lost a sibling in the last ten years, is widowed or has lost a child.

Table A7 shows the results of the auxiliary analyses probing whether the trauma-related variables constitute intermediate variables related to underweight. We do not observe that exposure to battle deaths -- with or without peacekeeping -- significantly increases the expected likelihood of any of the types of family deaths considered here. We do not find evidence that trauma, so measured, is a key mechanism connecting exposure to armed conflict or peacekeeping to malnutrition.

Table A7: Trauma

	(1)	(2)	(3)	(4)
VARIABLES	Sibling deaths	Widow	Child deaths	Family deaths
ln(battle deaths)	-0.0173 (0.0186)	-0.00339 (0.00390)	0.00845 (0.0290)	-0.00198 (0.0161)
ln(troops)	-0.00765 (0.00726)	-0.00148 (0.00143)	-0.0121 (0.00969)	-0.00585 (0.00528)
ln(battle deaths)*ln(troops)	0.00324 (0.00237)	0.000597 (0.000444)	-0.00129 (0.00333)	0.000811 (0.00192)
ln(neighbor battle deaths)	-0.00387 (0.00884)	0.00347* (0.00190)	-0.0354*** (0.0124)	-0.0176** (0.00734)
ln(neighbor troops)	0.00997 (0.00934)	-0.00172 (0.00179)	-0.00497 (0.0115)	0.00285 (0.00712)
Night lights	1.875 (2.291)	-0.306 (0.612)	-2.728 (3.733)	-3.302 (2.225)
Drought	0.214 (0.318)	-0.00594 (0.0571)	0.0876 (0.418)	0.160 (0.240)
2011-12 wave	-0.0768 (0.152)	0.0356 (0.0347)	0.170 (0.230)	0.142 (0.133)
Constant	0.0903 (0.0632)	0.0662*** (0.0125)	0.696*** (0.0847)	0.381*** (0.0508)
Observations	7,949	6,377	8,203	8,203

Models include Grid dummies not shown

Standard errors in parentheses

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

These analyses have explored whether mechanisms related to household economies explain the main findings, but the results are indeterminate. One challenge with the research

design relates to the substantial time gaps between the baseline survey in 1994, the first wave of violence in 2002-2004, the second wave of violence in 2010-2011, and the endline survey in 2011/2012, allowing ample opportunities for more noise to make it difficult to detect key relationships. The lack of statistical significance should not be interpreted as dispositive for a lack of mechanisms in play. Further studies that can narrow in on shorter time horizons for the observed effects may uncover a clearer picture of the relevant pathways.

Full Table 2

VARIABLES	(1) Underweight	(2) Underweight
ln(battle deaths)	0.0203*** (0.00637)	0.0210*** (0.00639)
ln(troops)	-2.44e-05 (0.00312)	-0.000646 (0.00318)
ln(battle deaths)*ln(troops)	-0.00166** (0.000704)	-0.00167** (0.000713)
ln(neighbor battle deaths)	-0.00896** (0.00388)	-0.0100** (0.00398)
ln(neighbor troops)	-0.00202 (0.00379)	-0.00206 (0.00382)
Night lights	1.786* (1.006)	1.748* (1.032)
Drought	-0.177 (0.118)	-0.193 (0.123)
2011-12 wave	-0.0568 (0.0654)	-0.0463 (0.0675)
Pregnant/recent birth		-0.0392*** (0.00744)
Age		-0.00217*** (0.000458)
Time to water		-0.000129 (0.000140)
Education		-0.000345 (0.000988)

Visitor		0.00268	
		(0.0236)	
Constant	0.00858	0.0845***	
	(0.0243)	(0.0274)	
<hr/>			
Observations	8,203	8,083	

Models include Grid dummies not shown

Standard errors in parentheses

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

Full Table 3

VARIABLES	(1) Underweight
ln(battle deaths, placebo)	0.00487 (0.00807)
ln(troops, placebo)	0.00293 (0.00385)
ln(battle deaths, placebo)*ln(troops, placebo)	-0.000916 (0.000979)
ln(neighbor battle deaths, placebo)	-0.00361 (0.00473)
ln(neighbor troops, placebo)	-0.000888 (0.00447)
Night lights	0.696 (1.209)
Drought	0.0610 (0.157)
2011-12 wave	-0.0231 (0.0884)
Constant	0.0635* (0.0371)
Observations	6,523

Models include Grid dummies not shown

Standard errors in parentheses

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

Full Table 4

VARIABLES	(1)	(2)	(3)
	Δ Energy adequacy	Δ Cereal production	Δ Meat production
ln(battle deaths)	-0.0567** (0.0242)	-57,118** (24,920)	-4,130* (2,204)
Peace operation	-0.530** (0.254)	-136,760 (117,164)	-14,399 (10,205)
ln(battle deaths)*ln(peace operation)	0.0544 (0.0358)	39,774* (23,053)	2,924* (1,600)
GDP per capita (t-1)	-1.148*** (0.294)	375,298 (320,451)	-5,135 (21,461)
Δ GDP per capita (t-1)	3.434*** (1.142)	944,359 (905,588)	30,325 (25,963)
Urban population ratio (t-1)	3.663* (1.896)	-358,945 (941,690)	-138,397 (186,341)
Δ Urban population ratio (t-1)	-35.23* (21.07)	1.479e+07 (1.178e+07)	-205,551 (457,371)
Constant	8.944*** (2.242)	-2.870e+06 (2.667e+06)	166,674 (282,362)
Observations	2,678	2,865	3,058

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1