

Data Appendix – Working Paper, "Armed Conflict, Household Victimization, and Child Health in Côte d'Ivoire" by Camelia Minoiu (cminoiu@imf.org) and Olga Shemyakina (olga.shemyakina@econ.gatech.edu).

The following provides details on our data sources, variable construction, and software.

Data sources:¹

- Household surveys ENV-2002 and ENV-2008²
 - ENV-2008. "Enquête sur le Niveau de Vie des Ménages de Côte d'Ivoire." National Statistical Institute and Ministry of Planning and Development of Côte d'Ivoire.
 - ENV-2002. "Enquête sur le Niveau de Vie des Ménages de Côte d'Ivoire." National Statistical Institute and Ministry of Planning and Development of Côte d'Ivoire.
- Armed Conflict Location and Event Data (ACLED) from <http://www.acleddata.com/> (see <http://www.acleddata.com/index.php/archived-data> for datasets), Raleigh et al. (2010).

Processing raw survey data

ENV-2002. Age information is available for 7,648 children aged 6-60 months; of these 988 have missing or non-reported height information (coded as '00'). Reasons are given why the child's height could not be recorded in 888 cases, as follows: child was absent (72.18 percent); child was ill (5.86 percent); refused (16.22 percent); and other (5.74 percent). Cells coded '00' were treated as missing.

Some observations on height are clearly mis-recorded; we inspect each observation and correct them as follows. The original survey height variable, reported in cm, varies between 1 and 9950. At the higher end, we divide values between 225cm and 1950cm by 10. We divide values between 4000cm and 9950cm by 100. (Extreme, biologically implausible values resulting from any of these manipulations—that is, 6 standard deviations higher than the median of the reference population—will subsequently be filtered out by the World Health Organization (WHO) Anthro STATA routine, see further below). At the lower end, we replace observations of 1cm (for children with ages 10 to 60 months) with 100cm. We examine the remaining observations with original height between 2 and 34cm in turn and manually adjust them depending on the age using the following code:

```
replace height=70 if height==7 & age==18
replace height=70 if height==7 & age==25
replace height=80 if height==8 & age==14
replace height=80 if height==8 & age==22
replace height=80 if height==8 & age==26
replace height=80 if height==8 & age==27
replace height=90 if height==9 & age==16
replace height=90 if height==9 & age==31
replace height=100 if height==10 & age==29
replace height=100 if height==10 & age==37
```

¹ In this document we do not refer to the third survey used in the analysis (namely, the MICS3-2006. "Enquête par Grappe a Indicateurs Multiples." National Statistical Institute, Ministry of Planning and Development of Côte d'Ivoire, and UNICEF) because clean height information and height-for-age z-scores are available in the dataset.

² The ENV-2002 and ENV-2008 survey data can be obtained on request from the National Statistical Institute of Côte d'Ivoire; for contacts, see <http://www.ins.ci/nada/?page=contacts.html>

replace height=100 if height==10 & age==48
replace height=100 if height==10 & age==51
replace height=110 if height==11 & age==48
replace height=110 if height==11 & age==54
replace height=120 if height==12 & age==32
replace height=120 if height==12 & age==39
replace height=120 if height==12 & age==50
replace height=130 if height==13 & age==28
replace height=150 if height==15 & age==47
replace height=150 if height==15 & age==57

The final number of children in ENV-2002 with height information is 6,544 (~ 85 percent). The mean height for imputed observations is 85.59cm while for non-imputed observations it is 83.63cm.

ENV-2008. Age information is available for 4,588 children aged 6-60 months; of these, 1,566 have missing or non-reported height information (coded as '00'). Reasons are given why the child's height could not be recorded in 1,192 cases, as follows: child was absent (34.23 percent); child was ill (3.52 percent); refused (14.35 percent); and other (47.90 percent).

There are 2 children (1 month old, 30 months old) with height of 1cm. A height of 100cm is assumed for the 30 month child. No imputations are made to recorded cells of 2cm and 3cm. For children with recorded height of 4cm to 20cm, we manually examined each child's height and age and made corrections as follows:

replace height=140 if height==14 & age==30
replace height=120 if height==12 & age==24
replace height=110 if height==11 & age==57
replace height=100 if height==10 & age==19
replace height=100 if height==10 & age==48
replace height=100 if height==10 & age==51
replace height=90 if height==9 & age==14
replace height=90 if height==9 & age==42
replace height=90 if height==9 & age==51
replace height=90 if height==9 & age==60
replace height=80 if height==8 & age==60
replace height=70 if height==7 & age==20
replace height=60 if height==6 & age==32
replace height=50 if height==5 & age==18
replace height=50 if height==5 & age==25
replace height=50 if height==5 & age==27

The final number of children in ENV-2008 with height information is 3,022 (~ 66 percent). The mean height for imputed observations is 83.64 cm while for non-imputed observations it is 84.46 cm.

Correlation between missing/imputed height observations in the original surveys and observables.

We examine whether households in which children were measured, or for which height information was imputed, are systematically different from households in which they were not (so height information is missing or has been imputed). As indicated above, height information is missing for 15 percent of the children in the 2002 survey and 34 percent in the 2008 survey. The results are presented in Table 1.

Calculating height-for-age z-scores

Height-for-age z-scores are calculated using WHO reference datasets and the WHO Anthro (version 3.2.2 January 2011) STATA routines available on <http://www.who.int/childgrowth/software/en/>. In the two surveys, 9.99 percent and 21.20 percent of observations respectively are deemed to have biologically implausible z-scores (that is, more than 6 standard deviations away from the international reference population). We drop these from the analysis. The final sample comprises 8,221 children (5,885 from the 2002 survey and 2,326 from the 2008 survey).

Defining non-migrant households

ENV-2002. Non-migrant households are defined as those that lived in their current location (as of the interview date in fall 2002) since December 1993. The December 1993 cutoff was chosen because it marks the death of Ivorian president Félix Houphouët-Boigny, and is the beginning of a relatively turbulent period in Cote d'Ivoire.

ENV-2008. Non-migrant households are defined as those that had lived in their current location since August of 2002, that is, before the start of the 2002–2007 armed conflict.

Defining rural households

Neither survey provides information on rural/urban sector of (current) residence. We create an indicator variable for children in rural residence based on children's recorded place of birth and migration history. Children from non-migrant households are assigned their sector of birth. For 23 children in the 2008 survey for whom this information is missing, we use instead the household head's sector of birth as long as the household head has been in their current location since their birth, and it is a non-migrant household (that is, the child was born in that location).

Maps with the spatial distribution of conflict events

Conflict event maps were created by manually merging conflict event locations from ACLED with children's residence in the household surveys. ACLED locations are either provinces, in which case the merging is automatic, or villages/towns, in which case the latter are matched to their respective province (on the basis of searches on <http://www.maplandia.com/search/>). The maps were created using the "spmap" STATA routine (<http://www.stata.com/support/faqs/graphics/spmap.html>). The Atlas for Cote d'Ivoire with GIS information was downloaded from Dynamic Atlas (<http://psugeo.org/Africa/Tools.htm>).

Table 1. Determinants of likelihood that height information is missing or imputed

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
|----------------------------------|-----------------------|----------------------|----------------------|----------------------|-----------------------|----------------------|---------------------|--------------------|
| | 1=Missing observation | | | | 1=Imputed observation | | | |
| Age (months) | -0.001*** (0.000) | -0.001*** (0.000) | -0.001*** (0.000) | -0.010*** (0.001) | -0.000 (0.000) | -0.000 (0.000) | -0.000 (0.000) | -0.000 (0.000) |
| 1=Female | 0.011 (0.012) | 0.013 (0.012) | 0.009 (0.012) | 0.009 (0.018) | -0.006 (0.006) | -0.006 (0.006) | -0.004 (0.006) | 0.010 (0.009) |
| 1=Poor household | -0.025 (0.019) | -0.028 (0.019) | -0.028 (0.020) | 0.073** (0.030) | -0.001 (0.011) | 0.002 (0.012) | 0.000 (0.010) | -0.000 (0.011) |
| 1=Rural household | 0.015 (0.020) | 0.013 (0.021) | 0.004 (0.022) | 0.036 (0.026) | -0.003 (0.010) | -0.001 (0.009) | -0.001 (0.010) | 0.002 (0.009) |
| 1=Conflict Region | -0.032** (0.014) | -0.031** (0.014) | -0.030** (0.015) | -0.027 (0.028) | 0.008 (0.009) | 0.007 (0.009) | 0.006 (0.010) | 0.017* (0.009) |
| 1=Ethnicity: Northern Mande | 0.069*** (0.025) | 0.064*** (0.025) | 0.057** (0.026) | -0.011 (0.042) | -0.002 (0.017) | 0.001 (0.016) | 0.007 (0.019) | 0.012 (0.015) |
| 1=Ethnicity: Southern Mande | 0.008 (0.031) | 0.002 (0.031) | 0.003 (0.035) | 0.086* (0.046) | -0.024 (0.015) | -0.025* (0.015) | -0.019 (0.016) | -0.008 (0.014) |
| 1=Ethnicity: Voltaique/Gur | 0.016 (0.038) | 0.007 (0.037) | 0.005 (0.037) | -0.059 (0.039) | -0.017 (0.016) | -0.013 (0.015) | -0.017 (0.015) | 0.018 (0.016) |
| 1=Ethnicity: Krou | 0.085*** (0.025) | 0.084*** (0.024) | 0.079*** (0.025) | -0.029 (0.040) | 0.012 (0.017) | 0.010 (0.017) | 0.010 (0.018) | 0.018 (0.018) |
| 1=Ethnicity: Naturalized Ivorian | 0.100 (0.077) | 0.098 (0.077) | 0.118 (0.089) | 0.466** (0.209) | -0.044*** (0.014) | -0.040*** (0.014) | -0.037** (0.016) | -0.031 (0.021) |
| 1=Ethnicity: Immigrant | 0.012 (0.021) | 0.002 (0.021) | -0.002 (0.021) | 0.016 (0.039) | 0.003 (0.015) | 0.006 (0.015) | 0.008 (0.015) | -0.009 (0.009) |
| 1=Muslim | -0.067** (0.032) | -0.067** (0.031) | -0.077** (0.032) | -0.028 (0.037) | -0.006 (0.014) | -0.005 (0.014) | -0.008 (0.013) | -0.013 (0.014) |
| 1=Christian | -0.061*** (0.021) | -0.061*** (0.021) | -0.068*** (0.022) | -0.043 (0.031) | -0.008 (0.010) | -0.010 (0.010) | -0.009 (0.010) | -0.013 (0.011) |
| 1=Household head is educated | | -0.011 (0.016) | | 0.004 (0.024) | | 0.013 (0.009) | | 0.006 (0.010) |
| 1=Household head is male | | 0.050*** (0.018) | | -0.099** (0.048) | | 0.024** (0.010) | | 0.019 (0.017) |
| Household head's age | | -0.001* (0.000) | | -0.000 (0.001) | | 0.000 (0.000) | | 0.001* (0.001) |
| 1=Household head is married | | -0.022 (0.019) | | 0.127** (0.057) | | -0.038** (0.015) | | -0.035 (0.028) |
| 1=Mother is educated | | | -0.031** (0.015) | -0.031 (0.025) | | | 0.010 (0.006) | -0.016* (0.009) |
| Mother's age | | | -0.002** (0.001) | -0.000 (0.002) | | | 0.000 (0.000) | -0.001 (0.001) |
| Economic losses, index | | | | 0.000 (0.010) | | | | 0.001 (0.004) |
| Health impairment, index | | | | 0.018 (0.013) | | | | 0.013* (0.007) |
| Displacement, index | | | | -0.015 (0.014) | | | | -0.009 (0.006) |
| Victim of war violence, index | | | | -0.011 (0.024) | | | | -0.010 (0.008) |
| 1=2008 obs. | 0.210*** (0.015) | 0.206*** (0.015) | 0.217*** (0.015) | | -0.011 (0.007) | -0.011 (0.007) | -0.010 (0.007) | |
| Observations | 11,096 | 11,062 | 10,005 | 3,107 | 8,808 | 8,778 | 7,957 | 2,075 |
| R-squared | 0.021 | 0.024 | 0.025 | 0.128 | 0.004 | 0.007 | 0.004 | 0.020 |

Notes: *** p<0.01, ** p<0.05, * p<0.1. Standard errors clustered at the province level.