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The Impact of the Iraq War on Children's Health Outcomes

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Dissertation written under the supervision of Joana Silva

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Abstract

Title: The Impact of the Iraq War on Children's Health Outcomes
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War and violent shocks can have long-term effects on health and human capital. Children in younger years are particularly vulnerable. This paper quantifies the effect of war on children anthropometrics using linked household and health survey data, complemented with administrative records from Iraq. The identification strategy exploits differences in war-intensity across households and areas. Estimates indicate that height-for-age Z-scores are lower for children exposed to higher war-intensity. War also leads to stunting and severe stunting among children in Iraq with potentially long-run consequences. These results are found both when using self-reported survey data on injury or mortality in the children's households and administrative data on injury and mortality by governorate. Furthermore, impacts are larger on children exposed to the war *in utero* than those exposed later in life. Inadequate food supply does not appear to drive these results. Instead, disruptions in access to health care services and income effects from wage and/or job loss among adults are important channels through which the Iraq War lead to detrimental long-term effects on children's health. The findings are robust to including region-specific and socioeconomic controls, as well as excluding displaced households.

Resumo

Título: O Impacto da Guerra no Iraque na Saúde das Crianças
Autor: Jacob Fabian Sievers
Palavras-chave: Saúde, Crianças, Guerra do Iraque, In-utero

Guerra e outros confrontos violentos podem ter efeitos de longo prazo na saúde e no capital humano de um país ou região. As crianças são o grupo etário mais vulnerável. Este estudo quantifica os efeitos da guerra nas medidas antropométricas das crianças, usando dados de inquéritos sobre a saúde e agregado familiar e dados administrativos do Iraque. O método de identificação explora as diferenças em exposição à guerra e violência entre regiões e agregados familiares. As estimativas apontam para menores Z-scores para o indicador altura-idade para crianças mais expostas à violência. A guerra afeta também o crescimento das crianças, por vezes de forma severa. Os mesmos resultados são obtidos quando são usados dados de incidência direta de violência na família (calculados através do inquérito às famílias) ou dados administrativos de incidência no município. Além disso, o impacto é relativamente mais forte nas crianças que são expostas à guerra ainda numa fase *in utero*. A alimentação inadequada não parece ser a causa principal dos efeitos encontrados. Em vez disso, dificuldades no acesso a cuidados médicos e redução no rendimento dos adultos causado pela perda de emprego parecem ser os fatores determinantes na maneira como a guerra no Iraque influencia a saúde, e em particular as medidas antropométricas, das crianças. A robustez destes resultados é comprovada pela inclusão de controlos socioeconómicos e por região e/ou pela exclusão de agregados familiares deslocados em consequência da guerra.

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1. Introduction

War and violent shocks can have long-term effects on health and human capital. A growing body of research suggests significant negative effects of violent shocks and warfare on adults' mental or physical health (Foster and Brooks-Gunn 2015; Akbulut-Yuksel 2017; Singhal 2019; Han and Hong 2019; Yayan et al. 2019). While the literature acknowledges the importance of early childhood for the long-term development of health and socioeconomic factors (Almond and Currie 2010; Strauss and Thomas 2008), evidence on the effects of war on children's outcomes is more limited. Recent studies have focused on the Eritrean-Ethiopian war, finding a negative correlation between warfare, children's height-for-age Z-scores and child mortality, as well as potentially worse later-in-life health outcomes (Weldeegzie 2017; Akresh, Caruso and Thirumurthy 2014; Akresh, Lucchetti and Thirumurthy 2012). Lower survivability chances for children exposed to the Burundi War more intensely have been examined by Verwimp (2012). Yet, this evidence is not definitive for three reasons. First, the majority of these wars took place in a short period of time and a restricted geographic area with limited data, making it difficult to settle the issue of causality. Second, these wars were associated with famine. This is not generalizable and raises the question of whether income effects, another key theoretical channel for health effects (Kohara, Matsushima and Ohtake 2019; Krug and Eberl 2018), could lead to the same outcome. Lastly, most of the papers use only indirect measures of war, proxies, and cannot directly identify exposure to the war.

This paper estimates the impact of the Iraq War on children's health outcomes considering direct and indirect measures of war exposure. It uses detailed data on children anthropometrics linked at the individual level with information on their parents from a nationally representative household survey. The Iraq War started in March 2003 with the invasion of the United States and officially ended in May 2003. The occupation phase that followed the invasion put a heavy burden on the country and its population, resulting in 185,000 to 205,000 documented civilian deaths from violence until the end of the occupation in December 2011.[1] The violence spread across the country, with various degrees of intensity. The period studied in this paper includes the invasion by the United States as well as the most violent years that followed up to 2006, when the maximum number of kills was registered. This paper uses two types of data on violence. First, self-reported survey data on injury or mortality in the household during the

[1] Iraq-Body-Count.

previous 12 months. This variable records information on whether somebody in the respondent's household was injured or killed. These data come from the Iraq Household Socio-Economic Survey (IHSES), collected in the October 2006 to November 2007 period. Second the paper uses administrative data from the Iraq Body Count database on civilian (noncombatant) deaths. Anthropometry for children was computed using UNICEF's Iraq Multiple Indicator Cluster Survey (MICS) collected between February and June 2006. Due to a common individual identifier between IHSES and MICS, this information was complemented with data on parent's demographics, socio-economic conditions, expenditures, income and consumption. The empirical strategy uses the different intensities of the conflict across individuals and geographical areas to analyze the causal effect of the war on children's anthropometrics with potential long-run effects. It also investigates the channels through which the conflict has affected children's health.

This paper contributes to the literature on the impact of early childhood shocks on children's welfare in several ways. Firstly, in contrast to violent conflicts in African countries, relatively few studies have addressed the above-mentioned research question in the context of the Middle East, and of the Iraq War in particular. Given that the country had little interruptions of food supply due to its food ration program, the paper provides novel evidence of the income channel of health effects of conflicts. These effects are bound to become more important as countries develop. Secondly, this paper offers causal estimates of the effects of violence on health outcomes. This was made possible by using novel data that identify households and thus children that have been directly exposed to violence and information on their anthropometrics and detailed socio-economic characteristics of their parents. Thirdly, this paper contributes to the literature that links the timing of the exposure to a shock to the magnitude and duration of their effects by differentiating between effects on children exposed to the war *in-utero* and on children only exposed later in their childhood. This is particularly important given that the literature found different negative long-run consequences of undernutrition for children exposed *in utero* for the first and the second half of the pregnancy (Baker 1995; Lee 2014) and for prenatal stress likely caused by violence and leading to lower birth weight and higher chances of prematurity (Koppensteiner and Manacorda 2013; Camacho 2008).

Results in this paper indicate a robust, negative association between the exposure to the war and children's health outcomes, with long-run consequences. The children more intensely exposed to the war have significantly lower height-for-age Z-scores. This result is robust to

different measures of war. The main estimates yield height-for-age Z-scores 0.17 standard deviations lower for children living in households that have experienced direct violence and 0.07 standard deviations lower for one unit increase of indirect violence, that is one more death per 10,000 in the residing governorate. The results are similar to comparable studies in other settings, even though the estimates are slightly smaller. For the case of the indirect violence, this could be due to the conservative usage of the Iraq-Body-Count data. Results are robust to regional (including urban and governorate variables) and socio-economic controls (including individual, household and mother variables). The paper also tests for potential bias through displaced people but rejects this hypothesis. Grounded on early studies about war exposure in the earliest phase of life, it is very likely that children exposed to the Iraq War will not only suffer short-term but also long-term consequences. Additionally, this paper finds that children exposed to violence while being *in utero* have lower height-for-age Z-scores than children that have been born before the war started. Potential mechanisms that explain the impact of the Iraq War on children's health include labour market problems, ante- and postnatal care, water supply and visits to the doctor when being ill. Some of the mechanisms help to explain the general negative impact of the war on height-for-age Z-scores of children and some can be used to explain the vulnerability of the *in utero* exposed cohorts. All in all, those mechanisms lead to worse health outcomes for children which will very likely affect their adult health outcomes, cognitive abilities, job productivity and wages among other factors (Strauss and Thomas 2008).

The structure of the remaining paper is the following: Section 2 gives a short overview of the key characteristics of the institutional background relevant to the paper's identification strategy. Section 3 describes the datasets and some of the key variables. Section 4 explains the methodology applied. Section 5 presents the results and robustness check. Section 6 concludes.

2. Institutional background

Until 40 years ago, Iraq had been known to be one of the countries with the highest health and educational standards in the Middle East. The health status of its population was constantly increasing. Its health system was well recognized for having very high standards. However, the regime ruling Iraq over the last three decades could or did not want to continue this development. Instead, since the Iraq-Iran War, a constant decrease in the above-mentioned factors was observed. The health system significantly suffered, and as a result, health indicators of the population dropped dramatically. After experiencing three substantial wars, Iraq has been struggling to get back to its once well-established health standards ever since (Alwan 2004).

In 1979, Saddam Hussein started his dictatorship in Iraq, which would last for over 20 years and significantly shaped today's Iraq. Shortly after Hussein's coming into power, Iraq started the first of three wars that were to take place over the next three decades, the Iran-Iraq War. The war lasted for eight years and left the country financially stricken, despite its oil reserves. Nonetheless, Iraq started the Gulf-War only one year later, lasting six months. After this phase, Iraq was facing several internal conflicts, mostly caused by ethnic conflicts (Pirnie and O'Connell 2008). The 20th of March 2003 states the official beginning of the invasion by the United States of America. Relatively little resistance was encountered on their way to the capital, Baghdad, which was due to the ongoing internal conflicts and resulted in the end of the invasion on the 1st of May of that year. However, since the invasion did take place with relatively little resistance and casualties, there were still many former soldiers and armed forces in the country. Under the control of former military officers, the first resistance against the occupants started in late 2003. On December 13th of 2003, the United States tracked down Saddam Hussein and managed to capture him, after his two sons' death in combat in July 2003. Over the course of the next months, the atmosphere became more heated up, resulting in an increasing number of attacks against U.S. forces and more support for the insurgents by the population. Ever since the invasion had ended, occupying forces were struggling to identify insurgents. As a result of this development, the violence spread across the country, with various degrees of intensity. Collateral damage rose, and casualties peaked in 2006[2] (Cockburn 2007; Pirnie and O'Connell 2008). Even though Pirnie and O'Connell (2008) point out that the United States, due to a notion of the upcoming occupation phase, avoided bombarding Iraqi infrastructure, disruptions of the latter were a common problem and put a heavy burden on the population. The ongoing violence hampered the maintenance of the weakened infrastructure.

[2] Iraq-Body-Count.

3. Data

3.1. Datasets

The analysis in this paper draws on three main datasets.

First, the *Iraq Multiple Indicator Cluster Survey* (MICS), carried out by the Iraqi Ministry of Health and UNICEF. These data contain detailed information about the health status of children and their mothers in Iraq. The survey covers the 18 governorates of Iraq, including the Kurdistan region and is representative.[3] The interviews were carried out during 2006. The questionnaire was designed for three types of groups: households, women between 15 and 49 years of age and children under five years of age. For the analyses, information about children under five is of special interest. The survey covers 17,873 households that have been successfully interviewed. This includes 27,564 women (between the ages of 15 and 49) and 16,570 children under age five. The dataset gives information on anthropometry for children, including height, age and weight at the time of the interview (measured by the interviewer). This allows for the calculation of several health indices. It also includes data on education, water/sanitation, marriage, mortality, birth registration, Vitamin A supplementation, breastfeeding, and immunization.

Second, the *Iraq Household Socio-Economic Survey* (IHSES), a nation-wide household survey collected by the World Bank to assess poverty. The data contains socio-economic information on the household-level that will be used. The sample design resembles the MICS survey and the two surveys have a common household identifier. Through this common identifier, the same households can be identified in both datasets and the information can be linked. The fieldwork was conducted in the time of October 2006 until December 2007 in the 18 governorates of Iraq. During that time, a total of 18,144 households was interviewed. This corresponds to 125,194 individuals. The questionnaire contained 354 items that have been split up into five main categories: demographics, socio-economic conditions, expenditures, income and transfers, and consumption. Data is available at the individual and household-level. Importantly, it includes self-reported measures of the incidence of violence, coping mechanisms such as asset sales and transfers and access to health services.

[3] Nowadays there exists 19 governorates. This change happened after the survey and therefore does not affect the results.

The third dataset used is the *Iraq Body Count* (IBC). The processed data has first been used in Condra and Shapiro (2011). This dataset reports incidents in Iraq from the beginning of the war onwards. It contains day-by-day information about location, perpetrators and type of attack, as well as the reported minimum and maximum of deaths. The database uses information from media reports of deadly attacks or bodies being found which have been crosschecked and supplemented by information from hospitals, morgues, NGOs and official records. The IBC also scans for news and articles in Arabic language. This source is especially useful since reliable data in times of war is rare. For the time period analyzed in this paper, 2003 until the end of 2006, the IBC reports 9,426 events that correspond with an attack. On average, 6.60 persons died per attack with a reported maximum of 2,000 deaths in one single attack. This information is aggregated on the governorate level.

3.2. Main Variables

The literature mainly uses three anthropometric indicators for a child's health, which are acute, general and chronic malnutrition. Those were defined and recommended by the World Health Organization (WHO, 1995). First, acute and general malnutrition (weight-for-height and weight-for-age) which reflects short-term shocks on food intake and results in wasting. Second, chronic malnutrition, expressed by the height-for-age score that indicates growth deficits typically caused by inadequate food and/or inadequate access to health services. This measure is computed using standardized Z-scores and records the child's height conditional on her/his gender and age relative to the median of a reference population. The score shows the standard deviation below or above the median of the reference population. It is widely accepted that the height-for-age plays a major role for later socio-economic and health outcomes (physical and mental) and can be difficult to correct later in life (Grantham-McGregor et al. 2007; Alderman, Hoddinott and Kinsey 2006). Because the focus of this paper lays on long-run effects, height-for-age is the main health outcome of interest. The third measure is stunting. A child is considered as stunted when her/his score is two standard deviations below the median of the reference population. When the Z-score is three standard deviations below the reference, the child is considered severely stunted.

This paper measures war-intensity using two different indicators. First, self-reported violence by each household. This is captured by the ISHES survey. Households were asked if they have encountered several sorts of violence within the previous12 months. Hence, it is possible to

precisely identify which household has been affected by violence. Therefore, this war measure relates to a direct form of violence. This variable is not bound to the governorate-level but refers to the household/individual-level. The second measure makes use of the IBC database. The mean of the reported minimum and maximum deaths of each observation have been aggregated on the governorate level. The numbers of casualties are separated year-by-year. Casualties are scaled by population control for densely versus scarcely inhabited governorates. The variable used, the average deaths per year per 10,000 people for each governorate, measures the average violence over of the wartime period (i.e. between 2003 and 2006). The most disaggregated common geographical area between IBC and the household and health survey is the governorate-level, which is used in this paper.

Table 1
Health outcomes and war measures by governorate

Governorate	Height-for-age Z-scores	Stunted Children	Severly stunted children	Households with self-reported violence	Average deaths per 10,000
Duhouk	-0.66	15.5%	3.7%	1.9%	0.02
Nineveh	-0.98	23.2%	7.3%	5.1%	2.54
Suleimaniya	-0.43	9.3%	2.7%	2.2%	0.18
Karkouk	-0.61	13.8%	5.5%	8.4%	4.49
Erbil	-0.71	16.3%	5.9%	3.2%	0.38
Diala	-0.79	26.8%	6.1%	12.0%	7.15
Al-anbar	-0.55	21.4%	10.8%	12.0%	7.24
Baghdad	-0.80	21.0%	6.2%	17.1%	13.42
Babil	-0.79	19.0%	7.0%	2.1%	4.52
Kerbala	-0.79	16.3%	4.0%	5.2%	3.84
Wasit	-0.99	25.3%	7.1%	5.0%	2.94
Salahuddin	-0.71	19.5%	6.7%	3.8%	5.77
Al-najaf	-0.76	19.1%	6.9%	4.6%	2.43
Al-qadisiya	-0.94	24.1%	9.2%	2.3%	0.72
Al-muthanna	-0.92	24.5%	8.4%	1.3%	0.71
Thi-qar	-0.84	26.0%	8.9%	4.6%	1.66
Missan	-1.19	26.5%	9.9%	2.4%	0.51
Basrah	-0.89	27.2%	12.3%	3.0%	3.39
Mean	-0.82	21.3%	7.3%	6.6%	4.64

Notes: Children with a height-for-age Z-score below -2 are consired stunted. Children with a height-for-age Z-score below -3 are considered severly stunted. Self-reported violence refers to the Iraq Household Socio-Economic Survey and is a measure on the individual- level. Average deaths per 10,000 refers to the Iraq-Body-Count data and is a measure on the governorate-level. It refers to yearly deaths per 10,000 people in the corresponding governorate.

Table 1 provides summary statistics on health outcomes and war measures by governorate for all children in the estimation sample. It presents the distribution of moderate and severe stunting, as well as the average height-for-age Z-scores across Iraq. On average, around 21.3% of all children are stunted and 7.3% are severely stunted. Stunting is highest in the governorates of Basrah and Diala. On average, 6.6% of the children live in households that self-report violence in the past 12 months. Violence is more prevalent in the governorates of Al-anbar, Baghdad and Diala. Average deaths per 10,000 peaks in the governorates of Al-anbar, Baghdad and Diala. Reassuringly, the incidence of the war (measured by direct or indirect measures) varies across governorates in Iraq, an aspect that is important for this paper's identification strategy.

3.3. Main Sample

As mentioned above, the design of the three datasets allows to precisely merge them. In the case of the MICS and the ISHES survey, the unique household identifier is used. This way the same household can be identified in both surveys. The data from the IBC is at the governorate level, meaning it gives information about the casualties of each governorate. The main dataset has information on children, their corresponding household and mother, as well as the IBC war-intensity information on their governorate. Summary statistics (including the mean, standard deviation, minimum and maximum) of the main variables in the estimation sample are presented in Table 2.

A typical child in the sample has a 49.1% chance of being female, is born in 2003 and is, by the time of the interview, 29 months old. Its height-for-age Z-score is 0.82 standard deviations below the reference median. The weight-for-height Z-Score is 0.26 standard deviations above the reference median. 21.3% of the children in the sample are stunted and 7.3% are severely stunted. Illness and severe illness has been reported by 43% and 7% of the sample. The average household consists of eight persons, with four children aged between zero and 15. The household head is most likely male and most of them have finished secondary education or higher, whereas the biggest group of mothers have only finished primary education. 24.6% of the households are considered poor. The majority of the households reside in an urban area and almost all of them receive ration cards for food from the government. 6.6% of the households of the sample have reported being directly affected by violence in the previous12 months. On

average their governorate has 4.64 deaths per 10,000 inhabitants per year. Appendix Table A.3 presents a detailed explanation of all variables used in this paper.

Table 2
Children and household characteristics of the main sample

VARIABLES	Mean	SD	Min.	Max.	Obs.
Children					
Female	0.491	0.50	0	1	11,002
Year of birth	2003.249	1.42	2001	2006	11,002
Age (in months)	29.433	16.90	0	59	11,002
Childen born after 01.01.2004	0.455	0.50	0	1	11,002
Height-for-age Z-score	-0.821	1.61	-5.97	5.88	11,002
Weight-for-height Z-score	0.258	1.32	-3.98	5.99	11,002
Stunted	0.213	0.41	0	1	11,002
Severly stunted	0.073	0.26	0	1	11,002
Illness	0.430	0.50	0	1	11,002
Severe illness	0.070	0.25	0	1	11,002
Household					
Household size	7.638	3.38	1	29	11,002
Children from 0 - 15 in household	4.027	2.04	1	15	11,002
Women from 15 - 49 in household	1.530	0.97	0	8	11,002
Female household head	0.056	0.23	0	1	11,002
Education of household head	2.280	0.79	0	3	11,002
Mother´s Education	1.910	1.06	0	3	11,002
Poor households	0.246	0.43	0	1	11,002
Displaced households	0.071	0.26	0	1	11,002
Households in urban area	0.616	0.49	0	1	11,002
Households receiving ration card(s)	0.998	0.04	0	1	11,002
Self-reported violence	0.066	0.25	0	1	11,002
Average deaths per 10,000	4.643	4.53	0.02	13.42	11,002

Notes: Children with a height-for-age Z-score below -2 are consired stunted. Children with a height-for-age Z-score below -3 are considered severly stunted. Ilness refers to having diarrhea and or cough in the last two weeks. Severe ilness refers to having diarrhea and cough in the last two weeks. Education (of the mother and the household head) has four different levels: None (=0), non-standard curriculum (=1), primary (=2), secondary and higher (=3). Households are considered poor if they have less than 76,896 Dinars per person per month. Households are considered displaced if they live for less than four years in their housing unit. Self-reported violence refers to the Iraq Household Socio-Economic Survey and is a measure on the individual-level. Average deaths per 10,000 refers to the Iraq-Body-Count data and is a measure on the governorate-level. It refers to yearly deaths per 10,000 people in the corresponding governorate.

4. Methodology

This paper quantifies the effect of war on health outcomes of children. The perfect identification strategy would be the observation of the health status of the same child, before and after the war and being exposed to the war versus not being exposed to the war. However, it is clearly not possible to find such an observation: a child can only be exposed to the war or not, never both at the same time. Instead, the empirical strategy used in this paper compares height-for-age Z-scores of children under 5 years of age that have been differently exposed to the war. The underlying assumption is that, without the war, height-for-age Z-scores would be, on average, similar for the children now considered war-exposed and non-war-exposed. Two different war measures have been used, one on the individual level and one on the aggregated level.

The first strategy estimates the effect of war through self-reported, direct violence on children's health scores. This strategy uses the war measure on the individual level. The paper estimates a model of the following form:

$$Y_{ij} = \beta_1 + \beta_2 (\text{Violence}_{ij}) + \beta_3 X_{ij} + \beta_4 Z_{ij} + \varepsilon_{ij} \quad (1)$$

where Y_{ij} is the outcome variable of observation i in governorate j. Three different dependent variables will be used: Height-for-age Z-score, being stunted and being severely stunted. Additionally, controls for individual and regional characteristics have been added. X_{ij} is a regional specific control, which includes governorate dummies and a dummy for the individual i residing in an urban area. Z_{ij} represents socio-economic variables, such as gender of the observed child, mother's education and the number of children in the household. β_1 is a constant term and ε_{ij} is a random, idiosyncratic error term. The coefficient of interest β_2 measures the impact of war, which is living in a household which self-reported violence, on the health outcomes of infants.

One possible concern with this analysis is the potential endogeneity of self-reported violence as households experiencing violence may reside in poorer neighborhoods. To address this concern, the paper shows that results are robust to adding strata and governorate fixed effects. The paper also tests for exogeneity of violence, conditional on the stratum of residence and shows that household characteristics that proxy their socio-economic status such as mother's

and father's education or the number of children in the household do not have a statistically significant association with self-reported violence. Importantly, the paper shows that the effect of violence on children's health outcomes is qualitatively similar when using data on attacks by governorate from administrative records instead of the self-reported violence at the household-level. Specifically, this paper estimates a regression using a continuous measure of war that is aggregated on the governorate level[4]:

$$Y_{ij} = \beta_1 + \beta_2 (\text{Deaths}_j) + \beta_3 X_{ij} + \beta_4 Z_{ij} + \varepsilon_{ij} \quad (2)$$

where $Deaths_j$ is the average number of deaths per 10,000 inhabitants per year in governorate j. The remaining variables are as in equation (1). Standard errors have been clustered on the governorate-level. The coefficient β_2 measures the impact of one more yearly death per 10,000 in the residing governorate of individual j on its health outcomes.[5]

Equations (1) and (2) estimate effects of the war without differentiating between the timing of children's war exposure, that is assuming that there is no difference in being born before or during the war. In order to address these potential differential effects, this paper estimates a model that controls for differences in the timing of the war exposure. Specifically, the estimated equation is:

$$Y_{ij} = \beta_1 + \beta_2 (\text{Deaths}_j) + \beta_3(\text{Birthafter2004}_{ij}) + \beta_4 (\text{Deaths}_j * \text{Birthafter2004}_{ij}) + \beta_5 X_{ij} + \beta_6 Z_{ij} + \varepsilon_{ij} \quad (3)$$

where $\text{Birthafter2004}_{ij}$ is a dummy variable equal to one for children born after 01.01.2004, and zero for children born before 01.01.2004. What separates the two groups is the *in utero* exposure to the war, meaning children born after the 01.01.2004 have almost certainly had a whole pregnancy *in utero* during the war, whereas the other group most likely was not, or only for a

[4] In equations 2 and 3, this paper uses a measure of war exposure at the governorate-level, instead of a measure of war exposure at the individual-level. An alternative to using this variable independently would be to use it as an instrumental variable for the self-reported exposure to violence of the family. This option was not chosen as while the requirement of an exogenous variable might be given, there was only a small correlation between the instrumented variable (self-reported violence) and the instrument itself (average deaths per governorate) which would lead to a weak instrument.

[5] The war measure in equation 1 refers to the 12 months before the interview. The war measure in equation 2 is a measure covering the time from 2003 until 2006. Restricting the governorate-level measure (equation 2) to the same time period as the individual measure of war (equation 1), that is the year 2006 for most of the cases, gives qualitatively similar results.

certain time of the pregnancy, exposed to the war *in utero*. The control variables remain the same as in the previous equations. War exposure is measured as in equation (2). [6] Standard errors have been clustered on the governorate level. The coefficient of interest is β_4. It measures the impact of one more yearly death per 10,000 in the residing governorate for children exposed to the war *in utero*.

A common concern across the regressions above is that due to displacement, current location of residence may differ from the location at the time of early childhood years and thus the location of war exposure. This could bias the results. To control for this, all the regressions above were run, excluding displaced families. A household is considered to have been displaced when they have lived in their housing unit for less than four years, that is when they have moved during the war.

[6] Using the indirect measure of war seems better suited to examine the effect of *in utero* exposure since it covers the whole period of the period of war and thus the *in utero* phase as well. The violence at individual level refers to the last 12 months that potentially do not include the *in utero* time. The indirect war measure is hence preferred to draw assumptions about the war-intensity during *in utero* time.

5. Results

As laid out in the methodology section, two different measures of war-intensity will be used. The two measures, one with direct violence, the other with indirect violence, however, point in the same direction. The first part uses self-reported, direct violence of the households as a measure of war-intensity. In the second part, data from the IBC is used to measure the number of deaths per governorate that will serve as the second, indirect measure of war-intensity.

5.1. The impact of the self-reported violence on children's health

Table 3 presents the results of the baseline regression, showing the impact of self-reported violence on the height-for-age Z-score and the likelihood of being stunted, moderately and severely, of children under the age of five. The theoretical framework is outlined in equation (1). Columns 1, 3 and 5 include region-specific dummies, namely governorate dummies and a distinction between urban and non-urban areas. Columns 2, 4 and 6 additionally control for the mother's education, the gender of the observed child and the number of other children in the household in the age between zero and 15. Columns 1 and 2 use the height-for-age Z-score as an outcome variable. Columns 3, 4 and 5, 6 refer to being stunted and being severely stunted.

Table 3
The impact of self-reported, direct violence on children's health outcomes

VARIABLES	Height-for-age		Stunted		Severly stunted	
	(1)	(2)	(3)	(4)	(5)	(6)
Self-reported violence	-0.173***	-0.179***	0.038**	0.040**	0.024**	0.024**
	(0.063)	(0.063)	(0.016)	(0.016)	(0.010)	(0.010)
Education of the mother		0.068***		-0.020*		-0.023***
		(0.016)		(0.011)		(0.007)
Female		0.073**		-0.008		-0.004
		(0.031)		(0.008)		(0.005)
Number of children in the household		-0.041***		0.007***		0.003**
		(0.008)		(0.002)		(0.001)
Urban	0.135***	0.054	-0.042***	-0.019**	-0.025***	-0.017***
	(0.033)	(0.035)	(0.008)	(0.009)	(0.005)	(0.006)
Governorate dummies	Yes	Yes	Yes	Yes	Yes	Yes
Observations	11,002	11,002	11,002	11,002	11,002	11,002

Notes: Standard errors in parentheses. Children with a height-for-age Z-score below -2 are consired stunted. Children with a height-for-age Z-score below -3 are considered severly stunted. Self-reported violence refers to the Iraq Household Socio-Economic Survey and is a measure on the individual-level. Education of the mother has four different levels: None (=0), non-standard curriculum (=1), primary (=2), secondary and higher (=3). Number of children in the household refers to children under 15 years of age. *** p<0.01, ** p<0.05, * p<0.1

The results show that self-reported violence is associated with lower height-for-age Z-score and higher stunting and severe stunting. In particular, children of a household that experienced violence have a 0.17 standard deviations lower height-for-age Z-score than those of not-affected households. The magnitude and significance of the coefficient of interest is similar when controls for socio-economic factors are added (column 2). Additionally, a positive correlation between a child being stunted (and severely stunted) and being exposed to violence can be observed. A child living in a household that was exposed to violence has a 3.8% higher probability of being stunted than a child not being exposed to violence. The likelihood of being severely stunted increase by 2.4%. Controlling for socio-economic variables gains similar results in terms of magnitude and significance. As expected, the results show a negative impact of a higher number of children in the household on the child's health. Positive impacts on the health indices are a higher education of the mother, as well as residing in an urban area. The gender of the observed child is only significant with the height-for-age Z-score as the outcome variable (column 2), indicating that male children do suffer more under the violence. The likelihood of being stunted, moderately or severely, is not influenced by the sex of the observed child (at conventional levels of significance).

Table 4
Exogeneity of violence and the impact of self-reported, direct violence and poverty on children's health outcomes

VARIABLES	Self-reported violence (1)	Height-for-age (2)	Stunted (3)	Severly stunted (4)	Poor (5)
Self-reported violence		-0.177***	0.039**	0.024**	0.028*
		(0.063)	(0.016)	(0.010)	(0.015)
Poor		-0.070*	0.042***	0.018***	
		(0.039)	(0.010)	(0.006)	
Education of the mother	0.001	0.063***	-0.018***	-0.009***	-0.057***
	(0.002)	(0.016)	(0.004)	(0.003)	(0.004)
Education of the household head	0.002				
	(0.003)				
Female	-0.006	0.073**	-0.008	-0.004	-0.009
	(0.005)	(0.031)	(0.008)	(0.005)	(0.008)
Number of children in the household	-0.002	-0.038***	0.005***	0.002	0.040***
	(0.001)	(0.008)	(0.002)	(0.001)	(0.004)
Birth after 01.01.2004	0.005				
	(0.005)				
Urban	0.007	0.046	-0.018**	-0.014**	-0.123***
	(0.005)	(0.035)	(0.009)	(0.006)	(0.00)
Governorate dummies	Yes	Yes	Yes	Yes	Yes
Observations	11,002	11,002	11,002	11,002	11,002

Notes: Standard errors in parentheses. Children with a height-for-age Z-score below -2 are consired stunted. Children with a height-for-age Z-score below -3 are considered severly stunted. Self-reported violence refers to the Iraq Household Socio-Economic Survey and is a measure on the individual-level. Households are considered poor if they have less than 76,896 Dinars per person per month. Education (of the mother and the household head) has four different levels: None (=0), non-standard curriculum (=1), primary (=2), secondary and higher (=3). Number of children in the household refers to children under 15 years of age. *** p<0.01, ** p<0.05, * p<0.1

Reassuringly, households experiencing violence do not appear to reside in poorer neighborhoods, which would raise endogeneity concerns of self-reported violence (Table 4, column 5). Column 1 shows that household characteristics that proxy their socio-economic status, such as mother's and father's education or the number of children in the household, do not have a statistically significant association with self-reported violence. In addition, Columns 2 to 4 show that adding a poverty dummy to the regressions in Table 3 does not alter the magnitude and significance of the effect of violence on children's health.

5.2. The impact of the Iraq Body Count war measure on children's health

This section applies the second measure of the war-intensity, which is the average yearly deaths per governorate per 10,000 people. Table 5 shows the baseline results of Equation (2). The regression is carried out the same way as regressions in Table 3 but using the incidents per 10,000 as the measure of war-intensity. Columns 1, 3 and 5 only include region-specific dummies and columns 2, 4 and 6 additionally control for socio-economic factors. Results suggest a negative impact of the war on children's health outcomes. An increase of one more yearly incident per 10,000 is associated with a decrease of 0.07 standard deviations of the height-for-age Z-score, an increase of 3.5% on the likelihood of stunting and 2.6% on the likelihood of being severely stunted. When controlling for the socio-economic factors, the main coefficients stay significant and of similar magnitude.

Table 5

The impact of average deaths per 10,000 on children's health outcomes

VARIABLES	Height-for-age		Stunted		Severly stunted	
	(1)	(2)	(3)	(4)	(5)	(6)
Average deaths per 10,000	-0.073***	-0.098***	0.035***	0.042***	0.026***	0.029***
	(0.001)	(0.007)	(0.000)	(0.001)	(0.000)	(0.001)
Education of the mother		0.067**		-0.020***		-0.010***
		(0.026)		(0.005)		(0.003)
Female		0.074**		-0.009		-0.004
		(0.029)		(0.009)		(0.005)
Number of children in the household		-0.041***		0.007**		0.002
		(0.009)		(0.003)		(0.002)
Urban	0.133	0.053	-0.042***	-0.023	-0.024***	-0.016**
	(0.092)	(0.085)	(0.014)	(0.014)	(0.007)	(0.006)
Governorate dummies	Yes	Yes	Yes	Yes	Yes	Yes
Observations	11,002	11,002	11,002	11,002	11,002	11,002

Notes: Standard errors in parentheses. Standard errors are clustered at the governorate level. Children with a height-for-age Z-score below -2 are consired stunted. Children with a height-for-age Z-score below -3 are considered severly stunted. Average deaths per 10,000 refers to the Iraq-Body-Count data and is a measure on the governorate-level. It refers to yearly deaths per 10,000 people in the corresponding governorate. Education of the mother has four different levels: None (=0), non-standard curriculum (=1), primary (=2), secondary and higher (=3). Number of children in the household refers to children under 15 years of age. *** p<0.01, ** p<0.05, * p<0.1

Table 6 examines whether war effects are more detrimental if the child experienced the war *in utero*, versus children that were born when the war has already started. Results show a significant, negative association between the interaction term and the outcome variable, the height-for-age Z-score (columns 1 and 2). This means, for children being exposed *in utero*, one unit increase of indirect violence, that is one more yearly death per 10,000 in the governorate, further decreases the height-for-age Z-score by 0.027 standard deviations compared to children not being exposed *in utero*. Children experiencing the war *in utero* thus are more vulnerable to an increase in war-intensity. The coefficient of the interaction term is not significant when stunting is the outcome variable. When severe stunting is the outcome variable, the coefficient has a positive correlation with a low level of significance, pointing in the same direction as the results in Column 1 and 2. One could argue that a child born between April 2003 and the end of 2003 is considered not to be exposed *in utero* with this method. To avoid such a bias, the same regression excluding children born between April 2003 and December 2003 has been carried out. Results stay almost identical in magnitude and similar significance, with no significance for severe stunting (results not included).

Table 6

The impact of average deaths per 10,000 on health outcomes of in utero exposed children

VARIABLES	Height-for-age		Stunted		Severly stunted	
	(1)	(2)	(3)	(4)	(5)	(6)
Average deaths per 10,000	-0.053***	-0.078***	0.035***	0.041***	0.025***	0.028***
	(0.003)	(0.007)	(0.001)	(0.002)	(0.000)	(0.001)
Birth after 01.01.2004	0.342***	0.320***	-0.012	-0.008	-0.004	-0.002
	(0.056)	(0.055)	(0.022)	(0.021)	(0.005)	(0.004)
Aver. deaths * Birth after 2004	-0.027***	-0.026***	0.001	0.001	0.001*	0.001*
	(0.005)	(0.005)	(0.002)	(0.002)	(0.001)	(0.001)
Education of the mother		0.067**		-0.020***		-0.010***
		(0.026)		(0.005)		(0.003)
Female		0.070**		-0.008		-0.004
		(0.029)		(0.009)		(0.005)
Number of children in the household		-0.034***		0.007**		0.003
		(0.009)		(0.002)		(0.002)
Urban	0.132	0.059	-0.042***	-0.023	-0.025***	-0.016**
	(0.092)	(0.085)	(0.014)	(0.014)	(0.007)	(0.006)
Governorate dummies	Yes	Yes	Yes	Yes	Yes	Yes
Observations	11,002	11,002	11,002	11,002	11,002	11,002

Notes: Standard errors in parentheses. Standard errors are clustered at the governorate level. Children with a height-for-age Z-score below -2 are consired stunted. Children with a height-for-age Z-score below -3 are considered severly stunted. Average deaths per 10,000 refers to the Iraq-Body-Count data and is a measure on the governorate-level. It refers to yearly deaths per 10,000 people in the corresponding governorate. Education of the mother has four different levels: None (=0), non-standard curriculum (=1), primary (=2), secondary and higher (=3). Number of children in the household refers to children under 15 years of age. The interaction term yields the effect of one more yearly average death per 10,000 on children exposed to the war *in utero* . *** p<0.01, ** p<0.05, * p<0.1

5.3. Channels

Violence caused by the Iraq War can potentially lead to detrimental effects on children's health. These effects occur mainly through two channels. In order to check for this, the average yearly deaths per 10,000 will be regressed on various potential channels to verify if war-intensity indeed is correlated with the potential channels. Results are presented in Table A.1.

Table 7
The impact of war-exposure on labour market outcomes

VARIABLES	Loss of job		Salary reduction		Loss of job or salary reduction	
	(1)	(2)	(3)	(4)	(5)	(6)
Self-reported violence	0.259***		0.207***		0.334***	
	(0.009)		(0.008)		(0.011)	
Average deaths per 10,000		0.014***		0.012***		0.019***
		(0.001)		(0.000)		(0.001)
Socio-economic dummies	Yes	Yes	Yes	Yes	Yes	Yes
Governorate & urban dummies	Yes	Yes	Yes	Yes	Yes	Yes
Observations	11,002	11,002	11,002	11,002	11,002	11,002

Notes: Standard errors in parentheses. Standard errors of column (2), (4) and (6) are clustered at the governorate level. Self-reported violence refers to the Iraq Household Socio-Economic Survey and is a measure on the individual level. Average deaths per 10,000 refers to the Iraq-Body-Count data and is a measure on the governorate-level. It refers to yearly deaths per 10,000 people in the corresponding governorate. Socio-economic dummies include: Sex of the household head, education of the household head (four different levels: None (=0), non-standard curriculum (=1), primary (=2), secondary and higher (=3)) and number of children under 15 years of age in the household. *** p<0.01, ** p<0.05, * p<0.1

First, violence puts an economic burden on households in the form of a negative income shock caused by the war. This could result in reduced expenditures on food and other services and thus less ability to optimize consumption. To test for this, the paper checks for correlation between poverty, unemployment and expenditures on food. Table 7 shows that in fact violence significantly and largely increases the likelihood of losing a job or receiving reduced salary, therefore resulting in less spending power. This result is robust to both measures of war. Regression 5 of Table A.1 supports this finding, indicating that households are more likely to be poor with an increase in war-intensity. This relationship is also confirmed by columns 3 and 4 of Table A.1, showing that households reduce their per-capita-expenditure on food when the indirect war-intensity increases. While they reduce food intake in absolute measures, they spend a higher share of their income on food with an increase of the war-measure, reflected by estimates in columns 1 and 2 in Table A.1. Those results are also supported by Table 8, stating that the reduction of expenditures and food, as well as sale of assets are the most common strategies for coping with the war among the surveyed households. This draws the picture of a race to the bottom, as war increases the likelihood of losing a job and becoming poor, thus decreasing the income of the households. Due to this, households must reduce their quantity and quality of food and sell their assets, leaving them even more vulnerable. In relative terms

they need to spend more of their income on food while in absolute terms, they have less to eat. As mentioned in 3.2, this paper however rules out famine as a major influence on children's health. Nonetheless, a reduction in food intake still has negative effects on health, even if actual starvation is not present.

Table 8
Coping strategies of the households

Coping strategies of households affected by self-reported violence or labor market problems in %	Self-reported violence	Labour market problems
Reducing expenditures	73%	74%
Reducing quantity and quality of food	64%	60%
Spending savings or investments	49%	38%
Loans from friends or relatives	37%	41%
Help from others in the community	14%	16%
Buying food against credit from merchants	15%	21%
Moving to another area	3%	2%
Loan from employers, shark-loaners, merchants, NGOs	3%	5%
One of the household members joined the armed forces	3%	3%
Sending their children to work or increasing their hours of work	1%	1%
Child marriage	1%	0%
Observations	561	829

Notes: Information from the Iraq Household Socio-Economic Survey. Numbers were obtained using the main sample of this paper.

Second, even if the income of households remains unchanged, they might be inhibited to access to health services like visits to the doctor, health checkups, and water supply. The remaining columns of Table A.1 (columns 7 to 18) test for this channel. Mother's health seems to be influenced in the sense that they receive fewer checkups, ante- and postnatal, by qualified staff with an increase in war-intensity. This could be due to less availability of those services on the one hand. Even if members of the household would like to go to checkups, there might be a lack of qualified staff, facilities have been destroyed or the security situation itself does not allow them to move freely. On the other hand, it also could be due to household's restraints, as they lack economic power to pay the doctor or even transport to the treatment. Due to disruptions caused by the violent atmosphere, priorities might lie elsewhere simply resulting in not enough time to turn to a doctor. On behalf of children's health, a decrease in the likelihood of visiting a doctor when being severely ill can be observed (columns 15 – 18). A similar logic can be applied here, as this might be due to the inability of the family to meet children's needs or simply no availability of a medical professional due to infrastructural reasons. Lastly, an

increase in one more yearly death per 10,000 does reduce the likelihood of having a stable water supply. This type of disruption is clearly due to collateral damages of the war, worsening the situation of the population.

5.4. Robustness

One problem of the Iraq War and war-stricken areas that could affect the results is displacement. People abandon their homes or must leave due to security, economic or other reasons. This could cause a potential bias for two reasons: Firstly, displaced households/children might have worse health outcomes just because they are displaced. Secondly, the data does not allow to track the movements of the displaced, meaning it can only be observed where they are at the time of the survey, but not where they have been before. However, the location at the time of the survey is possibly not the location they encountered the violence.

To ensure the estimates are not driven by the displaced, a subsample excluding the latter will be created. Displacement is identified if households reported that they have lived in their housing unit for less than four years, which corresponds to the beginning of the war. In the main sample, 7.1% of the observed are considered displaced. The same main regressions as in the previous sections have been carried out, excluding displaced families. The estimates can be found in Appendix Table A.2. The results remain very similar in significance and magnitude. This means results are thus robust against this potential bias.

Finally, this paper shows that results are also robust to the use of a probit model in the case of the binary outcome variables: stunting and severe stunting. Results stayed very similar (results are not included).

6. Conclusion

The effects of war in the Middle East and in particular in Iraq are important and have not been studied sufficiently yet. This paper combines information from two different micro-level datasets and administrative data in order to quantify the effect of war on children's health outcomes and households. The model exploits differences in war-intensity across areas and age at exposure. The result shows a negative and significant impact of direct violence on children's height-for-age Z-scores and an increase in the likelihood of being stunted (moderate and severe). The use of an indirect measure of war confirms these findings. An increase in average yearly deaths per 10,000 decreases of the height-for-age Z-scores and increases the probability of being stunted. Furthermore, estimates indicate that children who have been *in utero* during the conflict are more vulnerable to war-exposure than children not having been exposed to the war *in utero*. This finding contributes to literature investigating the impact of negative stress *in utero* on later health outcomes (Akresh, Caruso and Thirumurthy 2014; Almond and Currie 2010; Akbulut-Yuksel 2017; Camacho 2008; Lee 2013). Lastly, this paper finds channels that are potentially influenced by war and negatively influence health outcomes. Those include poverty, disruptions in the infrastructure and health care. In addition, results were obtained that indicate a strong correlation between war-intensity and labor market problems, that is the likelihood of losing a job or receiving reduced salary increases with an increase of the war measures. The most common strategies chosen by households to cope with the violence include a reduction in expenditures, food and asset sales.

Results found in this paper are important, given that children in their early years are especially vulnerable to exogenous shocks. Distortions during this phase of life are likely to influence a child's later life outcomes. The findings suggest that the Iraq War therefore did not only critically decreased children's health during the war but also will it hinder their ability to reach their full potential throughout their whole life. For instance, Alderman, Hoddinott and Kinsey (2006) showed that lower height-for-age Z-scores in young years decrease educational success in school which later results in lower wages earned. Effective policy design can help to protect children's health during war times. This paper shows that government should go beyond the distribution of free food and also support a stable supply of water as well as a stable health care provision, which means access to doctors if children are ill and ante- and postnatal checkups. Throughout all estimations, mothers' education showed a positive and significant impact on health outcomes as well, thus emphasizing the value of programs increasing educational access

for women. Lastly, this paper finds a strong correlation between war and labour market problems, further hindering the households' ability to properly cope with their misery.

The data used in this paper is mostly restricted on the governorate level. Administrative data on more disaggregated geographical areas is not available. However, the use of geographically more detailed data, especially on the location of attacks and place of residence for households, could potentially increase the accuracy of the findings. In addition, further research whether these effects remained, for example, during the latest round of the MICS survey, should be undertaken. This way exact long-term effects of war exposure on children could be revealed, thus possibly gaining deeper knowledge about the health channels associated with the body of this paper.

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Appendix

Table A. 1

Channels through which war affects children's health outcome

VARIABLES	Budget share food		Per-capita expenditure on food		Poor	
	(1)	(2)	(3)	(4)	(5)	(6)
Average deaths per 10,000	3.614***	3.611***	-5.111***	-5.055***	0.065***	0.064***
	(0.049)	(0.050)	(0.115)	(0.111)	(0.003)	(0.003)
Aver. deaths * Birth after 2004		0.032		-0.088		0.001
		(0.031)		(0.116)		(0.001)
Socio-economic dummies	Yes	Yes	Yes	Yes	Yes	Yes
Governorate & urban dummies	Yes	Yes	Yes	Yes	Yes	Yes
Observations	11,002	11,002	11,002	11,002	11,002	11,002

Notes: Standard errors in parentheses. Standard errors are clustered at the governorate-level. Households are considered poor if they have less than 76,896 Dinars per person per month. Average deaths per 10,000 refers to the Iraq-Body-Count data and is a measure on the governorate-level. It refers to yearly deaths per 10,000 people in the corresponding governorate. Socio-economic dummies include: Sex of child, education fo the mother (four different levels: None (=0), non-standard curriculum (=1), primary (=2), secondary and higher (=3)) and number of children under 15 years of age in the household. *** p<0.01, ** p<0.05, * p<0.10

VARIABLES	Antenatal visits		Checkup after birth		Stable water supply	
	(7)	(8)	(9)	(10)	(11)	(12)
Average deaths per 10,000	-0.019***	-0.012***	-0.027***	-0.028***	-0.056***	-0.055***
	(0.001)	(0.002)	(0.003)	(0.003)	(0.002)	(0.003)
Aver. deaths * Birth after 2004		0.010***		0.009***		-0.003**
		(0.001)		(0.001)		(0.001)
Socio-economic dummies	Yes	Yes	Yes	Yes	Yes	Yes
Governorate & urban dummies	Yes	Yes	Yes	Yes	Yes	Yes
Observations	11,002	11,002	11,002	11,002	11,002	11,002

Notes: Standard errors in parentheses. Standard errors are clustered at the governorate-level. Antenatal visits and checkup after birth refers to receiving a visit from either a governmental or private doctor, a nurse or a licensed midwife before and after giving birth. Average deaths per 10,000 refers to the Iraq-Body-Count data and is a measure on the governorate-level. It refers to yearly deaths per 10,000 people in the corresponding governorate. Socio-economic dummies include: Sex of child, education fo the mother (four different levels: None (=0), non-standard curriculum (=1), primary (=2), secondary and higher (=3)) and number of children under 15 years of age in the household. *** p<0.01, ** p<0.05, * p<0.10

VARIABLES	Days of electricity per week		Visits to doctor with illness		Vistis to doctor with severe illness	
	(13)	(14)	(15)	(16)	(17)	(18)
Average deaths per 10,000	0.007	0.009	0.005	0.018***	-0.087***	-0.059***
	(0.008)	(0.007)	(0.004)	(0.005)	(0.007)	(0.007)
Aver. deaths * Birth after 2004		-0.003*		-0.010***		-0.023***
		(0.002)		(0.003)		(0.006)
Socio-economic dummies	Yes	Yes	Yes	Yes	Yes	Yes
Governorate & urban dummies	Yes	Yes	Yes	Yes	Yes	Yes
Observations	10,647	10,647	4,758	4,758	793	793

Notes: Standard errors in parentheses. Standard errors are clustered at the governorate-level. Ilness refers to having diarrhea and or cough in the last two weeks. Severe ilness refers to having diarrhea and cough in the last two weeks. Average deaths per 10,000 refers to the Iraq-Body-Count data and is a measure on the governorate - evel. It refers to yearly deaths per 10,000 people in the corresponding governorate. Socio-economic dummies include: Sex of child, education fo the mother (four different levels: None (=0), non-standard curriculum (=1), primary (=2), secondary and higher (=3)) and number of children under 15 years of age in the household. *** p<0.01, ** p<0.05, * p<0.10

Table A. 2

The impact of war-exposure on children's health outcomes, excluding displaced families

VARIABLES	Height-for-age		Stunted		Severly stunted	
	(1)	(2)	(3)	(4)	(5)	(6)
Self-reported violence	-0.180***		0.041**		0.026**	
	(0.066)		(0.017)		(0.011)	
Aver. deaths * Birth after 2004		-0.026***		0.000		0.001*
		(0.005)		(0.002)		(0.001)
Socio-economic dummies	Yes	Yes	Yes	Yes	Yes	Yes
Governorate &uUrban dummies	Yes	Yes	Yes	Yes	Yes	Yes
Observations	10,166	10,166	10,166	10,166	10,166	10,166

Notes: Standard errors in parentheses. Standard errors of column (2), (4) and (6) are clustered at the governorate-level. Children with a height-for-age Z-score below -2 are consired stunted. Children with a height-for-age Z-score below -3 are considered severly stunted. Self-reported violence refers to the Iraq Household Socio-Economic Survey and is a measure on the individual-level. Socio-economic dummies include: Sex of child, education fo the mother (four different levels: None (=0), non-standard curriculum (=1), primary (=2), secondary and higher (=3)) and number of children under 15 years of age in the household.This estimations exclude observations that have been classified as displaced, i.e. households live for less than four years in their housing unit. *** p<0.01, ** p<0.05, * p<0.1

Table A. 3

Explanation of the applied variables

Variable:	Explanation:
Antenatal visits:	Equals “1” if the mother received a visit from either a governmental or private doctor, a nurse or a licensed midwife before giving birth.
Average deaths per 10,000:	This refers to the data from the Iraq-Body-Count. The average of the reported minimum and maximum has been accumulated for each governorate. The numbers have been split by years. The number of deaths per year has been divided by the population in that year. An average of 2003 until 2006 has been estimated. It shows the average number of deaths per 10,000 people per year in the corresponding governorate.
Birth after 01.01.2004:	Equals “1”, if the year of birth is higher than 2003.
Budget share food:	Budget share of the household spent on food. Note: Food is highly subsidized in Iraq, meaning the prices paid do not at all reflect market prices. The budget share refers to market prices and not to what the household actually paid out of their pocket but rather what they would have paid.
Checkup after birth:	Equals “1” if the mother received a visit from either a governmental or private doctor, a nurse or a licensed midwife after giving birth.
Days of electricity per week:	Days per week that the household has available electricity.
Displaced:	Equals “1”, if the household reported being living in their housing unit for less than four years.
Education of the household head:	Four different levels of education: None (=0), non-standard curriculum (=1), primary (=2), secondary and higher (=3).
Education of the mother:	Four different levels of education: None (=0), non-standard curriculum (=1), primary (=2), secondary and higher (=3).

Female:	Equals “1” if the child is female.
Height-for-age:	Comparing the height-for-age with a reference population. Here, the WHO/CDC/NCHS reference recommended by UNICEF and the World Health Organization was used.
Illness:	Equals “1”, if either diarrhea and or cough has been reported in the last two weeks.
Loss of job or salary reduction:	Equals “1” if one of the latter variables were answered with “Yes”.
Loss of job:	Equals “1” if the household has reported having lost a job in the last 12 months.
Number of children in the household:	Children in the household under 15 years of age.
Per-Capita Expenditure on food:	Per-capita expenditure of the household on food. Note: Food is highly subsidized in Iraq, meaning the prices paid do not at all reflect market prices. The per-capita expenditure on food refers to market prices and not to what the household actually paid out of their pocket but rather what they would have paid.
Poor:	Equals “1” if the household has less than 76,896 Dinars per person per month.
Salary reduction:	Equals “1” if the household has reported having a salary reduction in the last 12 months.
Self-reported violence:	Equals “1”, if at least one of the following questions has been answered with "Yes". Has anyone of your household encountered one of the following in the last 12 months?” - Death of a working member - Death of other household members - Theft - Violence due to abnormal situation - Kidnapping, life threats due to abnormal situations - Other types of violence
Severe illness:	Equals “1”, if diarrhea and cough have been reported in the last two weeks.
Severely stunted:	Equals “1”, if the height-for-age Z-score is lower than -3.
Stable water supply:	Equals “1”, if the household reported that the main source of water is giving a reliable supply.
Stunted:	Equals “1”, if the height-for-age Z-score is below than -2.
Urban:	Equals “1” if the household resides in an urban area.
Visits to doctor:	Equals “1” if the child was taken to the doctor.

Weight-for-height:	Comparing the weight-for-age with a reference population. Here, the WHO/CDC/NCHS reference recommended by UNICEF and the World Health Organization was used.