Violence and Nutritional Status of Children in Iraq

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Extended abstract

Background. There is limited empirical evidence on the effect of conflict on children's nutritional status, particularly from countries that have seen conflict for a prolonged period. For appropriate policy response, it is important to understand this relationship, including heterogeneous effects on different segments of the population.

Methods. We combined data from the 2011 Iraq Multiple Indicator Cluster Survey and the micro-level conflict data collected between 2004 and 2009 by the Empirical Study of Conflict Project. For each child born between 2006 and 2009, we created a measure of cumulative exposure to violence, defined as the total number of violent incidences reported per 1000 population in the child's district since the child's birth. We defined violence in multiple ways, including the total number of attacks, total number of attacks excluding criminal attacks, the number of incidences of improvised explosive device (IED), and the number of fire incidents. We estimated the relationship between stunting and the measures of violence exposure in a regression framework adjusting for individual, household and community confounders.

Findings. Our analytic sample consisted of 23,410 children of ages 12-59 months. In the sample, 21.4% children were stunted (height-for-age z-score <2 SD), with a mean HAZ= – 1.02. The mean cumulative exposure to violence, based on the total number of attacks reported, was 1.8 incidents per 1000 population (range: 0 to 73.2) (**Table 1**). For this measure, one additional incident of violence per 1000 population reduced a child's height-for-age z-score by 0.0043 (p=0.015) (**Table 2, Panel B**) and increased the probability of being stunted by 0.15 percentage point (p=0.006) (**Table 2, Panel A**). However, these seemingly small effects masked important heterogeneous effects. After adjusting for the confounders, the height-for-age z-score for a child in the highest quintile of exposure to violence (more than 1.65 incidents per 1000 persons) was 0.2 units lower (p<0.0001) than that of a child in the lowest quintile (less than 0.01 incidents per 1000 persons) (**Table 3a**). As such, a child in the highest quintile was 7.6 percentage points more likely (p<0.0001) to be stunted than a child in the lowest quintile (**Table 3b**). The effect of the exposure to violence varied by gender, with more pronounced effects on the nutritional status of girls than of boys (**Tables 4a** and **4b**). These findings were robust to alternative measures of violence and were not driven by initial differences in nutritional status of children across districts.

Interpretation. Our findings are consistent with the limited existing literature on the conflict-nutrition nexus in conflict settings. Based on our analysis, with no or minimal exposure to violence, there would have been 4.3 percentage points fewer stunted children in Iraq than there are today. More generally, our findings indicate the need for special attention to conflict-affected countries in order to achieve the nutrition-related SDGs.

Tables

Table 1. Summary statistics for the analytical sample (N=23,410)		
	Mean	SD
Dependent variables		
Child nutrition		
Stunting	0.22	0.41
Height-for-age z-score	-1.02	1.51
Key independent variables		
Cumulative exposure to violence (incidence per 1000 population)		
All attack incidents	1.85	5.48
All attacks (excluding criminal incidents)	1.65	5.02
IED incidents	1.04	3.06
Direct fire incidents	0.46	1.64
Other covariates		
Child-level indicators		
Gender (boy=1)	0.51	0.50
Age (in months)	36.80	12.63
Mother's education		
Less than primary	0.24	0.43
Primary	0.51	0.50
Secondary and above	0.25	0.43
Household-level indicators		
Household size	8.48	4.38
Access to improved sanitation	0.95	0.22
Access to clean drinking water	0.77	0.42
Quintiles of wealth index		
Poorest	0.34	0.47
Second	0.24	0.43
Middle	0.19	0.39
Fourth	0.14	0.34
Richest	0.10	0.30
Community-level indicators		
Urban	0.54	0.50
South/Centre Iraq	0.84	0.37
Kurdistan region	0.16	0.37

Note: This table shows the descriptive statistics for the analytic sample. For the binary variables, the reported means are in proportions. For example, in the sample 22% children are stunted and 51% are boys.

Table 2. Multivariate regression results for the effect of violence on child nutrition

Outcome	Measure of violence			
	All attack incidents	All attacks (excluding criminal incidents)	IED incidents	Direct fire incidents
Stunting	0.0015***	0.0016***	0.0025***	0.0054***
	(0.0005)	(0.0006)	(0.0010)	(0.0018)
Constant	0.3348***	0.3346***	0.3345***	0.3343***
	(0.0373)	(0.0373)	(0.0373)	(0.0373)
R-squared	0.0182	0.0182	0.0181	0.0182
F statistic	19.71***	19.67***	19.61***	19.79***
Height-for-age z-scores	-0.0043**	-0.0048**	-0.0077**	-0.0148**
	(0.0018)	(0.0019)	(0.0031)	(0.0058)
Constant	-1.1024***	-1.1022***	-1.1024***	-1.1009***
	(0.1334)	(0.1334)	(0.1334)	(0.1334)
R-squared	0.0179	0.0179	0.0179	0.0179
F statistic	15.70***	15.69***	15.68***	15.76***

Notes: * p<0.10, ** p<0.05, *** p<0.01

This table shows the coefficients and standard errors on the measures of violence, separately for stunting and height-for-age z-scores. Each column represents a separate regression for different measures of violence (cumulative exposure to violence, incidence per 1000 population). Standard errors are clustered at sample cluster level (n=3,658). All regressions control for the following child, mother, household, and community-level factors: age of the child, sex of the child, mother's education, household size, improved sanitation facility, improved drinking water facility, wealth index, type of residence (urban or rural), type of region (South/Centre Iraq or Kurdistan region), and month of the survey. The coefficients on the covariates are not shown, but are available on request.

Table 3a. Multivariate results for the effect of violence on height-for-age z-scores by quintiles of violence

	Measure of violence			
	All attack incidents	All attacks (excluding criminal incidents)	IED incidents	Direct fire incidents
Quintile-1 (reference)				
Quintile-2	-0.0928**	-0.0464	-0.0862**	-0.0041
	(0.0382)	(0.0384)	(0.0374)	(0.0412)
Quintile-3	-0.1251***	-0.1056***	-0.1483***	-0.0502
	(0.0395)	(0.0406)	(0.0384)	(0.0375)
Quintile-4	-0.2321***	-0.1868***	-0.1876***	-0.0781*
	(0.0435)	(0.0445)	(0.0410)	(0.0415)
Quintile-5	-0.1995***	-0.1815***	-0.2217***	-0.0898*
	(0.0495)	(0.0496)	(0.0450)	(0.0473)
Constant	-1.0976***	-1.1037***	-1.0784***	-1.1112***
	(0.1351)	(0.1345)	(0.1350)	(0.1345)
N	23,410	23,410	23,410	23,410
R-squared	0.0196	0.0193	0.0195	0.018
F statistic	15.05***	14.37***	14.86***	13.30***

Notes: * p<0.10, ** p<0.05, *** p<0.01

This table shows the coefficients and standard errors on the quintiles of violence. Height-for-age z-score is the dependent variable. Each column represents a separate regression for different measures of violence (cumulative exposure to violence, incidence per 1000 population). Standard errors are clustered at sample cluster level (n=3,658). All regressions control for the following child, mother, household, and community-level factors: age of the child, sex of the child, mother's education, household size, improved sanitation facility, improved drinking water facility, wealth index, type of residence (urban or rural), type of region (South/Centre Iraq or Kurdistan region), and month of the survey. The coefficients on the covariates are not shown, but are available on request.

Table 3b. Multivariate results for the effect of violence on child stunting by quintiles of violence

	Measure of violence			
	All attack incidents	All attacks (excluding criminal incidents)	IED incidents	Direct fire incidents
Quintile-1 (reference)				
Quintile-2	0.0424***	0.0355***	0.0407***	0.0109
	(0.0096)	(0.0101)	(0.0094)	(0.0104)
Quintile-3	0.0409***	0.0374***	0.0453***	0.0205**
	(0.0101)	(0.0104)	(0.0100)	(0.0102)
Quintile-4	0.0716***	0.0683***	0.0615***	0.0251**
	(0.0111)	(0.0114)	(0.0103)	(0.0108)
Quintile-5	0.0764***	0.0732***	0.0795***	0.0489***
	(0.0125)	(0.0129)	(0.0114)	(0.0122)
Constant	0.3316***	0.3317***	0.3233***	0.3399***
	(0.0374)	(0.0373)	(0.0373)	(0.0377)
N	23,410	23,410	23,410	23,410
R-squared	0.0206	0.0204	0.0207	0.0188
F statistic	18.96***	18.28***	19.11***	17.10***

Notes: * p<0.10, ** p<0.05, *** p<0.01

This table shows the coefficients and standard errors on the quintiles of violence. Stunting (binary) is the dependent variable. Each column represents a separate regression for different measures of violence (cumulative exposure to violence, incidence per 1000 population). Standard errors are clustered at sample cluster level (n=3,658). All regressions control for the following child, mother, household, and community-level factors: age of the child, sex of the child, mother's education, household size, improved sanitation facility, improved drinking water facility, wealth index, type of residence (urban or rural), type of region (South/Centre Iraq or Kurdistan region), and month of the survey. The coefficients on the covariates are not shown, but are available on request.

Table 4a. Multivariate regression results for the effect of violence on child stunting by gender

Outcome	Measure of violence			
	All attack incidents	All attacks (excluding criminal incidents)	IED incidents	Direct fire incidents
Stunting (Girls)	0.0018**	0.0019**	0.0032**	0.0058**
	(0.0008)	(0.0008)	(0.0014)	(0.0025)
Constant	0.3165***	0.3162***	0.3166***	0.3154***
	(0.0466)	(0.0465)	(0.0465)	(0.0465)
N	11,549	11,549	11,549	11,549
R-squared	0.0159	0.0158	0.0159	0.0158
F statistic	10.48***	10.46***	10.46***	10.48***
Stunting (Boys)	0.0013*	0.0013*	0.0019	0.0049**
	(0.0007)	(0.0008)	(0.0013)	(0.0025)
Constant	0.3615***	0.3613***	0.3608***	0.3615***
	(0.0515)	(0.0515)	(0.0515)	(0.0515)
N	11,861	11,861	11,861	11,861
R-squared	0.0222	0.0222	0.0221	0.0223
F statistic	14.70***	14.68***	14.61***	14.78***

Notes: * p<0.10, ** p<0.05, *** p<0.01

This table shows the coefficients and standard errors on the measures of violence, separately for boys and girls. Stunting (binary) is the outcome variable. Each column represents a separate regression for different measures of violence (cumulative exposure to violence, incidence per 1000 population). Standard errors are clustered at sample cluster level (n=3,658). All regressions control for the following child, mother, household, and community-level factors: age of the child, mother's education, household size, improved sanitation facility, improved drinking water facility, wealth index, type of residence (urban or rural), type of region (South/Centre Iraq or Kurdistan region), and month of the survey. The coefficients on the covariates are not shown, but are available on request.

Table 4b. Multivariate regression results for the effect of violence on height-for-age z-scores by gender

	Measure of violence			
	All attack incidents	All attacks (excluding criminal incidents)	IED incidents	Direct fire incidents
Height-for-age z-scores (Girls)	-0.0048**	-0.0055**	-0.0093**	-0.0156*
	(0.0024)	(0.0027)	(0.0042)	(0.0081)
Constant	-1.0366***	-1.0367***	-1.0381***	-1.0338***
	(0.1793)	(0.1793)	(0.1794)	(0.1792)
N	11,549	11,549	11,549	11,549
R-squared	0.019	0.019	0.019	0.019
F statistic	11.49***	11.49***	11.53***	11.49***
Height-for-age z-scores (Boys)	-0.0037	-0.004	-0.0061	-0.0136
	(0.0025)	(0.0027)	(0.0043)	(0.0085)
Constant	-1.1947***	-1.1942***	-1.1936***	-1.1940***
	(0.1769)	(0.1769)	(0.1769)	(0.1768)
N	11,861	11,861	11,861	11,861
R-squared	0.0189	0.0189	0.0189	0.019
F statistic	11.38***	11.37***	11.34***	11.42***

Notes: * p<0.10, ** p<0.05, *** p<0.01

This table shows the coefficients and standard errors on the measures of violence, separately for boys and girls. Height-for-age z-score (continuous) is the outcome variable. Each column represents a separate regression for different measures of violence (cumulative exposure to violence, incidence per 1000 population). Standard errors are clustered at sample cluster level (n=3,658). All regressions control for the following child, mother, household, and community-level factors: age of the child, mother's education, household size, improved sanitation facility, improved drinking water facility, wealth index, type of residence (urban or rural), type of region (South/Centre Iraq or Kurdistan region), and month of the survey. The coefficients on the covariates are not shown, but are available on request.