POLICY BRIEF

The Impact of Armed Conflicts on Child Health in the Central African Republic

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Abstract

For several decades, the Central African Republic has been the scene of a succession of coups which have been accompanied by armed conflicts in many prefectures of the country. However, children suffer high rates of acute malnutrition during these armed conflicts. This study aims to analyze the impact of the 2003-2008 and 2012-2014 armed conflicts on child health using data from the 2010 and 2018 Multiple Cluster Surveys of the Central African Republic. Our identification strategy relies on exploiting both temporal and spatial variation across birth and prefectures cohorts to measure child exposure to the conflicts.

From the difference-in-difference estimation, we find that height-for-age Z-scores and weight-for-age Z-scores are respectively 0.518 and 0.242 standard deviations lower for children born during the war. We also examine the impact of the total duration of exposure to conflicts, and the results indicate that an additional month of exposure significantly reduces both height-for-age and weight-for-age z-scores. We further perform robustness analysis, and the findings suggest that effects are robust to considering the level of internally displaced person across prefectures and the level of household wealth. As economic losses appear to be the most relevant mechanism paired with the decline in child nutritional health in the CAR, interventions must promote agricultural empowerment of internal displaced persons, initiate cash transfers and employment programs aimed at rebuilding household assets in the absence of agricultural income. Moreover, rehabilitating basic social services, especially health infrastructures, can help alleviate the negative effects of conflicts on child health through the access to adequate health care during illness.

Introduction

According to the World Health Organization (2006) health is "a complete state of physical, social and mental well-being, and is not merely the absence of disease and infirmity." As such, it can be affected by non-strictly medical factors such as nutrition, drinking water and sewage systems, hygiene, education, etc. (Labourdette, 1992). For many years, several policies to improve the health of vulnerable populations including women and children have been defined. We may mention for example the Alma Ata conference in 1978, Lusaka in 1985, the Bamako Initiative (1987) and the World Summit for Children in 1990 with the common goal of "health for all" by 2000. The international community has also focused on health in the MDGs, which were reaffirmed with acuity in the context of Sustainable Development as four goals (SDGs) as four goals on seventeen are directly related to health.

Health during childhood sets the stage for adult health. Hence, investing in the health of children is justified not only because it fulfils a basic human right, but also because it is an investment with high social and private returns, and that poor health contributes to perpetuating poverty (Belli & Appaix, 2003). But it is recognized that malnutrition, a rapid form of weight loss brought on by starvation and/or disease (Loewenberg, 2015), has a whole range of effects that impede not only children’s nutrition and development in the short term, but also their cognitive abilities and productivity in adulthood, with measurable economic impacts (Ruel and Hoddinott, 2008).

As indicated by Corley (2021), malnutrition refers to an imbalance between the intake of energy or nutrients and the body’s nutrition requirements. While the term malnutrition encompasses both undernutrition (e.g., moderate, and severe acute malnutrition; stunting, underweight; and micronutrient deficiencies) and

overnutrition (e.g., overweight, and diet-related noncommunicable diseases). Malnutrition during childhood remains a global public health concern. In developing countries, this concern is acute since malnutrition causes almost half (45%) of child deaths, particularly in low socioeconomic communities of developing countries (Black et al., 2008; de Onis et al., 2013). Yet, child under nutrition is a factor in more than three million preventable childhood deaths (Yaya et al., 2020). In recent years, stunting and wasting in particular have been gaining the attention of researchers on children's nutritional health (Kamiya et al., 2018; McKenna et al., 2019; Shroff et al., 2009; Yaya et al., 2020). Stunting, which reflects chronic malnutrition, refers to a child who is too short for his age and it is associated with prolonged food insecurity or persistent illness. Wasting on its part, which reflects acute malnutrition, refers to a child who is too thin for his height, and illustrates an acute nutritional deficiency (McKenna et al., 2019).

In the world, 149 million children under age five suffered from chronic malnutrition and 49 million children suffered from acute malnutrition in 2018 (UNICEF et al., 2019). In West and Central Africa, the prevalence of children who were stunted and wasted was 33.1% and 9% respectively. In the Central African Republic (CAR), investigations from Multiple Indicator Cluster Survey (MICS) carried out from 2018 to 2019 indicate that 39.8% of children under age of five years are suffering from stunting and 5.4% are wasted. Compared to 2010 (where prevalence of stunting and wasting were estimated at 38% and 7% respectively), it appears that the situation regarding stunting has worsened, as long as the prevalence of wasting has improved. But the fact remains that efforts must be made to reduce these rates since the under-five mortality rate, estimated at 103 deaths per 1,000 live births (MICS 2018-2019), is high and very far from the target of the third Sustainable Development Goal (SDG) by 2030 (reduce under-five mortality to no more than 25 per 1,000 live births).

Government has made efforts to improve child health in the country. To this end, a National Health Development Plan (NHDP) was adopted in 2015 to reduce the ill-health condition of vulnerable groups by 2025. Concretely, this plan aims to *(i)* ensure food security of vulnerable groups, especially children, *(ii)* rehabilitate and develop health infrastructures, *(iii)* increase the availability and quality of essential health care, especially food *(iv)* reduce infant and maternal mortality, *(v)* stop the spread of endemic diseases, *(vi)* strengthen the health system, *(vii)* promote a favorable environment for health, including sustainable development, preparation, and response to emergencies, etc. Internationally, the country is firmly committed to take action to achieve the SDGs following a recent analysis of some health indicators suggesting that the CAR is far from reaching the targets set under the SDGs.

Many factors (demographic and economic factors, insufficient dietary intake, infection and illness, lack of health services and socioenvironmental factors) can be associated with the poor infant and child nutritional status. Among environment

factors, armed conflicts, in particular, is an important driver of acute malnutrition (Brück & d'Errico, 2019; Corley, 2021). For 60 percent of people experiencing acute food insecurity, armed conflict is a key precipitating factor (Food Security Information Network, 2018). It is relevant to focus on armed conflicts in the CAR insofar as these conflicts are very frequent and very often associated with the multiple coups that the country has recorded for several decades. However, even if the war undermines majority of the territory and the capital in particular, it should be noted that some areas are very often safe. Therefore, we can postulate that a position relatively far from the conflicts zones implies very good health for children as compared to zones closer. This hypothesis thus leads us to look with a certain sharpness for the effect that armed conflicts could have on children's health.

History of armed conflicts in CAR between 2003 and 2014

The CAR has been the scene of several military-political crises which have considerably affected the economic and social environment. These crises generated armed conflicts that unfolded over several periods and in different ways. The objective of this section is to present the history of armed conflicts in CAR between 2003 and 2014, including the dynamics of child nutritional health indicators, with particular emphasis on the 2003-2008 conflict and the inter-communal civil war of 2012-2014.

Armed conflicts between 2003 and 2008

On March 15, 2003, a military operation brought General Bozizé to power, which formed a new transitional government. However, the capital, Bangui, due to the reinforcement of Chadian troops within the Central African Economic and Monetary Community, the southern and eastern part of the country was relatively spared from the abuses of the armed men. On the other hand, the north-west of the country was in the hands of armed gangs for a long period, without a substantial presence of regular troops capable of ensuring public order for the entire population. The population of the prefectures of Ouham and Ouham Pende, already the most affected during the fighting that occurred between November 2002 and March 2003, will still be victims of this insecurity during the beginning of this transition period (Beninga et al., 2017). At that time, 37.9% (29.8% in Ouham, 40.4% in Ouham Pendé, 36.5% in Bangui and 49.2% in Lobaye, the prefecture with the highest level) and 8.6% (9% in Ouham, 9.2% in Ouham Péndé, 8.7% in Bangui and 13.3% in Basse Kotto, the prefecture with the highest level) of children under age of five age were suffering from stunting and wasting, respectively, according to MICS realized in 2000.

The 2004–2007 Central African rebellions and the global peace agreement of 2008

This period was marked by the creation of several armed groups amongst which were the Movement of Central African Liberators for Justice (MCLJ), the Democratic Front of the Central African People (DFCP), the People's Army for the Restoration of Democracy (PARD) and the Union of Democratic Forces for the Rally (UDFR), which operated with an avowed aim of seizing power by force. The consequence of this combination of facts is that from 2005 to 2007, several towns in northern CAR such as Birao, Sam-Ouandja, Ouanda-Djalle, Ouadda and Ndele, fell in the hands of rebels. To contain these rebel groups, the government entered into negotiations with these groups (UN Security Council, 2010). Estimates of MICS carried out in 2006 show that 37.5% (25.4% in Bangui and 48.8% in Ouham, the prefecture with the highest level) and 28.3% of children (26.2% in Bangui and 37.1% in Mambéré-Kadéi) were affected by stunting and wasting, respectively.

On June 21, 2008, given the peace agreement of Birao in April 13, 2007, and the ceasefire agreement of Libreville in May 9, 2008, a *global peace agreement* was signed between the government and the Central African politico-military movements (comprised of the PARD, the DFCP and the UFDR) to put an end to the conflicts that have been going on since 2003, to organize the inclusive political dialogue and to plan local elections in 2009, as well as parliamentary and presidential elections in 2010 (MINUSCA, 2015). Compared to MICS 2006, statistics of MICS made in 2010 illustrate that the prevalence of stunting has increased to 40.5% (26.4% in Bangui) while the prevalence of wasting has decreased and reached 23.5% (21.5% in Bangui).

Spatial and temporal intensity of the 2012–2014 armed conflicts

The rebel coalition of Séléka, formed by members of the Convention of Patriots for the Salvation of the Kodro (CPSK), the Convention of Patriots for Justice and Peace (CPJP), the UDFR, and of the DFCP led by Michel Am Nondokro Djotodia, resumed offensive armed launches on December 10, 2012 to conquer the central power of Bangui. After taking five towns since the offensive began on December 18, the coalition captured the mining town of Bria, killing 15 government soldiers. It also takes the city of Kabo. The Central African president calls on his Chadian counterpart for military aid. Chad agrees to send troops, around 150 men and around 20 vehicles, specifying that they would be confined to an intervention role. On December 20, the rebels drove government forces out of the town of Batangafo, but the latter managed to retake Kabo, taken two days earlier by the rebels (International Peace Information Service, 2018).

On December 23, the coalition captured Bambari, the third largest city in the country. On the 25th, it took control of the city of Kaga-Bandoro while President Bozizé received his military advisers in the capital, Bangui. On the night of Friday 28 to Saturday 29 of December, the French Ministry of Defense announced the deployment of 150 French soldiers to a base in Libreville, belonging to a company of parachute infantry, France already has 250 soldiers in the M'Poko base, located near Bangui airport, as part of the Boali mission. The same day, the Seleka forces advanced a little further, this time taking the town of Sibut, located about one hundred and sixty kilometers from Bangui. The Central African armies, supported militarily by Chad, sent troops to Damara, the last "lock city" to save Bangui. On Friday 11 of January 2013, the government officially announced the signing of an agreement concluded in Libreville between government forces and the rebels. This agreement stipulates that the president in office, François Bozizé, will remain at the head of the country for the transition until 2016, when the next presidential elections are scheduled (Beninga et al., 2017).

Resumption of fighting and occupation of Bangui by the Seleka

On March 17 in Sibut, a hundred kilometers from Bangui, the Seleka rebels broke off negotiations with the Central African government to which they issued an ultimatum. They claim the release of their prisoners, the validation of the ranks of the rebel officers, the integration of 2,000 of their fighters into the national army and the departure of the South African soldiers. The Seleka claim that if these demands are not granted within three days, they will resume their offensive.

On March 22, rebel forces left Sibut and seized Damara. The Seleka is then 55 kilometers from Bangui. On March 23, the fighting continued on the Bangui-Damara-Sibut road axis, at PK 55, 55 kilometers from the capital. Further west, a second rebel column seizes Bossembélé and Boali. The South African forces are taken in rear by the second column and suffer losses. On the evening of March 23, the Seleka took up position 12 kilometers from Bangui. During the night, the rebels cut off electricity in the city. On Sunday March 24, 2013, the Seleka rebels announced the capture of the presidential palace. The same day, President Bozizé fled to Cameroon (International Peace Information Service, 2018).

Thus, on January 10, 2014, the President of the Central African Transition Michel Djotodia, and his Prime Minister Nicolas Tiangaye announced their resignation during an extraordinary summit of the Economic Community of Central African States (ECCAS). On January 20, the National Transitional Council elects Catherine Samba-Panza as Head of the Transitional State of the Central African Republic. In January, the Special Forces for Justice Revolution (SF-JR), led by Commander Sayo, attacks the Seleka in the north-west of the country. The movement publishes several statements

in which it claimed to have won several fights against the Seleka. According to them, on January 17, they beat the Seleka between Boguila and Goré. On the 19th, a new clash took place in Sido, between Markounda and Bossangoa. On the 22nd, the SF-JR declared that they had killed 22 Seleka fighters in Boguila after fighting for two days with no loss in their ranks, from which they then seized Bodjomo (Marchal, 2015).

According to Amnesty International report published on February 12, 2014, massacres committed by anti-balaka against Muslims killed around 30 people in Boyali on January 8, five in Boali on January 17, at least 43 in Bossemptélé from January 16 to 18, more than 100 in Bossembélé on January 18. For their part, the Selekas massacred 24 Christians in Bata on December 31, 2013, then more than 100 others in Baoro on January 22, 2014. In February, anti-balaka assassinated 72 men in Guen, not far in another village, the Seleka killed 19 people. On April 10, clashes in Dekoa between Seleka and anti-balaka left at least 37 dead. From April 13 to 16, fighting in Grimari between Seleka and Anti-Balaka left several dead (Marchal, 2015).

On April 26, the Seleka attacked Boguila after having murdered several people on the way. The rebels kill 16 people in the hospital, including three employees of Doctors without Borders. On May 1, Markounda was attacked by Fulani rebels who killed 20 to 30 people, 15,000 inhabitants then fled and took refuge in Komba, in Chad. At the start of the month, further violence in Paoua left at least 55 dead. Between May 1 and 5, clashes also took place in Mala between Seleka and Anti-Balaka, leaving at least 30 dead and around 10 injured. After this violence, the French forces of Operation Sangaris launch a reconnaissance mission between Bossangoa and Paoua. But on May 5, in Boguila, the French were attacked by a group of around forty armed men who might be part of the Seleka from Bémal. The attack was repulsed after three hours of fighting and 10 to 15 attackers were killed. The French do not deplore death or injury. On May 6, fighting between Seleka and Anti-Balaka left 13 dead in Kaga Bandoro, including two civilians. On May 10, the insurgent Seleka and Peuls attacked the village of Dissikou, near Kaga Bandoro, and killed several residents, 13 people were burned alive in a house (Carayannis & Lombard, 2015).

On May 11, in Gallo, in a village located on the Cameroonian border, between Bouar and Garoua-Boulaï, the Anti-Balaka fell into an ambush set up by the Seleka and the insurgent Peuls. The confrontation left at least four dead on the side of the Anti-Balaka and six among the Seleka and the Peuls. On June 5, fighting took place in Boyo, according to a Seleka officer, a man from his movement was killed, along with 18 anti-balaka. On June 9 and 10, fighting between Seleka and anti-balaka left at least 22 dead in the village of Liwa, near the town of Bambari, where after the clash, the Seleka publicly executed two prisoners. On June 19, in Sabanga, Seleka men massacred five people from a family, including two children. On June 30, in the village of Kono, in the region of Nzako in the south-eastern part of the Central African

Republic, the Ugandan army attacked Seleka soldiers, mistaking them for men of the Lord's Resistance Army. The fight left at least 15 dead among the Seleka and several killed on the side of the Ugandans. Towards the end of June, fighting between Seleka and anti-balaka in the center of the city of Bambari left around 100 dead. Two weeks later, on July 7, Seleka attacked the Catholic Cathedral of Saint Joseph, 26 people, including 11 women, were killed and 35 others were injured according to the Red Cross (MINUSCA, 2015).

Cessation of hostilities and peace agreements

On July 23, 2014, a cessation of hostilities agreement was signed in Brazzaville after three days of negotiations. The text is signed by Mohamed Moussa Dhaffane for the Seleka, by Patrice-Edouard Ngaissona for the Anti-Balaka and by forty other delegates, including Denis Sassou-Nguesso, President of the Republic of Congo, the Archbishop of Bangui Dieudonné Nzapalainga, and Imam Layama Kobine, president of the Islamic community of the Central African Republic (African Union, 2014). According to MICS 2018-2019, we noticed that the percentage of stunted children, estimated at 39.8% (21% at Bangui) has hardly changed, while the percentage of wasted children has dropped considerably and reached only 5.4% (5.9% in Bangui).

More than 25% of the world's population live in countries affected by conflicts (Avis, 2019). In sub-Saharan Africa, armed conflicts have affected almost 60% of countries for more than 30 years (Palik et al., 2020). The deterioration of human development indicators in sub-Saharan Africa is one of the consequences of multiple armed conflicts that affected the region, with the average value of the Human Development Index (HDI) of 0.423 in 2018. Most of the countries with low HDI and high infant mortality rate came out of a long period of armed conflict with the example of Angola, which recorded an average HDI of 0.581 in 2018 and an infant mortality rate of 180‰, Burundi whose HDI in 2014 was 0.417 with an infant mortality rate of 142‰, the Democratic Republic of Congo which registered an HDI 0.457 and an infant mortality rate of 170‰, and the CAR which over the same period recorded a HDI of 0.35, thus occupying the penultimate position of the ranking of 188 countries (PNUD, 2019).

Specifically in Central Africa, the Central African Republic (CAR) had a history marked by numerous socio-political and military crisis characterized by multiple coups since its independence. Over the ten presidents who have so far ruled the country between 1958 and 2016, five came to power by coup accompanied by rioting and the formation of rebel groups. Over the past sixteen years, recurrent military and political crises have led perpetual armed conflicts. This has accentuated the status of the fragility of the country and the level of vulnerability of groups such as farmers, women, and children whose access to basic infrastructure has been greatly reduced, which led to the degradation of the level of socio-economic and health indicators of the country, which remain among the lowest in the world (OCHA, 2022).

In general, populations affected by armed conflict experience severe public health consequences mediated by population displacement, food scarcity, and the collapse of basic health services, which together often give rise to complex humanitarian emergencies (Toole & Waldman, 1997; Vass, 2001). Conflict has both direct and indirect effects on people's health and on the overall health system (Vass, 2001). Armed conflicts can also cause the displacement of people and an increase in infectious diseases (Mcdonnell et al., 2004). From its consequences, it is recognized that armed conflict is an important driver of acute malnutrition (Brück & d'Errico, 2019; Loewenberg, 2015). An estimated 124 million people are exposed to crisis-level food insecurity, a direct contributor to acute malnutrition, and, at present, all countries at risk of crisis levels of food insecurity experience significant armed conflict (Food Security Information Network, 2018). While acute malnutrition is damaging to individual's health all along the life course, it is particularly harmful for young children. Worldwide, almost 51 million children under-five are affected by acute malnutrition which is one of the greatest contributors to mortality within this age range (UNICEF and WHO, 2018; Ahmed et al., 2013).

In the CAR, 40 percent of children under-five are already chronically malnourished (MICS 2018-2019), a rate above the emergency threshold of 30 percent. Due to the combined impact of violence, insecurity, population displacements, limited access to food, health, water, and sanitation services, rising food prices food, as well as the socio-economic repercussions of the COVID-19 pandemic, 27 localities distributed in 14 health districts of the country currently show alarming levels of severe malnutrition among children under five years old (UNICEF, 2021). On average more than two percent of children in these areas at risk of severe malnutrition, and these exceedingly more than three percent in the numbers of displaced people around Bouar, near the border with Cameroon.

Hence, from what precedes, it appears that the nutritional health of children is a call for concern in the CAR. Resolutely, the persistence of armed conflicts could be one of the main causes attributed to this concern. Regarding the frequency and destructiveness of armed conflict, previous studies (Akresh et al., 2012; Arcand & Wouabe, 2009; Kreif et al., 2022; Minoiu & Shemyakina, 2014; Ricci et al., 2018; Shemyakina, 2011; Singhal, 2019) have spent efforts to analyze the effects of conflict on human capital, especially on health, even if most of these works neglect the idea that the effect of the conflicts on a child's health could depend on the duration of its exposure to the war. But in the context of the CAR, no similar study has been realized in this country before. To the author's knowledge, the majority of works have instead been focusing on the links with the socio-economic status of household (Iwanaga et al., 2009; Ricci et al., 2018; Vonaesch et al., 2021).

Statistics on children's health from MICS reports show that between 2006 and 2010, and 2010 and 2018, indicators of child's health, in particular their nutritional health have deteriorated, highlighting the 2003-2008 and 2012-2014 armed conflicts as the potential cause of this situation. Thus, armed conflicts are expected to have an

impairing effect on children's health in CAR. Accordingly, it would be relevant to answer to the question: What are the effects of 2003-2008 and 2012-2014 armed conflicts on children's health in the Central African Republic?

There is a growing interest in microeconomic research to examine the impact of conflicts on children's health in developing countries (Akresh et al., 2012; Arcand & Wouabe, 2009; Kreif et al., 2022; Minoiu & Shemyakina, 2014; Singhal, 2019), particularly in CAR for three main reasons. Firstly, the country is still recovering from a deep political crisis that has accounted for its weakness, and at the same time, for its vulnerable groups. Access to health care is compromised because of the destruction and looting of health facilities and infrastructures. Then, the challenges on child health are enormous both nationally and internationally with the Sustainable Development Goals (SDGs) adopted in September 2015. Finally, from the local literature on the subject, it is clear that studies on the relationship between armed conflicts and children's health are inexistent in CAR to the best of authors' knowledge.

The main objective of this work is to evaluate the impact of the 2003-2008 and 2012-2014 armed conflicts on children's health in CAR. Specifically, this paper is designed to: *Measure the impact of armed conflicts on the nutritional status of children under age of five years born during the conflicts; Measure the impact of the total duration of exposure to the conflicts on the nutritional status of children.*

Data source

The data used in this study come from the fifth and the sixth edition of the Multiple Indicator Cluster Survey (MICS) conducted respectively in 2010 and 2018 in the Central African Republic (CAR). These surveys were conducted by the Central African Institute of Statistics, Economic and Social Studies (ICASEES) with financial and technical support of the United Nations Children's Fund (UNICEF), the United Nations Population Fund (UNFPA), World Food Programme (WFP), the World Health Organization (WHO) and the World Bank. The datasets are a nationally representative cross-sectional survey that provides information on and socioeconomic conditions of households and demographic topics such as fertility, child mortality, health service utilization, and nutritional status of mothers and young children.

The sample of the MICS database has been chosen to provide estimates for a large number of indicators on the situation of children and women at national level, by area of residence, and for all 17 prefectures covered by the survey, and structured into seven region : region 1 (Ombella-Mpoko, Lobaye), region 2 (Mambéré-Kadéï, Sangha-Mbaéré, Nana-Mambéré), region 3 (Ouham, Ouham-Péndé), region 4 (Kémo, Nana-Grébizi, Ouaka) , region 5 (Bamingui-Bangoran, Haute-Kotto, Vakaga), region 6 (Basse-Kotto, Mbomou, Haut-Mbomou) and region 7 (Bangui). Urban and rural areas

of these prefectures were identified as the main sampling strata. In each stratum, a number of enumeration areas (EAs) was selected systematically with a probability proportional to its size. After the list of households were established in selected enumerated areas, a systematic sample of 28 clusters (households) was chosen from each.

A representative sample of 10,474 and 9,037children aged 0–59 months could be drawn at the end of 2010 MICS5 and 2018 MICS6 respectively, and information on children were obtained from women between the ages of 15 and 49. However, the study does not consider children whose information on anthropometric indicators were not reported or flagged (305 in 2010 and 116 in 2018). Finally, empirical investigations will focus on samples of 10,169 and 8,921 children under age five respectively in 2010 and 2018.

Armed Conflict Location & Event Data Project (ACLED) dataset will also be used to illustrate the spatial and temporal intensity of these conflicts, and more specifically, to identify conflict-affected prefectures, the exact dates, and locations of violent incidents during the conflict, including riots, protests, armed battles, and violence against civilians.

Conclusion and policy implications

In this study, we examined the impact of the 2003-2008 and 2012-2014 armed conflicts in the Central African Republic on children's weight-for-age and height-for-age through Z-scores using data from the fifth and the sixth edition of the Multiple Indicator Cluster Survey conducted respectively in 2010 and 2018. Our identification strategy relies on exploiting both temporal and spatial variation across birth and prefectures cohorts to measure children's exposure to these conflicts. Our results show that height-for-age Z-scores and weight-for-age Z-scores are respectively 0.518 and 0.242 standard deviations lower for children residing in conflicts regions who were born during the war. Moreover, we found that an additional month of exposure significantly reduced height-for-age z-scores and weight-for-age z-scores respectively by 0.00561 and 0.00215 standard deviations on average. We also performed robustness analysis by considering migrations and the sub-sample poor household vs non-poor households, and our results are robust in considering the level of internally displaced person, and the impact of conflicts are of similar magnitude for poor household or non-poor households.

This study contributes to a growing literature that estimates the welfare impact of wars. It is the first study to be carried out in the CAR, a country affected for several years by successive waves of coups and conflicts between armed groups. It also proposes an innovative approach to address migrations in its robustness analyzes.

Its findings help improve our understanding of broader issues, which are the long-term growth and development consequences of wars. Investigating the impact on WHZ and HAZ in the CAR is important from a policy perspective, as the negative effects can be reversed with timely interventions to prevent stunting and wasting of children alive during conflicts. First of all, it should be remembered that during the conflicts in the CAR, the areas affected by the conflict are sometimes less accessible to the Central African government than humanitarian organizations and programs, which justifies the importance of taking these latter into account when formulating recommendations. Thus, we suggest two main policies that could mitigate the adverse effects of armed conflict.

During the conflict, the Central African government, in collaboration with the United Nations Multidimensional Integrated Stabilization Mission in the Central African Republic (MINUSCA), should set up humanitarian corridors allowing the movement of populations from affected areas to secure sites. The exploitation of these humanitarian corridors will make it possible, with the participation of international programs and organizations (World Food Programme, Food and Agriculture Organization of the United Nations, UNICEF) and civil societies, to transport and supply displaced populations in basic necessities and foodstuffs, especially children who are most at risk of malnutrition in times of conflict (FAO, 2016). The involvement of the ministry of health with international humanitarian medical organizations (Médecins sans Frontières, International Committee of the Red Cross) cannot be ruled out in the management of diseases that degrade the nutritional status of children. With regard to areas unaffected or little affected by the conflicts, the Central African government should define a security plan by strengthening the defense forces around and inside these areas so that its inhabitants are not affected by the Conflicts.

After the conflict, policy makers should facilitate the return of the displaced persons in order to restore their economic well-being. As economic losses appear to be the most relevant mechanism paired with the decline in child nutritional health in the CAR, interventions must promote agricultural empowerment of internal displaced persons, initiate cash transfers and employment programs aimed at rebuilding household assets in the absence of agricultural income. Moreover, rehabilitating basic social services, especially health infrastructures, can help alleviate the negative effects of conflicts on child health through the access to adequate health care during illness.

However, this study has a number of limitations. Firstly, it is very difficult to absolutely distinguish the treatment group from the control group. Indeed, the cartography of armed conflicts in the CAR suggests a strong geographical extent of these conflicts, in particular the 2012-2014 armed conflict, so that almost all the prefectures had been directly or indirectly affected. As a result, the comparison group may be also affected by war, and therefore its cohorts of children affected by the negative effect on

nutritional health through the loss of household's income, rising prices of food stuffs and the reduction in the use of health care services. Secondly, the results obtained underestimate the "true impact" of the conflicts since they do not include deceased children in the analysis. Thirdly, the cross-sectional nature of the data used limits the ability to determine causal effects of conflict exposure on children health. The last limitation of this study concerns the absence in the MICS database of information on the location of households (or children) during the conflicts, which could have permitted us to capture more effectively migrations.

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