Working Paper Series 723
(ISSN 2788-0443)

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CERGE-EI
Prague, March 2022

ISBN 978-80-7343-530-1 (Univerzita Karlova, Centrum pro ekonomický výzkum a doktorské studium)
ISBN 978-80-7344-632-1 (Národohospodářský ústav AV ČR, v. v. i.)

Violent Conflicts and Child Gender Preferences of Parents: Evidence from Nigeria*

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Preliminary and Incomplete
This draft version: March 2022

Abstract

Identifying the impacts of conflicts and understanding the origins of gender gaps are both seemingly unrelated but crucial questions in the literature. Focusing on the gap at the intersection of these two branches of literature, this study explores whether and how long-run exposure to violent conflicts contributes to and shapes the child gender preferences of parents. I use temporal and spatial variations in conflicts in Nigeria and combine the Uppsala Conflict Data Program and the Demographic and Health Surveys Program to perform the analysis. The results show that the effect of long-run exposure to violent conflicts on stated preferences (attitudes) for boys is not homogeneous. While conflict events with low or no civilian death increase preferences for sons, violence targeted at civilians works in the opposite direction and decreases preferences for boys. I find no evidence of translating these preferences into behaviour via sex-selective abortions. Instead, evidence shows that parents use the stopping rule to achieve the desired gender composition of children. Further, analysis also indicates that, in the districts affected by conflict, parents have a positive bias towards boys in terms of their postnatal health investment.

Keywords: gender preferences, son preference, violent conflicts, attitudes and behaviour

*This study was supported by Charles University, GAUK project No 546120. I thank Nikolas Mittag, Vasily Korovkin, Michal Bauer, Stepan Jurajda, Andreas Menzel, Christian Ochsner, Randall Filer, Alexey Makarin, Luigi Guiso and Stefano Gagliarducci for their valuable comments and suggestions. I am grateful to the conference participants at ArmEA 2021, the Young Economists meeting in Brno 2021, and Rare Voices in Economics Conference in Geneva for useful feedback.

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1 Introduction

While in industrialized countries there is an emerging pattern of child gender indifference among parents (Pollard & Morgan, 2002), in some developing countries sons are more desired as they are presumed to bring greater net economic utility, to continue the family line and to serve as a simple 'social security system', among other reasons. Given some of the motives behind having a son preference, it is reasonable to expect that changes in beliefs and socio-economic conditions in developing countries may have an impact on the child gender preferences of parents (see for example Almond et al., 2019; Qian, 2008).

One especially striking phenomenon that leads to alterations of beliefs and socio-economic conditions in developing countries is exposure to armed conflicts and wars (Blattman & Miguel, 2010; Bauer et al., 2016; Callen et al., 2014; Voors et al., 2012). For example, literature documents that conflicts tend to promote more traditional and group-based norms (Henrich et al., 2019; Rohner et al., 2013). While studies find changes in fertility rates in response to natural disasters and wars (Nepal et al., 2018; Rodgers et al., 2005; Saing & Kazianga, 2019), there has been little or no attempt to explore changes in child gender preferences in countries exposed to long-run conflicts. Concurrently, literature examining the factors and reasons affecting child gender preferences looks at one specific channel, e.g. how changes in income opportunities affect the preferences. This creates an open question at the intersection of these two strands of literature: Do changes in beliefs and socio-economic conditions caused by conflicts have an impact on the child gender preferences of parents?

Using data from Nigeria, I explore a novel mechanism behind gender preferences, i.e., the extent to which long-run exposure to violent conflicts affects the child gender preferences of parents and their investment in postnatal health care. The empirical approach in this study exploits the temporal and spatial variations in long-run exposure to violent conflicts in Nigeria during the 1983–2018 period. I combine two datasets to perform the analysis. The data on conflicts comes from the Uppsala Conflict Data Program (UCDP)[1], while the second data set is from the Demographic and Health Surveys (DHS)[2] Program in Nigeria with nationally representative repeated cross-section data. To perform some of the robustness analysis, this study also utilizes data from the Armed Conflict Location and Event Data Project (ACLED)[3].

[1]Retrieved from `https://ucdp.uu.se/downloads/index.html#ged_global`

[2]Retrieved from `https://dhsprogram.com/data/available-datasets.cfm`

[3]Retrieved from `https://acleddata.com/#/dashboard`

In particular, I construct time-varying district-level measures of conflict exposure for Nigerian households. Employing different econometric models, I estimate the effect of long-run exposure to conflict events on stated preferences for boys, actual realisation of gender composition and investment in the postnatal health of children.

Using a district fixed-effects model, I find that long-run exposure to violent conflicts has a differential effect on the stated preferences for boys depending on the type of the conflict and occurrence of civilian deaths. While state-based[4] and non-state[5] conflict events increase the preference for sons, one-sided violence[6] decreases it. In sum the two effects cancel each other out. One of the key differences between the first two and the third types of conflict events lies in the number of casualties among civilians. One possible explanation behind the differential effect could be described by the individual versus societal survival motives. On one hand, long-run exposure to violent conflicts creates fear and uncertainty about the future, which might lead to individual or family survival threats. Conflict events that cause high rates of civilian deaths, on the other hand, not only create fear and uncertainty about the future but also have a direct impact on population numbers. In a country with a high male-to-female ratio, this might give rise to group or societal survival threats and lead to a change in preferences towards girls.

Further, I check whether and how the changed preferences translate into behaviour via three possible mechanisms suggested in the literature: sex-selective abortions, stopping rules, and skewed investments in the postnatal health of children. I find no evidence of translating the skewed preferences into behaviour via sex-selective abortions. Rather, there is evidence of using stopping rules to achieve the desired gender composition of children. More importantly, the findings indicate a positive bias towards boys in terms of postnatal health investment as measured by the probability of receiving a vaccination in districts of Nigeria more exposed to conflict.

This study makes a three-fold contribution to the literature. First, this research explores a novel mechanism to explain child gender preferences in Nigeria, the largest economy in Africa,

[4]"a contested incompatibility that concerns government and/or territory where the use of armed force between two parties, of which at least one is the government of a state, results in at least 25 battle related deaths in a calendar year".

[5]"the use of armed force between two organized armed groups, neither of which is the government of a state, which results in at least 25 battle-related deaths in a year".

[6]"the deliberate use of armed force by the government of a state or by a formally organised group against civilians which results in at least 25 deaths in a year". (The source of definitions in footnotes 4, 5, and 6 is UCDP website: `https://www.pcr.uu.se/research/ucdp/definitions/`)

and this might be a step forward in understanding and unraveling the origins and persistence of gender gaps in developing countries. Second, this paper advances previous research on the consequences of conflicts by identifying one of its social legacies. Third, one of the features of the DHS surveys allows me to analyse the effects of conflicts on attitudinal measures and to check whether and how attitudes translate into behaviour. While gender preferences for children have been examined rigorously in terms of behavioural measures, attitudinal measures have been less systematically analysed. Looking at both attitudinal and behavioural measures contributes to the research on the influence of attitudes on behaviours - a key question for many aspects of economic life.

2 Related Literature and Contribution

My research builds on the current literature in several ways. By studying the effect of conflicts on child gender preferences, this paper contributes to the literature examining the factors and reasons behind the gender differential treatment of children and, thus, the gender gap rooting from there. In this area, Qian (2008) provides evidence for the economic motivation. He shows that an increase in gender-specific income connected to the price of tea affects the survival rates of girls, as well as their educational attainment in China. Carranza (2014) argues that differences in soil texture create differential opportunities for female labor force participation, which explains the relative scarcity of girls in India. Bhalotra et al. (2018) address the question from a different angle and show that granting women inheritance rights in India increases their relative cost and leads to a stronger son preference. Almond et al. (2019) document an increase in the fraction of sons as a result of land reform in rural China. They suggest two mechanisms: the increased income of parents allows them to afford sex selection, and the greater productivity benefit of sons incentivizes parents to have more boys. The old-age-support motive behind son preference is tested by Ebenstein & Leung (2010), who explore the introduction of a voluntary old-age pension program in rural China to show that sons and formal savings are treated as substitutes, and participation in the program reduces sex ratios at birth. Thus, studies examining the reasons behind son preferences provide evidence for the hypothesis that sons are preferred because of the belief that they are able to provide better economic and social security to their parents. At the same time, the literature provides evidence that changes in beliefs and economic conditions may affect preferences. As the above studies mostly refer to the contexts

of China and India, there is a gap in the literature to examine the reasons behind skewed gender preferences in countries exposed to wars and conflicts, which this paper addresses.

The literature on the consequences of conflicts is abundant, but only a small part of it relates to the social legacies of wars (Blattman & Miguel, 2010). The closest study to my research is Nepal et al. (2018), who uses data from Nepal DHS to show how exposure to a violent civil conflict in Nepal affects the quantity and quality of children, measured by fertility and health outcomes, respectively. Their results suggest that women from exposed villages temporarily increase their fertility. Concurrently, the conflict has a negative permanent effect on health (measured by height-for-age) of children due to an increased number of mouths to feed in the households. Further, they show that the negative effect on health is stronger for girls and children of higher order births. This is in line with claims that the effects of conflicts are not gender neutral and supports my hypothesis of skewed investments in children. Using time and geographic variation in the exposure to conflict, studies by Akresh et al. (2012), Minoiu & Shemyakina (2014), Bundervoet et al. (2009) also examine the effects of conflicts on children's health. Mansour & Rees (2012) document the negative effect of conflict on the birth weight of babies. My study delves further and tests whether conflicts have gender differential effects on fertility choices of parents.

A growing literature agrees on the disruptive effects of wars and conflicts on human capital accumulation (Blattman & Miguel, 2010). Shemyakina (2011) finds that exposure to armed conflict in Tajikistan affected the educational attainment of girls more than that of boys in the households. School age daughters from exposed regions were less likely to finish mandatory education. The conflict also negatively affected the enrollment of girls. The mechanism suggested, though not tested, is parents' fear for the safety of daughters on the way to school. This mechanism is supported by Jayachandran (2015), who emphasizes safety and "purity" concerns of parents as an underlying reason for women's and girls' constrained physical mobility. Chamarbagwala & Morán (2011) also study the effect of conflict on human capital accumulation and suggest that conflicts might worsen the gender, regional, sectoral, and ethnic gaps in schooling. The findings of my paper contribute to this strand of literature by providing evidence that conflicts can expand gender gaps, which originate even at the beginning of human life.

Another strand of conflict literature looks at the effects of violent conflicts on collective actions after a war. Bauer et al. (2016) provide a meta analysis of relevant studies and summarize the literature, stating that "evidence suggests that war affects behavior in a range of situations,

real and experimental" (p.217). Further, Henrich et al. (2019) show that war increases religiosity, while Rohner et al. (2013) document that conflict increases the importance of ethnic identity. The results from these studies lend a strong support for the mechanisms behind the effects of conflicts that I test in this study, as those effects should necessarily involve changes in behaviour and beliefs among people affected by conflicts.

3 Mechanisms

To understand the motivation behind this analysis, this chapter discusses some channels through which conflicts can affect or alter preferences. Theories of economics have mainly assumed that people have exogenous preferences. However, recent economic literature, both theoretical and empirical, has weighed in with endogenous preferences (Bernheim et al., 2021). In particular, a substantial amount of literature shows that natural disasters, violence and wars alter people's preferences (Hanaoka et al., 2018; Cassar et al., 2017; Callen et al., 2014; Voors et al., 2012).

Parents' preferences for children of a particular gender are formed from the gains they receive from their children. Factors affecting the utility of parents can be generalised into two groups: economic and cultural. There is substantial evidence in the literature showing that conflicts affect both these aspects. Firstly, conflicts and wars have a disruptive effect on the economy (Abadie & Gardeazabal, 2003) and create risk and uncertainty about the future (Bozzoli & Müller, 2011). Secondly, research has shown that exposure to conflicts increases the importance of ethnic identity (Rohner et al., 2013) and religiosity (Henrich et al., 2019). As suggested by the literature on child gender preferences, this might lead to the creation of, or exacerbation of an existing, son preference in a country with patriarchal values, such as Nigeria.

Another potential mechanism that might drive a shift in child gender preferences is safety and "purity" concerns for daughters (Jayachandran, 2015). Burde & Linden (2013), for example, evaluate the effects of building new schools in Afghan villages and show that girls' enrollment is affected more by the possibility of having a school inside their own village. The distance reduction closes the otherwise-large gender gap in the enrollment. During wartime, such concerns are likely to rise even further: sexual violence both by civilians and fighting groups is a common threat in times of conflicts (Annan et al., 2009). Therefore, exposure to conflicts may increase these concerns further and lead to an increase in son preference. All the

above mechanisms relate to individual or family survival concerns.

Finally, the last mechanism is connected to the notion of societal survival. Conflict events that cause high rates of civilian deaths not only create fear and uncertainty about the future but also have a direct impact on population numbers, thus giving rise to group or societal survival threats. If that is the case, then the effect of conflict might become ambiguous: on one hand men are needed for protection, but on the other hand women are needed for reproductive purposes. This study contributes to the literature by providing evidence that one-sided violence (violence targeted at civilians) decreases preference for boys, motivating one possible explanation (societal survival threat) for differential effects of different conflict types.

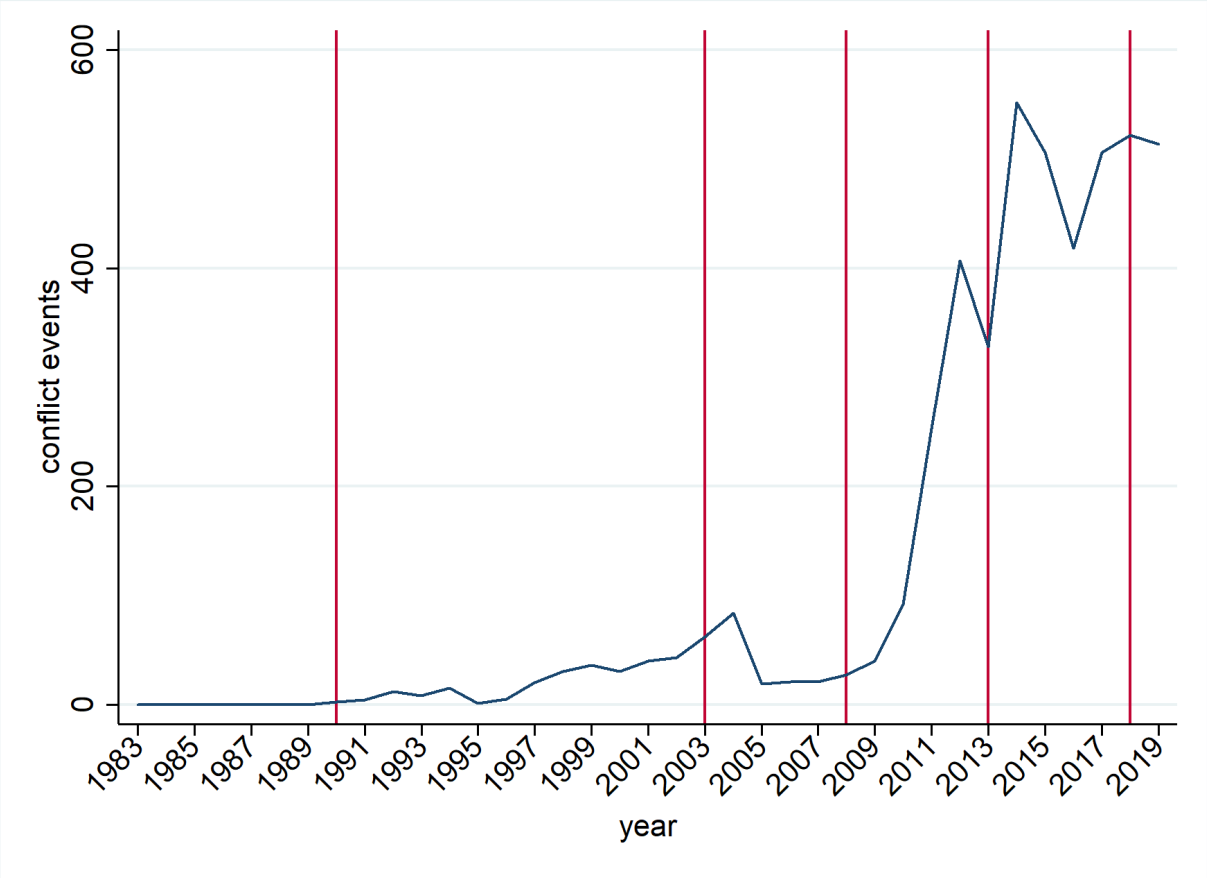
4 The Setting and Identification

This research tests whether the long-run exposure to violent conflicts affects child gender preferences. An underlying potential mechanism is that the constant and long-run exposure creates fear and uncertainty about the future and affects the development of beliefs under which the preferences might form or change. Over the past decade and a half, Nigerians have been exposed to violence through numerous ethnic and religious group tensions, organized insurgencies, and government repression of different magnitudes and intensities occurring across the country. Importantly for my analysis, conflict events in Nigeria are highly regionalized and different areas are affected by various types of violent events, as the underlying determinants of the conflicts are also different. Complemented with Nigeria being the most populous country in Sub-Saharan Africa, all these complexities make the country a good candidate on which to test my research question.

Conflict regions in Nigeria can be geographically divided into 4 parts based on the type of conflict events occurring there (Abidoye & Calì, 2021). The first area is the middle belt, where a core reason for the violence is unequal access to land (clashes between farmers and pastoralists). Violent events in the northeastern parts of the country started as clashes between Muslims and Christians and continued in large part due to the activities of the Islamic militant group Boko Haram. The Niger Delta is well known for militants competing for the control of oil production centers. Finally, violence in urban areas is mostly due to political demonstrations.

Figure 1 illustrates the annual evolution of all conflict events and the rounds of DHS surveys conducted in Nigeria for the period of 1983-2019.

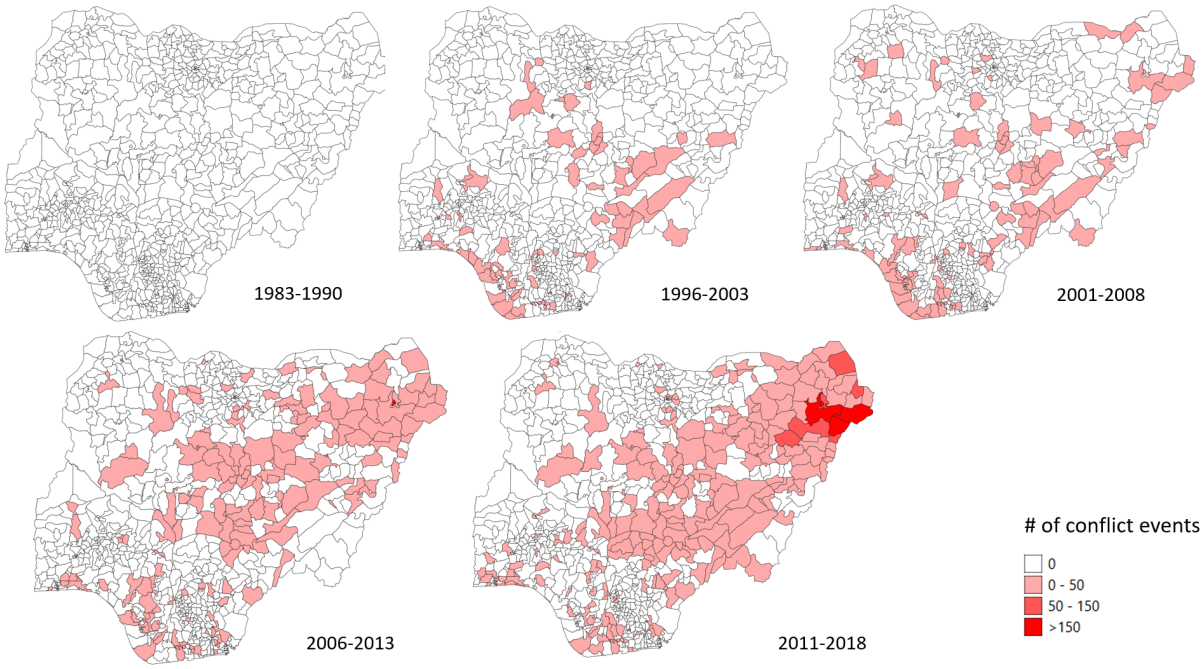
Figure 1: Conflict Events and DHS Rounds in Nigeria



Note: Red lines stand for the rounds of Demographic and Health Surveys conducted in Nigeria.
Source: Author's calculations based on data from the Uppsala Conflict Data Program (UCDP) and Demographic and Health Surveys in Nigeria

The DHS rounds divide the period under interest into 5 intervals with respondents who were subject to different levels of conflict exposure not only across different regions, but also over time. On average, there are seven-year gaps between the survey rounds, and in the analysis below I use this as the baseline number of years to define the main measures of conflict exposure. Thus, the identification of the exposure in this study relies on the changes in the number of conflict events in the seven-year period preceding each round of DHS interview. Additionally, I use a second source of variation in the exposure to conflict - spatial variation. To see the evolution of the spatial variation in the conflict events, I map the cumulative number of events for seven years preceding each round of DHS interview in Figure 2 below.

Figure 2: Evolution of Spatial Variation in Cumulative Number of Events in Nigeria



Source: Author's calculations based on data from the Uppsala Conflict Data Program

In contrast to many studies that concentrate on one specific conflict, my research first looks at all conflict events occurring in Nigeria in the 1983-2018 period and then dissagregates them to examine separate effects, while still controlling for other types. The first rationale behind this is that examining only one conflict episode might not capture the mechanism of fear and uncertainty about the future if the conflict is resolved. Second, ignoring other conflict events occurring simultaneously might result in biased estimates.

In this study, an individual's long-run exposure to conflict is identified by the cumulative number of events in the district of residence during the seven-year period preceding each round of interview date. Thus, the key assumption for the identification is that the evolution of the preferences in conflict-exposed districts would be the same as in non-exposed districts in the absence of conflict events. Verifying this assumption is challenging due to lack of data on households before the conflict events started to escalate. One way of checking the validity is to compare the average characteristics of conflict and non-conflict districts before the conflict events started to escalate. To do this, I compare the average HH characteristics of conflict-exposed districts with the non-exposed ones using DHS survey data from the rounds before which the number of conflict events in Nigeria was relatively low; in particular I use 1990 and 2003 rounds. Since there are already some violent events occurring before 2003, I restrict the

sample to include only the districts with 0 events before 2003. Table 1 of the Appendix shows the averages of the preferences and some demographic characteristics as well as the results of the mean difference tests. As indicated in the table, the conflict-exposed districts are not significantly different from non-exposed ones.

5 Data and Key Variables

5.1 Data

For the main analysis, I combine two sources of data: the Uppsala Conflict Data Program (UCDP) and Nigeria Demographic and Health Surveys (NDHS).

UCDP started collecting data on conflicts from the mid-1980s and is now the main conflict data provider. It provides panel data on worldwide conflicts covering the 1989-2018 period, where the unit of observation is an event defined as "the incidence of the use of armed force by an organized actor against another organized actor, or against civilians, resulting in at least 1 direct death in either the best, low or high estimate categories at a specific location and for a specific temporal duration" (Sundberg & Melander, 2013, p. 524). The data collection is conducted in multiple stages. First, "intelligent indexing" is used to search for all articles within specified parameters. Then the collected reports are evaluated by human coders. Second, UCDP also consults reports and data from non-governmental organizations and international organizations (such as the UN), case studies, truth commission reports, historical archives and other sources of information. The third stage is source evaluation: both the independence and transparency of the origins are examined. However, this source of conflict data is likely to provide only the lower bound of the estimates due to the lack of complete information in conflict zones.

UCDP categorizes conflict events into three mutually exclusive groups: (1) state-based armed conflict; (2) non-state conflict; and (3) one-sided violence. The dataset contains information on spatial and temporal locators within Nigeria, such as place name, administrative division, and geographic coordinates, as well as start and end dates, to allow for fine grained spatial and temporal analysis. It also provides estimates of death from each side of the conflict, as well as civilians and unknowns. This allows me to construct several measures of the long-run exposure to violent conflicts using two aspects: (1) cumulative number of all conflict events in a particular location; (2) cumulative number of events by type in a particular location; and (3) cumulative number of events with and without civilian death in a particular location.

The Demographic and Health Surveys (DHS) Program collects representative individual and household-level data on population, health, HIV, and nutrition in more than 90 developing countries. I use information from a nationally representative sample of ever-married women in the reproductive age groups of 15-49 from Nigeria, and match the sample to household characteristics from the household surveys.

To match the armed conflict events with individual and household responses of NDHS datasets, I use the geocoded GPS data routinely collected by the program. There are five rounds of surveys conducted in Nigeria (1990, 2003, 2008, 2013, and 2018).

The DHS surveys aim to produce national, urban-rural, and provincial-level representative data (each as a separate domain). The surveys undertake a two-stage, stratified, random sample design. The first stage involves creating sampling strata by dividing each administrative region into urban and rural areas, and selecting sample points (clusters) with the probability-proportional-to-size approach. The second stage implies the systematic random sampling of households.

As mentioned, NDHS provides repeated cross-sectional data. Therefore, to construct a panel, I match the data from different waves of surveys based on the 2nd administrative division level of Nigeria. I then aggregate the event-level conflict data to the 2nd administrative division level and match with the panel of women respondents.

5.2 Key Variables

Taking into account the average years of gaps between DHS rounds of surveys and to be able to capture an individual's long-run exposure to conflict, I construct the main measures of long-run exposure to conflicts as follows:

- cumulative number of all conflict events that occurred in a district seven[7] years preceding the interview;
- cumulative number of violence against civilians that occurred in a district seven years preceding the interview;
- cumulative number of other conflict events, which include state-based and non-state events, that occurred in a district seven years preceding the interview.

[7]The results are robust to varying this number to six and eight years and can be provided upon request.

These aggregated measures will capture the awareness of being under a threat even if not necessarily being an active participant. However, it is important to mention that the exposure to violence against civilians, as discussed above, might have direct implications for population numbers and create fear about societal survival.

The rationale behind separating the conflict events into two types lies in the fact that these types are characterized with different patterns of conflict-related death. While violence against civilians is characterized by a high level of casualties among civilians, other conflict events (state-based and non-state) are mostly characterized by no civilian deaths and a high level of deaths among the armed forces (see Figure 1 of the Appendix). As described in the mechanisms section, the literature does not provide evidence of how the deaths of civilians (loss of one's own children and overall threat to survival) might affect preferences for the gender of children. However, economic uncertainty and risk regarding the future (individual or family survival threat) brought by state-based and non-state conflict events mostly have a positive effect on the preference for sons based on the mechanisms described above. The UCDP definitions[8] for each type of conflict is as follows:

1. *state-based conflict* - "a contested incompatibility that concerns government and/or territory where the use of armed force between two parties, of which at least one is the government of a state, results in at least 25 battle related deaths in a calendar year."

2. *non-state conflict* - "the use of armed force between two organized armed groups, neither of which is the government of a state, which results in at least 25 battle-related deaths in a year."

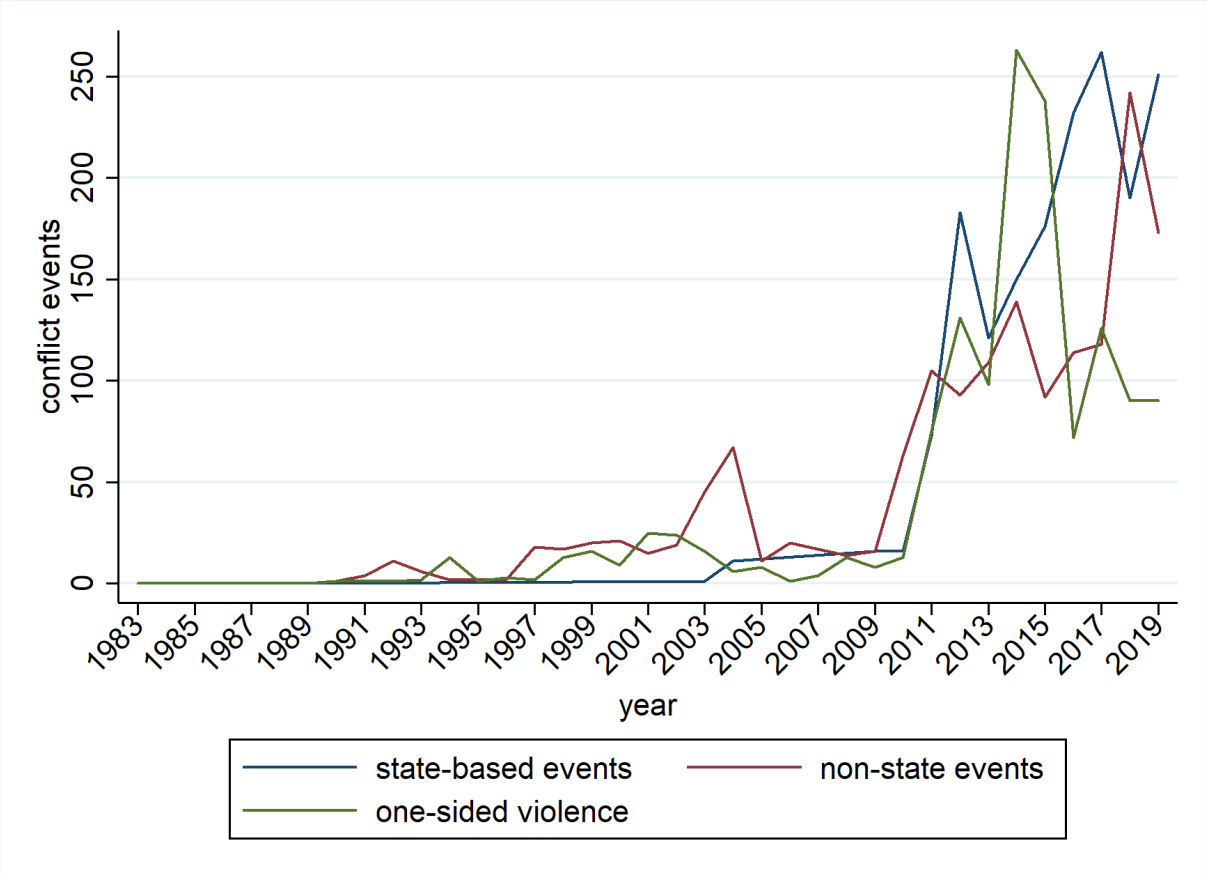
3. *one-sided violence* - "the deliberate use of armed force by the government of a state or by a formally organised group against civilians which results in at least 25 deaths in a year."

The evolution of conflict events by each of the types is presented in Figure 3 below.
I use four types of outcome variables in my analysis. The first type includes an attitudinal measure, which uses information on stated preferences regarding the desired number of sons and daughters. This measure is constructed as the ratio of the desired number of sons to the desired number of children multiplied by 100. I refer to this variable as $desired\ share\ of\ sons$ throughout the text. Then, to test whether the preferences translate into behaviour, I use the information on the actual children born to each woman. The actual share of sons in families

[8]Source: UCDP `https://www.pcr.uu.se/research/ucdp/definitions/`

tests whether sex-selective abortions are implemented and/or the differential survival rate is present. The third type of variables are used to test the stopping rule behaviour and include the stated desire of women to have another child, the gender of the last-born child, and the number of siblings for a child in each family. Finally, I use the probability of obtaining a vaccination as a measure of postnatal health investment.

Figure 3: Evolution of Conflict Events by Types in Nigeria



Source: Author's calculations based on data from the Uppsala Conflict Data Program

6 Empirical Strategy and Results

6.1 Empirical Strategy

I use district fixed-effects models for my analysis. To estimate the effect of conflict exposure on the stated preferences and actual share of sons in the family, I construct the following model:

$$y_{idt} = \lambda_d + \eta_t + \delta exposure_{dt} + X\gamma + \epsilon_{idt}$$

in which y_{idt} is either the desired or actual share of sons for mother i in district d at time t; $exposure$ is one (or in some specifications several) of the measures of long-run conflict exposure; λ_d is a district fixed effect and η_t is time fixed effect; X is a vector of control variables, which includes respondent's age, household's wealth index, respondent's education level, husband's education level, religion, settlement type (urban/rural) and actual total number of sons and daughters.

Whether preferences translate into behaviour is a separate question that this research addresses. In the first described model, I use the actual share of sons. This measure can either reflect the presence of sex-selective abortions or gender differential survival rates. Additionally, literature suggests that the translation of son-favoring preferences into behaviour can be alternatively implemented via stopping rules. This rule implies that if there is a preference for a certain gender composition of children, families continue having children until the desired number of the preferred gender is attained. Stopping rules may potentially have several implications, which are used to detect the existence of son preference in the empirical literature. The first implication is that families with the most recent born child being female should be more likely to want another child than those with a recent male birth. Second, families are more likely to stop having children after a boy, which results in a higher probability of the last born child being a male in completed families[9]. The third implication of the stopping rule is that girls are more likely to be born in larger families compared to boys (Clark, 2000). This has a sibling effect, which means that in son-favoring families girls typically have a higher number of siblings than boys. This implication is easy to understand in a hypothetical example. Assume that all families in a society with a strong son-preference want to have one son. If the first child is a boy, according to the stopping rule, the family will stop having children. Therefore, this child has no siblings. If the first child is a girl, then the family will continue having children until they have a boy. This will result in girls having, on average, more siblings than boys in this particular society.

To test whether the stated preferences translate into behaviour implemented via the stopping rule, I construct and estimate the following model:

$$y_{ict} = \lambda_d + \eta_t + \delta_1 exposure_{dt} + \delta_2 last\ born\ girl_{idt} + \beta_1 [last\ born\ girl_{idt} \times exposure_{dt}] + X\gamma + \epsilon_{idt}$$

in which y_{idt} is either a binary variable expressing the willingness of mother i to have another child interviewed in year t in district d, or the number of siblings of the most recent born child;

[9] I define completed families as families that stopped having children.

$last\ born\ girl_{idt}$ is 1 if the most recent child born to mother i in district d interviewed at year t is a girl; and vector X includes respondent's age, household's wealth index, respondent's education level, husband's education level, religion, settlement type (urban/rural), total number of children and an indicator whether the respondent currently works or not. To test whether the probability of the last born child being a male in completed families is higher in conflict-affected districts, I estimate a model similar to the first one, using the sample of completed families:

$$y_{idt} = \lambda_d + \eta_t + \delta exposure_{dt} + X\gamma + \epsilon_{idt} \quad i \in completed\ families$$

in which y_{idt} is an indicator of the last born child to be a boy.

Another, more important, way gender preferences might translate into behaviour is parents' investment in their children. To test whether and how conflict-driven increased son preference translates into investment behaviour, I examine the vaccination patterns received by children of different gender and the level of conflict exposure. I construct and estimate the following model:

$$y_{idt} = \lambda_d + \eta_t + \delta_1 exposure_{dt} + \delta_2 boy_{idt} + \beta_1[exposure \times boy_{idt}] + X\gamma + \epsilon_{idt}$$

in which y_{ict} is an indicator that the child received one of the following vaccinations: polio, measles, and BCG (tuberculosis); boy is an indicator whether the child is a boy; and the remaining variables are similar to previous specifications. Polio vaccination is recommended to be given to children in four doses: at the age of 2, 4, 6 through 18 months; and 4 through 6 years old. The DHS survey records all the doses, and thus in my analysis I have polio 0, polio 1, polio 2 and polio 3 variables indicating the administration of each of the four doses, respectively.

6.2 Results

Table 1 below presents the results for the desired share of sons. The first two specifications use the total number of all events that occurred in a district seven years preceding each round of DHS survey in Nigeria. The third and fourth columns further disaggregate conflict events into two types: violence against civilians and other conflict events.

Table 1: Estimation Results for Desired Share of Sons

	Desired share	Desired share	Desired share	Desired share
# events	-0.000154	-0.000513		
	(0.00219)	(0.00219)		
# other conflict events			0.0347***	0.0372***
			(0.0133)	(0.0132)
# violence against civilians			-0.0408***	-0.0446***
			(0.0146)	(0.0145)
controls	No	Yes	No	Yes
District FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Observations	118718	118411	118718	118411
Districts	680	680	680	680

Note: In all specifications, the outcome variable is the desired share of sons, constructed as the number of desired sons divided by the number of desired children multiplied by 100. The main explanatory variable in the first two columns is the total number of all conflict events seven years preceding each round of NDHS interview. In the last two columns, the main explanatory variables are the number of violent events against civilians and other conflict events, which include state-based and non-state events. The list of controls includes age, wealth, education level, husband's education level, religion, and the type of settlement (urban/rural). Standard errors are clustered at the district level. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

The results show that the average effect of all the conflict events on the desired share of sons is 0. However, once I examine types of conflicts separately, I find that while the other types of conflict events increase the share of desired sons, violence against civilians has the opposite effect. Interestingly, the magnitudes of these effects are comparable and cancel each other out when examining all conflict events as one treatment variable.

To explain these differential effects in the results, I look at one of the key differences be-

tween these types of conflict events. In particular, while one-sided violence (violence against civilians) is characterized by high level of civilian death, other conflict events (state-based and non-state conflict) involve fewer casualties among civilians (see Figure 1 in the Appendix). Therefore, to verify that the negative effect of violence against civilians is connected to the occurrence of civilian death, I further decompose all conflict events into two types - events with civilian death and without - and I estimate a district fixed-effects model with these variables. The results are presented in Table 2 and are consistent with those from Table 1. In particular, conflict events with no civilian deaths have a significant positive effect on preferences, while events with civilian deaths have a significant negative effect on preferences.

Thus, the significant negative effect of violence against civilians is explained by the high number of civilian deaths associated with these events. The conclusion that can be drawn from these results is that exposure to conflicts has a differential effect on stated preferences based on their type and the occurrence of civilian deaths. One of the explanations for these results might lie in individual versus societal survival threats. Other conflict events (state-based and non-state conflict) are conflicts between states, between a state and an armed group, or between two armed groups, which, from civilians' point of view, cause distortions in the economy, and fear and uncertainty about future individual or family survival. As discussed in the mechanisms section, all of these can affect preferences for sons in a positive direction. There can be several potential mechanisms here, which require further analysis to be identified, but, importantly, all of them work in the same direction. On the other hand, violence against civilians (or one-sided violence) is directly targeted at civilians and involves a much larger number of civilian deaths, causing societal or group survival threats, especially in an ethnically divided society such as Nigeria. Therefore, the concerns and need for reproduction becomes a stronger factor in this case and leads to a negative effect on the preference for sons.

Table 2: Estimation Results According to Occurrence of Civilian Deaths

	desired share of sons
# events with no civilian deaths	0.0276*
	(0.0158)
# events with civilian deaths	-0.0362*
	(0.0190)
Controls	Yes
District FE	Yes
Year FE	Yes
Observations	118411
Districts	680

Note: The outcome variable is the desired share of sons, constructed as the number of desired sons divided by the number of desired children multiplied by 100. The main explanatory variables are the number of all conflict events seven years preceding each round of NDHS interview with no occurrence of civilian death and with occurrence of civilian death. The list of controls includes age, wealth, education level, husband's education level, religion, and the type of settlement (urban/rural). Standard errors are clustered at the district level.

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

The next step in the analysis is to test whether these preferences translate into behaviour expressed via sex-selective abortions. For this, I perform a similar analysis using the actual share of sons in families as the outcome variable. Table 3 displays the results from these regressions.

Table 3: Estimation Results for Actual Share of Sons

	full sample actual share	completed families actual share	full sample actual share	full sample actual share
# events	0.00199	0.0137		
	(0.00598)	(0.0153)		
# of other conflict events			-0.0422	0.0828
			(0.0483)	(0.0608)
# violence against civilians			0.0540	-0.0685
			(0.0515)	(0.0729)
controls	Yes	Yes	Yes	Yes
District FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Observations	87720	24030	87720	24030
Districts	680	680	680	680

Note: In all specifications, the dependent variable is the actual share of sons, constructed as the number of living boys divided by the number of living children multiplied by 100. The main explanatory variable in the first two columns is the total number of all conflict events seven years preceding each round of NDHS interview. In the last two columns, the main explanatory variables are the number of violent events against civilians and other conflict events, which include state-based and non-state events. The list of controls includes age, wealth, education level, husband's education level, religion, and settlement type (urban/rural). The sample of completed families includes women who stated that they do not want to have any more children. Standard errors are clustered at the district level.

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

The first two columns use all conflict events and the last two columns use disaggregated events. The first and third columns of the table use the full sample. Coefficient estimates are insignificant, suggesting that the preferences do not translate into behaviour using sex-selective abortions and/or there is no gender differential survival rate among children. In the second and fourth columns, I restrict the sample to completed families, i.e. respondents who stated that

they do not want to have any more children. Had families used sex-selective abortions, the consequences of these (e.g. higher share of sons) would have been more visible in completed families rather than in the full sample. However, the results display no evidence of that with the restricted sample as well.

As an additional check, in Table 2 in the Appendix, I also restrict the sample to completed families with a recent newborn, i.e. respondents whose most recent child was born at most two years prior to each round of the DHS interview. The rationale behind this is connected to the measure of conflict exposure. Since the measure is defined as the cumulative number of events seven years preceding each round of survey, families who stopped having children, for instance five years ago, might not be affected by this measure. The results of these estimations are similar to those obtained using the full sample. These findings imply that while exposure to conflict affects women's stated preferences, it might not necessarily translate into actually having more sons than daughters. One possible reason for this could be the fact that sex-selective abortions are prohibited in Nigeria.

Table 4 presents the results for the stopping rule behaviour. The first column uses the full sample and tests whether women from districts affected by conflicts and whose most recent born child is a female have higher probability to want another child. The coefficient estimate of the interaction term of conflict events with the indicator of last born child being a girl is positive and significant, suggesting evidence for exacerbation of the stopping rule in areas more exposed to conflicts. Column two uses interactions with dissagregated conflict types and, in line with Table 1, the interaction term with violence against civilians is negative, while positive with other conflicts. The third and fourth columns show the probability of stopping after a boy. Here the analysis does not produce strong significant results. The last two columns examine the number of siblings a child has in a family. Column 5 uses the full sample and displays that girls from districts more affected by conflict have more siblings than boys. Column 6 displays the interaction with the dissagregated conflict types and the results are in line with Table 1. Overall, this table suggests that the stopping rule is being practiced in Nigerian families, and long-run exposure to conflicts further strengthens this practice.

Table 5 presents the results of the effects of conflict exposure on the probability of receiving a certain type of vaccination by gender. In the case of vaccinations, I observe that the effect of the conflict is not conditional on its type. Using the specification with all conflict events produces a significant positive coefficient estimate on the interaction term of all conflict events

Table 4: Estimation Results for the Stopping Rule

	(full sample) want more	(full sample) want more	(completed families) last birth boy	(full sample) last birth boy	(full sample) siblings	(completed families) siblings
last birth girl × # events	0.000161*				0.00629*	
	(0.0000881)				(0.00364)	
# events	0.00212**		-0.000488		-0.00906	
	(0.000825)		(0.000318)		(0.00611)	
last birth girl	0.0546***	0.0561***			0.00681	0.00756
	(0.00377)	(0.00379)			(0.0116	(0.0116)
last birth girl × # other events		0.00182**				0.00724**
		(0.000920)				(0.00364)
# other events		-0.00177**		0.00129		-0.0105*
		(0.000893)		(0.00135)		(0.00618)
last birth girl × # violence against civilians		-0.00178**				-0.00213***
		(0.000795)				(0.000696)
# violence against civilians		0.00277***		-0.00269*		0.00399***
		(0.000818)		(0.00157)		(0.00106)
controls	Yes	Yes	Yes	Yes	Yes	Yes
District FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	71450	71450	14909	14909	81829	81829
Districts	680	680	663	663	680	680

Note: In the first and second columns, the dependent variable is the desire to have another child. In the third and fourth columns, the dependent variable is the gender of the last born child, and in the last two columns, the dependent variable is the number of siblings. The main explanatory variables are the interaction of the indicator for last born girl and the number of total events or number of violent events against civilians and other events, and the number of total events or violence against civilians and other events. In all specifications, the list of controls includes age, wealth, education level, husband's education level, religion, and type of settlement (urban/rural). The sample of completed families includes women who stated that they do not want to have any more children. Standard errors are clustered at the district level. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

and an indicator for a child being a boy. This implies that in districts more exposed to all types of conflict, parents invest more in the health of their boys. These results suggest that, despite the difference in the effects of different types of conflict on preferences before birth, once the child is born, the conflict induces parents to invest more in the health of their boys. This is in line with the findings that, in son favoring societies, parents invest more in the health of their male offspring (Jayachandran & Kuziemko, 2011; Jayachandran & Pande, 2017; Barcellos et al., 2014). To check the robustness of these results, I repeat the analysis of Table 5 using the data from the Armed Conflict Location and Event Data Project (ACLED). The results are presented in Table 3 in the Appendix and are comparable to Table 5.

Table 5: Estimation Results for Postnatal Health Investment

	(1)	(2)	(3)	(4)	(5)	(6)
	polio 0	polio 1	polio 2	polio 3	measles	BCG (TB)
# events × boy child	0.000482***	0.000674***	0.000726***	0.000529***	0.000553***	0.000238
	(0.000120)	(0.000261)	(0.000217)	(0.000164)	(0.000122)	(0.000193)
# events	0.00191	-0.00310	-0.00217	-0.00466**	-0.000396	0.00133
	(0.00205)	(0.00206)	(0.00229)	(0.00210)	(0.00103)	(0.00170)
boy child	-0.00252	-0.00412	-0.00514	-0.00340	-0.000238	-0.00244
	(0.00285)	(0.00314)	(0.00331)	(0.00357)	(0.00321)	(0.00281)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
District FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	74128	80710	79835	79827	80262	81671
Districts	675	675	675	675	675	675

Note: The dependent variables are indicators whether the child received polio 0-3, measles and BCG (tuberculosis) vaccination. The main independent variable is the interaction term of the number of events with the indicator of child being a boy. In all specifications, the list of controls includes age, wealth, education level, husband's education level, religion, and type of settlement (urban/rural). Standard errors are clustered at the district level. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Overall, the results underline the importance of studying both the behavioural and attitudinal measures of gender preferences. This is because behavioural measures, such as sex ratios, shares of sons, and the measures used to detect the stopping rule, may sometimes fail to reveal any significant change in behaviour, even though there is a change.

7 Robustness

7.1 Respondents with no children

A valid concern for using stated preferences for children is that mothers might be biased towards their realised gender composition, i.e. their stated preferences might be largely affected by the gender of the actual children that they have. To address this concern in the baseline specification I directly control for the actual number of sons and daughters. In addition, in the robustness checks I restrict the sample to the respondents with no children. These are women in reproductive age who still have not had children and their preferences could not have been affected by the gender composition of their actual children. The results are presented in column 2 of Table 4 in the Appendix. I observe a significant positive effect of other types of conflict and a significant negative effect of violence against civilians on the desired share of sons even with the restricted sample. Furthermore, similar to the full sample, here as well the average effect of all the conflict types is 0.

7.2 Addressing migration concerns

Another concern to address is the migration behaviour of parents. If people with less conservative views are also those who migrate to non-conflict areas, then this might bias the results. The DHS data allows me to test this concern. One of the questions posed to the respondents is how long they reside in the current place of residence. Exploiting this question, I restrict the sample to women who stated that they have always been living in the current place of residence. The results are shown in the 3rd column of Table 4 in the Appendix. The coefficients are more significant and larger in magnitude than in the baseline specification, implying that the effect of conflicts is stronger for the stayers.

7.3 Total number of desired children

I define the desired share of sons as the ratio of desired sons to desired children. This ratio might increase either due to an increase in the desired number of sons or a decrease in the desired number of children. To ensure that the results I obtain are not driven by the fact that respondents in conflict areas state that they want fewer children of both gender, I repeat the analysis using the number of desired and actual children. The results are presented in Table 5 in the Appendix and indicate that neither the total number of all events nor the number of disaggregated events has any significant effect on the desired number of children. However, the total number of actual children in the families that stopped having children is positively affected by the total number all conflict events. Column 4 of Table 5 shows that this effect is mostly driven by violence against civilians. This further supports the explanation of the societal survival threat connected with violence against civilians.

8 Conclusion

Exploiting temporal and spatial variations in conflicts in Nigeria, this study establishes skewed gender preferences as another long-lasting legacy of armed conflicts. I combine two sources of data to perform the analysis: the Uppsala Conflict Data Program and the Demographic and Health Surveys Program. The results show that long-run exposure to violent conflicts has a differential effect on stated preferences (attitudes) for boys depending on the type of the conflict and occurrence of civilian deaths. The explanation for these results might lie in individual (or family) versus group (societal) survival threats. I find no evidence of translating these preferences into behaviour via sex-selective abortions or evidence of gender differential survival rate. Instead, evidence shows that parents use the stopping rule to achieve their desired gender composition of children. Further, my analysis also indicates that, in the districts affected by conflict, parents have a positive bias towards boys in terms of their postnatal health investment.

The study contributes to the literature on skewed gender preferences by simultaneously looking at both attitudinal and behavioural measures of gender preferences and testing whether and how the preferences translate into behaviour. It emphasises the importance of differentiating the impact of conflicts by their types. Finally, the results also contribute to the literature on the origins of gender gaps by revealing another mechanism that leads to skewed investment in

the health of children in early childhood, raising questions about gender gaps in future human capital development.

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Appendix

Table 1: Mean Difference Test for Conflict Exposed and Non-exposed Districts

	non-exposed districts	conflict exposed districts	b
average ideal_ratio	51.90894	51.82097	.0879679
average of sons	1.231996	1.2732	-.0412038
average of daughters	1.219347	1.172902	.0464456
share no religion	.012161	.0051814	.0069796
share muslim	.442744	.4752755	-.0325315
share christian	.5287261	.4928153	.0359108
share other	.0163689	.0267279	-.010359
share poorest	.2188467	.1711315	.0477152
share poorer	.2003887	.183689	.0166997
share middle	.1862998	.1654123	.0208875
share richer	.1938507	.224476	-.0306253
share richest	.200614	.2552911	-.0546771
share no education	.4369059	.4494642	-.0125584
share primary education	.2370565	.2318725	.0051841
share secondary education	.2811597	.2642732	.0168866
share higher education	.0448779	.0543901	-.0095123
share Ekoi	.0020745	0	.0020745
share Fulani	.0357885	.0689157	-.0331272*
share Hausa	.2413576	.1723237	.069034
share Ibibio	.0100247	.0099451	.0000796
share Igala	.009579	.0311176	-.0215386
share Igbo	.2252784	.1433707	.0819077*
share Ijaw/Izon	.010234	.0097309	.0005031
share Kanuri/Beriberi	.0125692	.048428	-.0358588**
share Tiv	.0160862	.028652	-.0125658
share Yoruba	.2176256	.1246244	.0930012**
share Other	.2193822	.3628919	-.1435097***
Observations	428		

Table 2: Effect of Conflicts on Actual Share of Sons for Families with Recent Newborn

	(1)	(2)
	actual share of sons	actual share of sons
# events	0.0400	
	(0.0269)	
# other conflict events		0.0426
		(0.113)
# violence against civilians		0.0371
		(0.143)
controls	Yes	Yes
District FE	Yes	Yes
Year FE	Yes	Yes
Observations	6979	6979
Districts	652	652

Note: In both specifications, the dependent variable is the actual share of sons, constructed as the number of living boys divided by the number of living children multiplied by 100. The main explanatory variable in the first column is the total number of all conflict events seven years preceding each round of NDHS interview. In column 2, the main explanatory variables are the number of violent events against civilians and other conflict events, which include state-based and non-state events. The list of controls includes age, wealth, education level, husband's education level, religion, and settlement type (urban/rural). The analyses are performed with the sample of completed families, whose most recent birth was at most two years before each round of NDHS interview. Standard errors are clustered at the district level. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 3: Effect of Conflicts on Investment Behaviour Using Data from ACLED

	(1)	(2)	(3)	(4)	(5)	(6)
	polio 0	polio 1	polio 2	polio 3	measles	BCG (TB)
# events × Boy child	0.000161	0.000505***	0.000563***	0.000379**	0.000740***	0.000362**
	(0.000136)	(0.000128)	(0.000160)	(0.000184)	(0.000179)	(0.000149)
# events	0.000442**	-0.000303	-0.000132	-0.000143	-0.000351*	-0.000363
	(0.000214)	(0.000258)	(0.000265)	(0.000219)	(0.000210)	(0.000280)
Boy child	-0.00208	-0.00453	-0.00565*	-0.00369	-0.00165	-0.00315
	(0.00291)	(0.00312)	(0.00331)	(0.00357)	(0.00320)	(0.00278)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
District FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	74128	80710	79835	79827	80262	81671
Districts	675	675	675	675	675	675

Note: The dependent variables are indicators whether the child received polio 0-3, measles and BCG (tuberculosis) vaccinations. The main independent variable is the interaction term of the number of events with the indicator of child being a boy. In all specifications, the list of controls includes age, wealth, education level, husband's education level, religion, and type of settlement (urban/rural). Standard errors are clustered at the district level. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 4: Robustness Check: 0 Children and Never Moved Samples

	(full sample) desired share	(0 children) desired share	(never moved) desired share
# other conflict events	0.0372***	0.0350**	0.0628***
	(0.0132)	(0.0169)	(0.0198)
# violence against civilians	-0.0446***	-0.0315*	-0.0747***
	(0.0145)	(0.0186)	(0.0216)
total sons alive	0.546***		0.470***
	(0.0291)		(0.0404)
total daughters alive	-0.681***		-0.482***
	(0.0346)		(0.0447)
Controls	Yes	Yes	Yes
District FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
Observations	118411	39082	42278
Districts	680	680	677

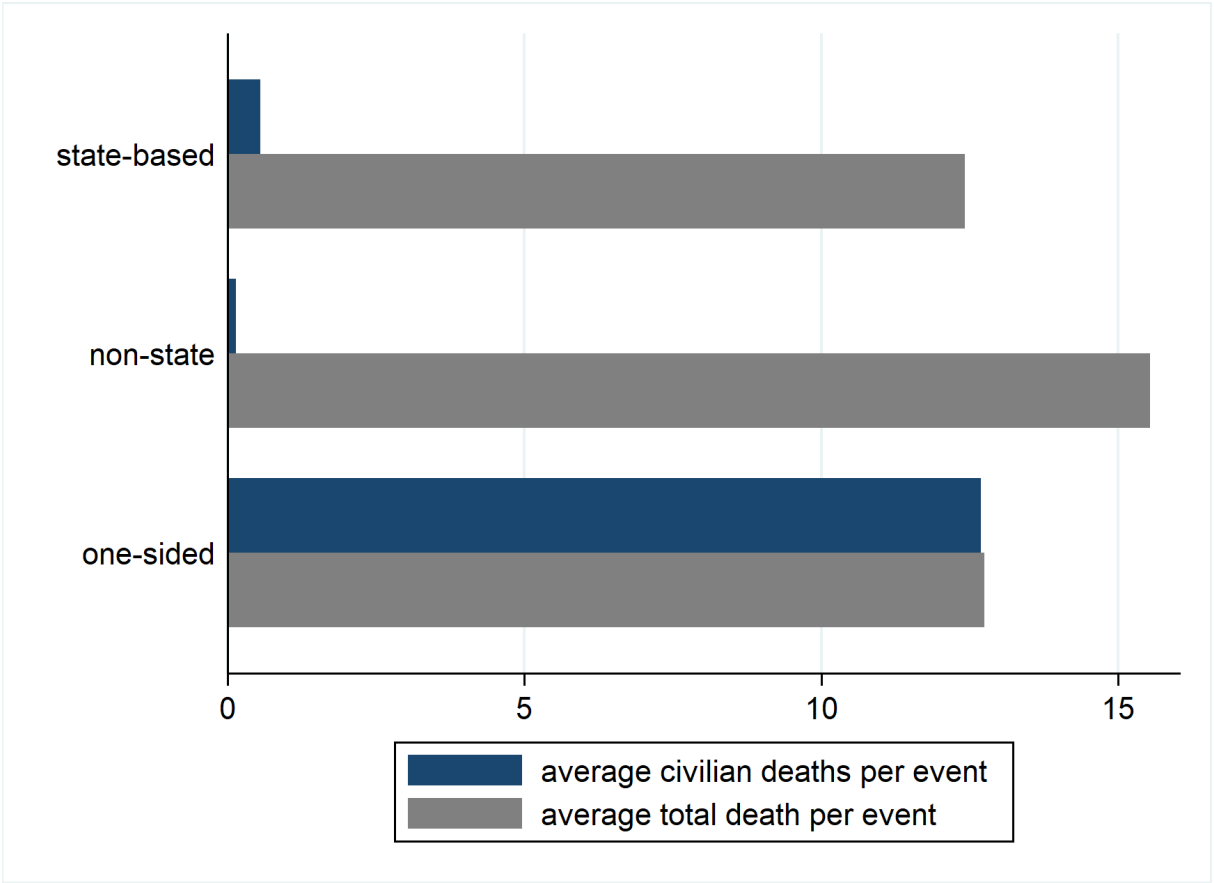
Note: In all specifications, the outcome variable is the desired share of sons, constructed as the number of desired sons divided by the number of desired children multiplied by 100. The main explanatory variables are the number of violent events against civilians and other conflict events, which include state-based and non-state events. The first column uses the full sample, the second column uses the sample of women with no children, and the third column includes the sample of respondents who stated that they have always lived in the current place of residence. The list of controls includes age, wealth, education level, husband's education level, religion, and the type of settlement (urban/rural). Standard errors are clustered at the district level. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 5: Effect of Conflicts on Total Number of Children - Desired and Actual

	(full sample)	(full sample)	(completed families)	(completed families)
	desired # of total children	desired # of total children	total children alive	total children alive
# events	0.000470		0.00363***	
	(0.00259)		(0.000800)	
# other conflict events		-0.0153		-0.00471
		(0.0165)		(0.00677)
# violence against civilians		0.0189		0.0136*
		(0.0191)		(0.00759)
controls	Yes	Yes	Yes	Yes
District FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Observations	113175	113175	21405	21405
Districts	680	680	677	677

Note: In columns 1 and 2, the outcome variable is the total number of desired children. In columns 3 and 4, the outcome variable is the total number of living children. The main explanatory variable in columns 1 and 3 is the total number of all conflict events seven years preceding each round of DHS survey in Nigeria; in columns 2 and 4 - the number of violent events against civilians and other conflict events, which include state-based and non-state events. The list of controls includes age, wealth, education level, husband's education level, religion, and the type of settlement (urban/rural). The sample of completed families includes women who stated that they do not want to have any more children. Standard errors are clustered at the district level. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Figure 1: Average Deaths by Type of Conflict



Source: Author's calculations based on data from the Uppsala Conflict Data Program (UCDP)

Abstrakt

Zkoumání dopadů válečných konfliktů a porozumění původu genderových nerovností jsou zdánlivě nesouvisející, ale významná témata v literatuře. V této studii se zaměřuji na otázky na pomezí těchto dvou témat a zkoumám, jestli a jakým způsobem dlouhodobé vystavení násilným konfliktům ovlivňuje a formuje genderové preference rodičů. Využívám časové a prostorové variace v konfliktech v Nigérii, konkrétně kombinuji dva datové zdroje, Uppsala Conflict Data Program a Demographic and Health Surveys Program, k zodpovězení zkoumaných otázek. Výsledky ukazují, že vlivy dlouhodobého vystavení násilným konfliktům na uvedení preference pro chlapce nejsou homogenní. Zatímco konflikty s nízkým nebo žádným počtem civilních obětí zvyšují preferování synů, při násilí cíleném na civilní obyvatelstvo je vliv opačný a snižuje preferování synů. Nenacházím žádné důkazy projevů těchto preferencí při rozhodování o potratu na základě pohlaví dítěte. Namísto toho důkazy ukazují, že požadovaného zastoupení pohlaví u dětí dosahují rodiče svým rozhodováním o tom, zda mít další dítě. Další analýza také naznačuje, že ve čtvrtích zasažených konfliktem mají rodiče pozitivní zkreslení ve prospěch chlapců ve smyslu jejich postnatálních zdravotních výdajů.

Klíčová slova: genderové preference, preferování syna, násilné konflikty, postoj a chování

Working Paper Series
ISSN 2788-0443

Individual researchers, as well as the on-line version of the CERGE-EI Working Papers (including their dissemination) were supported from institutional support RVO 67985998 from Economics Institute of the CAS, v. v. i.

Specific research support and/or other grants the researchers/publications benefited from are acknowledged at the beginning of the Paper.

Published by
Charles University, Center for Economic Research and Graduate Education (CERGE)
and
Economics Institute of the CAS, v. v. i. (EI)
CERGE-EI, Politických vězňů 7, 111 21 Prague 1, tel.: +420 224 005 153, Czech Republic.
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Editor: Byeongju Jeong

The paper is available online at https://www.cerge-ei.cz/working-papers/.

ISBN 978-80-7343-530-1 (Univerzita Karlova, Centrum pro ekonomický výzkum a doktorské studium)
ISBN 978-80-7344-632-1 (Národohospodářský ústav AV ČR, v. v. i.)