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The Institute of Development Studies - at the University of Sussex - Falmer - Brighton - BN1 9RE
www.hicn.org

Forced Displacement and Early Childhood Nutritional Development in Colombia[1]

Karen del Mar Ortiz Becerra[2]

HiCN Working Paper 180

August 2014

Abstract: This document attempts to determine the impact of forced displacement on early childhood nutritional development. I use two identification strategies in order to address the endogeneity caused by the potential correlation between forced displacement and the unobserved heterogeneity of the household. Using instrumental variables, the first strategy compares the outcomes of the displaced children with those of the children who stayed at the municipality of expulsion. The second identification strategy compares cohorts of children within the same household born before and after displacement. The results suggest that forced displacement increases the likelihood of chronic malnutrition between 12.6 and 18.1 percentage points. After controlling for household fixed effects, I find that forced displacement also delays linear growth. The results differ in magnitude and significance depending on the type of displacement (reactive or preventive), the age at which the child moved, and the time of exposure to the shock (duration of displacement).

Keywords: Forced displacement, armed conflict, early childhood health, anthropometric indicators, instrumental variables
JEL Codes: D74, I10, I15, C36

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[1] This article was written as a thesis for the Magister in Economics at Universidad de los Andes. I thank my advisor Ana María Ibáñez for her constant support and interest in this work. Comments from Adriana Camacho and Sandra García also helped to improve this paper.
[2] Consultant at Inter-American Development Bank. kortiz@iadb.org, ka.ortizb@gmail.com

1. Introduction

Colombia is the country with the highest number of displaced people in the world. At 14.7 percent of the world's displaced population in 2011, it ranks higher than war-torn countries such as Sudan, Iraq and the Democratic Republic of the Congo (IDMC Global Overview, 2011). Forced displacement now affects 3.9 million people in Colombia, about 8 percent of the national population. However, despite forced displacement's relevance and impact on national public policy, very few studies present statistical evidence on its causes and its medium and long term costs.

Unlike temporary shocks to income, forced displacement is a permanent shock that structurally impacts the welfare of a family. The loss of physical and specific human capital deteriorates the productive capacity of households (Ibáñez, 2008) and undermines access to formal insurance such as credit. Moreover, the weakening of social networks prevents the access to informal insurance mechanisms that would mitigate the effects of subsequent changes in income. Given the lack of insurance mechanisms to mitigate the shock, households are forced to adopt strategies that generate irreversible long-term costs in terms of human capital accumulation. Evidence suggests that as a consequence of forced displacement household consumption decreases. Furthermore, the dropout rate for children over 12 years of age increases due to the need for alternative sources of household income (Ibáñez and Moya, 2010).

There is ample international literature that studies the impact of conflicts on early childhood nutritional development. However, there is no empirical study related to the effect of internal forced displacement on children's nutrition and health. The existing literature on the consequences of forced displacement in Colombia analyzes and quantifies the loss of household welfare in terms of consumption and

household income, but the evidence regarding the irreversible long-term costs to human capital is still lacking. Plausible explanations for the limited exploration of this topic may be related to the limited availability of data about displaced people, the difficult task of finding an appropriate control group, and identification problems arising from the endogeneity of forced displacement. I use two identification strategies to determine the impact of forced displacement on nutritional development during early childhood. Using the instrumental variables approach, the first strategy compares the outcome indicators of displaced children with those from children in the municipalities of origin who were not displaced. The second strategy uses differences in time of exposure to the shock by comparing cohorts born before and after displacement within the same household.

The results indicate that forced displacement increases the probability of chronic malnutrition between 12.9 and 18.1 percentage points. However, the significance and magnitude of impact differs according to the age at the time of the shock, the type of displacement, and the duration of displacement. Children who were displaced during their first two years of life have a higher prevalence of chronic malnutrition. Furthermore, children from households that were either attacked directly or displaced more than a year earlier are more likely to exhibit retardation in their linear growth. I find a significant reduction of 0.35 standard deviations in the z score of height for age after controlling for fixed effects. No impacts on short term health indicators were found when controlling for household fixed characteristics over time.

This study contributes to the economic literature on conflict as well as the literature related to shocks to early childhood health and nutrition. Given the empirical evidence about the effects of early malnutrition on education, productivity, and later job performance (Alderman et al., 2001; Alderman et al.,

2006; Glewwe y Jacoby, 1995; Glewwe et al. 2001), the results show evidence of the negative impact of armed conflict on short and long term childhood development.

This paper is organized as follows. The next section presents a literature review of the impact of conflict on health and nutritional indicators in childhood. Section three discusses the empirical estimation strategy and describes the data and nutritional indicators used. The econometric results obtained from both empirical strategies as well as the heterogeneous effects by type of displacement and age at the moment of the shock are presented in the fourth section. The fifth section concludes.

2. Conflict and Early Nutritional Development

There are several channels through which armed conflict affects children's health and nutritional status. The deterioration of public infrastructure limits access to basic sanitation, potable water, and care in health centers. Moreover, the lack of food availability deteriorates household consumption trends, limiting the intake of sufficient micronutrients in children. Evidence also suggests that conflict limits the ability of households to invest time and resources in their children. Guerrero (2009) finds that, due to a decrease in the probability of being breastfed and an increase in the incidence of diarrhea, children born in areas exposed to high levels of violence during the war in Iraq are between 0.38 and 0.44 standard deviations shorter than those born in areas with low violence intensity.

Civil conflicts like those in Rwanda and Burundi in the 90s are evidence of the deterioration of nutritional status as a result of conflict. Akresh, Verwimp and Bundervoet (forthcoming) find that children born in areas affected by civil

conflict in Rwanda experience linear growth delay represented by a 0.676 standard deviation reduction in their height for age. Similarly, findings of Bundervoet and Verwimp (2005) suggest that children from rural areas who were exposed to civil conflict in Burundi have a 0.5 standard deviations lower height for age. The evidence for Latin America is also consistent with the results obtained in studies from Africa. Grimard and Laszlo (2010) investigate the long-term effects of the Peruvian civil conflict on health outcomes, finding that women who were exposed to violence during those decades are smaller and display a higher incidence of anemia.

Two studies show evidence of violence's impact on children's health in Colombia. First, using data at the municipality level between 1990 and 2000, Urdinola (2004) finds that an increase of 1 murder per 1,000 people is related to an increase in the child mortality rate of 2 deaths per 1,000 births. Although this is a first attempt to explore the effects of violence on childhood health, this study contains some identification weakness since the local homicide rate is endogenous. Furthermore, the birth data from the National Registry, used to calculate infant mortality rates, belongs to a self-selected sample which only accounts for children whose parents came to a notary to register them. In a second study, Camacho (2008) estimates the impact of terrorist attacks on child health indicators such as weight and length at birth. Using a quasi-experimental approach, her results indicate that children exposed in utero to mine explosions in their town of residence during the first trimester of pregnancy are 8.7 grams lighter at birth compared to their brothers without exposure to mines. Some of the channels are mother's stress during pregnancy and lower attendance to prenatal care.

There is no literature on the impact of forced displacement on the nutritional development of displaced children; however, a study by Baez (2010) estimates the impact of forced cross-border migration during the genocides in Burundi and Rwanda on the health and nutrition of children from the reception communities. Children from the hosting town (Kagera, Tanzania) experienced a deterioration of their health and nutritional indicators. The prevalence of infectious diseases increased by 15 to 20 percent, anthropometric measurements such as height for age displayed a decline of 0.3 standard deviations, and the mortality rate of children under five increased by 7 percentage points.

To date, Baez's paper is the only study that estimates the impact of conflict on anthropometric indicators using the channel of forced migration. The current study, however, aims to answer a different question. Forced displacement in Colombia is an idiosyncratic shock that, aside from expelling people to other countries en masse, requires households to move *within* the country. Thus, while Baez (2010) estimates the impact of forced migration on children's nutritional development in the communities that host the refugees, the objective of this research is to estimate the direct impacts of forced migration on children's nutritional development within the internally displaced population.

3. Methodology

This section presents the empirical strategy of estimation. It describes the data, the nutritional indicators used as outcome variables, and some econometric issues that must be taken into account in order to obtain an unbiased and consistent estimator of the impact of forced displacement on the nutritional status of children who were displaced.

3.1 The Data

The data used in this paper comes from two different impact evaluations of the conditional cash transfer program *Familias en Acción* (FA). The first evaluation attempts to find the impacts of FA on rural households and consists of a baseline collected in 2002, and two follow-ups collected in 2004 and 2006 respectively. The second evaluation, which attempts to find the impacts of FA on the displaced population, consists of cross sectional data collected in 2007. Data for the control group comes from the first follow-up of the evaluation for rural households since the time of exposure to the program FA when the survey was collected is very similar to that reported in the evaluation for the displaced population, 20.9 and 19.2 months respectively.

The use of rural households as a control group represents an important advantage for estimating the impact of forced displacement on early childhood nutrition. The vast majority of displaced families come from rural areas, hence it is less likely to find many preexisting differences between the treatment and control groups than if a control group of urban households was used. Moreover, to avoid bias due to preexisting differences among the towns with and without expulsion of displaced people, I restrict the control group to rural households residing in the same towns where the displaced population in the sample comes from.

The two surveys provide information on the socioeconomic characteristics of the households including structure, size, level of education, labor force participation,

ownership of assets and access to services[2]. They also contain detailed information on the anthropometric measurements of weight and height for children ages 0-6, children's immunization schedules, and the incidence of diseases in children during the 15 days preceding the survey date. In addition to these variables, the impact evaluation that focuses on displaced population collects current and retrospective information regarding the socioeconomic status of the households at the municipalities of origin and arrival. This information includes assets possession, access to credit, household composition, participation in labor markets, parents' education, health insurance affiliation, and membership to social organizations. Data on the causes and date of displacement as well as characteristics of the municipalities of origin and arrival are also collected in this survey.

There are at least two advantages to having retrospective information for the displaced population. First, data about the condition of the households in the place of origin may facilitate a match of the groups in observable characteristics before displacement. Moreover, as explained in the next section, information about the date of displacement as well as the location of the municipalities of origin and arrival allows the construction of an instrumental variable since possible differences in unobservable characteristics between displaced and non-displaced households may exist. I also use data on the number of massacres in the municipalities of origin as an input for the construction of the instrumental variable (Calderón and Ibáñez, 2009). The data is retrieved from the official publications of the Observatorio de la Vicepresidencia de la República, which

[2] Due to the imprecision of the income data in the surveys, I use an index in order to approximate the household's wealth status. This index is constructed by using a principal component analysis of the possession of assets and the access and availability of public services in the household.

contains yearly data on the number of massacres at the municipal level on an annual basis from 1997 to 2007.

One of the disadvantages of using these two surveys is the difference in time of collection of the data - the first follow-up to the evaluation for rural households was held in 2004 while the evaluation for displaced households was held in 2007. Thus, in order to avoid potential bias due to the economic cycle, the estimation includes municipal variables that capture the municipality's economic situation at the time of the survey.

Also, although the surveys of the two evaluations identify the households that participate in the program *Familias en Acción*, there is no uniformity in the questions regarding date of entry to the program, time since the first grant was received, and the number of subsidies received. Hence, in order to avoid any possible bias due to the lack of information on the benefits of the program for each household, I only use the sample of displaced and rural households that are not beneficiaries of FA[3].

After joining the two databases and eliminating some inconsistent data[4], the sample is composed of a total of 2,423 children under 6 years of age from 1,637 households. 57.4 percent are displaced households and the remaining 42.6 percent belong to the control group made up of rural households in municipalities where the displaced population comes from. Given that the displaced population has immediate access to FA once they register in the *Unique Record of the Displaced Population* (RUPD for its acronym in Spanish), the sample used in this evaluation

[3] Future research should take into account access to state social programs to check the effectiveness of these programs in mitigating the impacts of displacement.

[4] Following the data cleansing used in Alderman et al. (2006) all children with a z-score less than -6 or greater than 6 standard deviations were excluded.

is representative of displaced households, and thus, the results presented have external validity and are generalizable.

3.2 Nutritional Outcomes

Nutritional development in children can be measured by the incidence of overall malnutrition, acute malnutrition, and chronic malnutrition as determined by the use of the anthropometric measures of weight for age, weight for height and height for age (WHO, 1995)[5]. Acute malnutrition, or low weight for height, is a measure of recent weight loss associated with reduced food availability or incidence of disease at the time of the survey. Chronic malnutrition, or low height for age, is an indicator of stunting of long term growth due to deficiency in protein or food intake for a long period of time, concurrent disease, or impairment of health of the mother during pregnancy. Finally, low weight for age, or overall malnutrition, is a general indicator of nutritional status at the time of the survey that does not obey long-term structural factors.

In order to compare the magnitude of the impact with the coefficients found in the literature on conflict and nutrition, the standardized score of height for age, a measure of linear growth, is also used as an outcome indicator. Given the relationship between short-term illnesses and nutritional development, the incidence of diarrhea and the incidence of cough, flu, or cold are used as well.

[5] Standardization for height and weight according to sex and age in months uses measures from the National Center for Health Statistics (NCHS) for 2000

These six indicators - overall malnutrition, acute malnutrition, chronic malnutrition, height for age (z score), incidence of diarrhea and incidence of cough, flu, or cold - are used to find the impact of displacement on the nutritional status of displaced children. The incidence of chronic malnutrition and low height for age are analyzed in more detail due to their importance as determinants of long-term health; children with growth retardation during the first months and/or years of life are more likely to continue with this problem as they get older (Martorell Habicht, 1986).

3.3 Empirical strategy

I use the following reduced form in order to estimate the impact of forced displacement on the nutrition of displaced children. The variable of interest D_{hj} is a dummy variable that takes the value of 1 if the child belongs to a displaced household and 0 otherwise:

$$Y_{ihj} = \beta_0 + \beta_1 D_{hj} + \beta_2 c_{ihj} + \beta_3 z_{hj} + \beta_4 X_j + \beta_k + \Phi_{\text{hj}} + \xi_{ihj} \quad (1)$$

where Y_{ihj} corresponds to the anthropometric measures, c_{ihj} contains the individual characteristics of child i in household h and municipality j, z_{hj} is a vector of socio-demographic and economic characteristics of household h in municipality j, X_j contains variables regarding the economic performance of municipality j, and β_k represents fixed effects by departamento[6]. Φ_{hj} and ξ_{ihj} capture the unobserved heterogeneity of the household and the child respectively.

[6] I am not able to control for municipality´s fixed effects due to the way the instrumental variable is constructed. Robust exercises using the OLS estimations that control for i) municipality´s fixed effects, ii) fixed effects by departamento and iii) fixed effects by departamento including the

The next subsection discusses some econometric issues and the identification strategies used in order to obtain an unbiased and consistent estimator of the impact of forced displacement on the nutritional development of the displaced children.

3.4 Some econometrics issues

Finding a suitable control group for displaced people due to violence is not an easy task. Victimization is not random to household characteristics, and under certain circumstances leaving the place of origin and finding a place of destination may be decisions. Attacks on civilians in the Colombian context are not random. Armed groups deliberately target households that have high income, property, female heads, and high levels of social capital (Ibáñez and Vélez, 2005)[7]. Therefore, given that income, socioeconomic status, and social capital also depend on unobservable characteristics of the individuals - altruism, entrepreneurship, and leadership ability-, the probability of being a victim of a direct attack is also related to unobservable household characteristics.

Displacement and the choice of destination may be another source of endogeneity. Conditional to observable household characteristics, households with higher risk aversion are more likely to displace. Similarly, mothers who are more motivated and concerned about the welfare of their children will make decisions based on comparisons of the conditions in the municipalities of origin and reception. If they

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economic performance of the municipality during the year of collection of the survey, were conducted. The results show that the impact of forced displacement is overestimated when controlling only for fixed effects by departamento. However, once I include the economic performance of the municipality, the coefficient is very similar to the one found when controlling for fixed effects at the municipality level.

[7] See Ibáñez Velez (2005) for more detail on the profile of the victims in municipalities with forced displacement.

decide to displace, it is possible that they also make an informed decision on which would be the municipality of reception with the least unfavorable conditions[8].

It is likely that these unobservable household characteristics that influence the decision to displace are also part of the unobserved household heterogeneity affecting the outcome indicators of nutrition. It is plausible to think that children in risk averse households or with more motivated mothers have better results in terms of childhood nutritional development. Therefore, even when using non-displaced rural households as a control group, the estimate of the model by Ordinary Least Squares would produce a biased and inconsistent estimator of the impact of forced displacement on the nutritional status of children.

I use two identification strategies to solve this potential endogeneity. Based on the model presented above and the two evaluations of *Familias en Acción*, the first strategy compares the outcomes of displaced and non-displaced children living in the municipalities of expulsion using the instrumental variable approach. The two instrumental variables for forced displacement are: i) the median number of massacres in the municipality of origin from 1997 to the year of each household's expulsion and ii) the distance between the towns of expulsion and reception for each household[9]. The number of killings in the town of origin is related to the process of expulsion of the population. However, the median number of massacres at the municipal level is not related to unobservable household characteristics such as greater motivation in motherhood and

[8] Among the reasons that households report for having chosen their place of reception are presence of friends or relatives, greater job opportunities, and greater aid from the state.

[9] The instrumental variables used are a variation on the instrumental variables proposed by Calderón and Ibáñez (2009)

parenting[10]. Since it is plausible that people who live in municipalities with high levels of massacres have poor health, one may think that children with high levels of exposure to violence in their place of origin would have a disadvantage in terms of pre-displacement health. To check whether there is a relationship between the median of massacres and the state of health in the municipalities, Table 1 shows the comparison of some nutritional indicators between children who have lived in municipalities with high and low intensity of massacres. The results indicate that there are no significant differences between groups for any of the indicators.

The distance that households travel between departure and arrival cities is also related to the choice of municipality of reception. As the distance between the municipalities of expulsion and reception increases, travel costs increase and the chance of receiving aid from a family member or acquaintance decreases. However, despite the fact that households can choose the place of reception deciding to move farther in order to reach municipalities with more assistance or staying closer in order to stay close to their assets, the distance between the municipality of origin and any other municipality is exogenous to the unobservable household characteristics. I present the Hansen over-identification test in order to check the validity of the instrumental variables in each estimation.

The second identification strategy uses differences in timing of exposure to the shock by comparing cohorts born before and after forced displacement within the same household. The estimated model in this case is a variation on model (1):

$$Y_{ih} = \beta_0 + \beta_1 A_h + B_2 C_{ih} + \alpha_h + \xi_{ih} \quad (2)$$

[10] Although armed actors select which municipalities to attack, this selection is based on municipal characteristics such as geography, the availability of natural resources and institutional weaknesses that facilitate the appropriation of resources

The coefficient of interest β_1 represents the difference in the impact received by a child that was born before displacement and thus suffered the shock, and a child of the same household born after the event. C_{ih} is a vector that contains observable characteristics of the child and α_h corresponds to household fixed effects.

This strategy helps to solve many endogeneity problems. Since forced displacement is an unexpected shock, being born before or after displacement is exogenous to the unobservable heterogeneity of the household. In order to avoid possible biases due to the parent´s decision of having more or less children after forced displacement[11], this second strategy is estimated using only the subsample of children conceived before the event. Furthermore, controlling for household fixed effects reduces the estimation bias, enhancing the accuracy of the estimated coefficients.

Two potential problems may persist with this estimate. Since the only requirement is that the unobservable characteristics that affect household decisions regarding childcare are fixed in time, evidence of change in these characteristics due to forced displacement imposes a bias in the estimates. In this regard, a study by Calderon, Gáfaro and Ibañez (2011) on women's empowerment as a result of conflict found that mothers' frustration induced by the lack of bargaining power in the household despite the increase in their share of household income is related to an increase in violence against children at home. Therefore, as the change in rearing practices after displacement imply a disadvantage in the welfare of children born after the event, any effect found in this paper would be underestimated.

[11] This decision may be influenced by greater educational opportunities and access to health and public services in the reception cities.

The second source of bias is related to the ability to control for the effects of intrauterine exposure to shock in the model. Camacho (2008) found that children who were exposed to conflict shocks in utero are disadvantaged in terms of birth weight. Her results are evidence against the nutritional status of children who were born after displacement but who were exposed to a shock in utero. Since I am not able to control for children's in utero exposure, the coefficients obtained with these estimates underestimate the impact of forced displacement on the development of children's nutritional and health status.

4. Evidence of the Impact on Early Nutritional Development

This section presents forced displacement's impact results on nutritional development indicators obtained through the two estimation strategies. Heterogeneous impacts by age of exposure to shock, time, and type of displacement are also presented.

4.1 Household characteristics

Since forced displacement affects household characteristics, it is expected that displaced and non-displaced rural households are very different in their current features (i.e. after displacement)[12]. However, for non-displaced rural households to be a good control group, no major differences in their characteristics prior to displacement should be found. Table 2 shows descriptive statistics and mean differences for retrospective features (i.e. before displacement) between treatment

[12] In the remainder of this document, *current features* refers to household characteristics after displacement.

and control households[13]. Mothers and heads of households in the displaced sample have a higher level of education. Additionally, the size of the displaced households is smaller. The proportion of households with home ownership also shows evidence about the favorable economic conditions of displaced households before displacement; 53 percent of non-displaced rural households owned housing, while about 58 percent of displaced households owned housing. The proportion of single-parent households among the displaced population was about 51 percentage points higher than the proportion of single-parent households in the control group.

The results indicate that there are systematic preexisting differences between displaced households and control households; in particular, the situation of displaced households in the origin towns was better. This evidence is consistent with the findings of Ibanez and Velez (2005), which show that the households with better socio-economic conditions, asset ownership, and land ownership have a greater likelihood of victimization. Since household socioeconomic characteristics are positively related to nutritional performance and children's health, it is expected that given the lack of information on pre-existing differences in a wider set of households' characteristics, OLS estimations would produce sub estimated coefficients of forced displacement's impact. To solve this problem, the first strategy of this study uses the instrumental variables approach to correct for possible bias due to differences in observable and unobservable characteristics between groups.

Table 3 indicates the differences in some current socio-economic features of households such as structure and size, mother's and head of household's

[13] It is assumed that these characteristics do not change significantly over time for non-displaced rural households. Therefore, in order to compare the data of non-displaced households with the retrospective information of displaced households, information collected in 2004 on current features was used.

education, labor force participation and socioeconomic status as approximated by a household wealth index. As expected, the current conditions of displaced households are not only different from those of rural non-displaced households, but in most cases worse. On average, displaced families are smaller, and even when the percentage of single-parent households decreased after displacement, this proportion is still significantly higher when compared to the proportion of single parents in non-displaced households (36% vs. 20%).

Participation in urban labor markets is lower for displaced households. Although on average mothers of displaced households work more hours per week, only 33 percent of displaced mothers have a job. Statistics regarding unemployment of household heads also show a disadvantage for displaced population (10% vs. 0.7%). However, since control households belong to rural areas, these results may be due to differences in the measurement of unemployment among urban and rural markets.

The economic conditions of displaced households are also unfavorable. The wealth index is lower in displaced households than it is in control households (-0.201 vs. -0.076), and the proportion of households in the first quintile is four percentage points higher. Displaced households are also disadvantaged in terms of welfare; the logarithm of the average monthly expenditure per capita is lower (1.26 vs. 1.88), which is statistically significant at one percent.

In addition to the comparison of household socio-economic characteristics, Table 4 presents some of the child´s characteristics as well as the health and nutrition indicators to be used as outcomes in the study.

Results show that participation and attendance of displaced children in health programs is higher. This is expected due to the higher availability of health care and state social programs in urban areas. However, the nutritional and health status of displaced children is worse in cities. Although the incidence of acute malnutrition is only 4 percent among these children, 23 percent of them have chronic malnutrition. This incidence of chronic malnutrition in displaced children is 8 percentage points higher than the incidence in the control group and 10 percentage points higher than the national average according to the National Demographic and Health Survey of 2010. Compared to non-displaced children, displaced children display a little more than twice the incidence of diarrhea (30%) and cough, flu or cold (65%) during the last 15 days prior to the survey.

4.2 Results

Table 5 presents the results of the OLS estimations. All estimations control for observable characteristics of children and households, and fixed effects by *departamento* of current residence. Since the surveys for the control and treatment group were conducted in different years, the estimations also include a tax revenue per capita variable as a proxy of municipal performance in the year of collection of each survey[14].

The results indicate that forced displacement deteriorates nutritional status in the long term since a displaced child has a 5.6 percentage points higher probability of chronic malnutrition. There is no statistical evidence that forced displacement

[14] It is plausible to think that business cycle factors are related to current household characteristics as well as the performance of children's nutritional indicators. Thus, since it was not possible to obtain data on displaced and rural households that both meets the requirements for this study and was collected during the same year, I control for municipal performance in the year in which each survey was collected to avoid possible bias (2004 for the first follow-up of *Familias en Acción* for Rural Families and 2007 for the evaluation of *Familias en Acción* for Displaced Population)

affects overall and acute malnutrition or the z-score of height for age. Nevertheless, the incidence of short term diseases that affect nutritional development increases with forced displacement: a displaced child has a higher probability of having diarrhea and a cough, cold or flu by 12.4 and 27.8 percentage points respectively. The chronic malnutrition coefficient is significant at 5 percent while the coefficients of diseases such as diarrhea and the flu are significant at 1 percent.

Boys have a lower height for age and a higher probability of incidence of chronic malnutrition; however, there is no significant difference in the performance of short-term indicators such as overall malnutrition by sex. Household size and the proportion of children under six years old at home, as well as low economic status are associated with the deterioration of nutritional development. On the other hand, mother's education has a positive relationship with the three different nutritional indicators. Further analysis of the child and household characteristics coefficients is presented with the results obtained after correcting for endogeneity.

Table 6 shows the results of the estimates obtained by using the instrumental variables approach. It also shows the Hansen test of the relevance and validity of the instruments: the median number of massacres in the municipality of origin from 1997 to the year of expulsion of each household and the distance between the towns of expulsion and reception for each household h [15]. The *F*-statistic is large enough to reject the null hypothesis of weak instruments in all the

[15] The null hypothesis for orthogonal instruments is rejected once I include massacres as an instrument of displacement in the estimations where the dependent variable is the incidence of cough, cold or the flu. Since a correlation between the massacres in a municipality and the incidence of diseases acquired by infection such as cough/cold is possible, I only use the distance between the municipalities of expulsion and reception for each household as an instrument of forced displacement when estimating impacts on this particular outcome.

estimations[16]. Furthermore, it is not possible to reject the null hypothesis of the Hansen test of instrument in any of the six estimations. Given that the instruments used meet the relevance and validity conditions, it is plausible to assume that these estimations reduce and correct the bias of the OLS estimates presented above.

There is no significant evidence that forced displacement impacts the probability of overall or acute malnutrition[17]. Although the sample used in this study does not include beneficiary households of the Program *Familias en Acción*, it is likely that emergency humanitarian aid provided by the government or food assistance provided by NGOs contribute to mitigate recent weight loss associated with reduction in food availability. An increase in one year of the mother's education is associated with a decrease in the probability of both overall and acute malnutrition by 0.9 and 0.4 points respectively.

Forced displacement deteriorates long-term nutritional development. Compared to a non-displaced child, a displaced child has an 18.1 percentage points higher probability of chronic malnutrition. This coefficient is significant at 5% percent and is greater in magnitude compared to the coefficient obtained in the OLS estimates. Boys have a 3.5 percentage points greater likelihood of chronic malnutrition. Likewise, the size of the household, the proportion of children under 6, and lower economic status are related to a deterioration in this long-term nutritional indicators. The results suggest that these characteristics are also important for short-term nutritional development (i.e. overall and acute malnutrition).

[16] Appendix Table A1 presents the estimates of the first stage

[17] No significant effect is found even before controlling for characteristics of the child and the household. These estimates are not presented since there are no major differences in the coefficients once I include control characteristics.

A higher level of the mother´s education is related to improved nutrition; an increase in one year of approved education is associated with a decrease of 0.7 percentage points in the probability of stunting. This effect is statistically significant at 1 percent. In contrast to the results found by OLS, instrumental variables estimates suggest that preventive behaviors of the mother play an important role in child's nutrition: a child attending growth and development programs has a lower probability of chronic malnutrition by 3.8 percent points.

I do not find any significant impact of forced displacement on the height for age z-score; however, the estimations provide some interesting insights. Boys are 0.16 standard deviations shorter for their age than girls. In addition, an increase in a month of life among the youngest children is associated with a reduction of 0.016 standard deviations in height for age. A larger size and proportion of children under six years in the household hinders the investment of sufficient resources for each household member deteriorating linear growth of children in the long run. Similarly, children within the lowest wealth quintile have a poorer nutritional performance (-0.17 standard deviations). Mother's education and preventive behaviors play an important role in their children's nutritional development in the long term. An increase in one year of education is related to an increase of 0.04 standard deviations in height-for-age. Furthermore, children's attendance in growth and development programs is associated with a 0.2 standard deviation improvement in linear growth.

Columns 5 and 6 in Table 6 show the estimations of forced displacement on the health indicators. Forced displacement increases the probability of incidence of diarrhea and cough and cold by 26 and 39.7 percent points respectively; both effects are significant at 1 percent. Children's attendance in growth and development appointments has different impacts on the two health indicators; it

decreases the incidence of diarrhea by 3.7 percent points but increases the probability of incidence of cough/cold by 4.1 percent points. These results may be related to the purpose of the program and the contagion level of each one of these two diseases. Since growth and development programs monitor children's nutritional development, it is expected that the incidence of diarrhea decreases; nevertheless, in the absence of a component to monitor children's respiratory health is possible that during visits to health centers the rate of spread of these diseases increases. Household variables such as labor force participation of the mother, number of hours worked, and female headship are found not to be significant for any of the indicators of malnutrition and health. As indicated in Escobar (2009), these variables due to their endogenous nature, only become statistically significant when instrumented.

There is a common pattern for the five outcome indicators when comparing the instrumental variables estimates with OLS estimates. Although the signs and magnitudes of the children's and households' characteristics remain very similar in both estimations, OLS estimates always underestimate the impact of forced displacement. Since the pre-existent differences between displaced and non-displaced households showed evidence of more favorable conditions for displaced households in their origin site, it was expected that estimations that do not correct for observable and unobservable heterogeneity would produce downward bias.

4.3 Forced displacement and nutrition: a second approach

This section presents the estimation results of the second identification strategy which uses differences in time of exposure to the shock by comparing cohorts born before and after displacement within the same household. To avoid potential

bias due to the parents' decision to have children after displacement, I use a sub-sample of children conceived before this event (811 children from 369 households). Since all children were exposed to the shock, either because they were born before or because they were in the womb at the time of displacement, the estimates capture the differential effect but not the total effect of forced displacement. All estimates control for child characteristics such as gender and age[18].

I do not find any impact on overall or acute malnutrition; however, the results presented in Table 7 indicate that forced displacement does deteriorate long-term nutrition. A child born before displacement has a 12.6 percentage points higher probability of chronic malnutrition compared to a child born after displacement within the same household. The probability of occurrence of overall and chronic malnutrition decreases with age; nevertheless, it seems to have a non-linear effect. There is no evidence of differences by sex.

Unlike the findings with the first strategy, estimates that control for household fixed effects suggest that forced displacement generates linear growth delay. A child born before displacement has a size for age 0.35 standard deviations lower than a child born after displacement within the same household. This coefficient, statistically significant at 10 percent, is similar to the reduction in height for age of 0.38 standard deviations found in the Rwandan conflict (Verwimp and Bundervoet 2005) and 0.5 standard deviations in the Second Iraq War (Guerrero 2009). The coefficient is also similar to the 0.03 standard deviation reduction in height-for-age found in children from communities hosting refugees Báez (2010). As in previous studies, I find that boys have a disadvantage in terms of nutritional

[18] I also did some estimations controlling for the child's initial conditions such as birth weight and breastfeeding. However, due to the few report of this type of data, the estimators obtained were very imprecise. When I include each one of these variables, the number of observations in the sample drops 50% and 75% respectively.

development. A boy has a height for age 0.18 standard deviations lower than a girl and this effect is significant at ten percent. I find no impact on the incidence of short-term illnesses such as the flu and diarrhea when controlling for household fixed effects.

After controlling for household characteristics that do not change over time, I find that forced displacement deteriorates the long-term nutritional development of children through a delay in their linear growth. Since evidence suggests that intrauterine exposure to conflict negatively affects the initial conditions of children born after displacement (Camacho, 2008), and changes in mothers' parenting behavior adversely affects the welfare of children after the shock (Calderon et al., 2011), the coefficients obtained with this strategy underestimate the impact of forced displacement on early childhood nutrition development.

4.4 Heterogeneous effects

This section presents the differential impacts of forced displacement on children's nutritional development by type of displacement (reactive or preventive), age at which the child was displaced, and time of exposure to the shock (duration of displacement). Using instrumental variables, all the estimates compare the corresponding subsample of displaced children with non-displaced children who live in the municipalities where the displaced households come from. Each estimation includes child and household characteristics as control variables. Nevertheless, since the sign and magnitude of these coefficients do not differ very much from the main findings presented in subsection 4.2 above, I only present a summary table with the coefficient of the variable of interest, the Hansen over-identification test, and the F statistic for weak instruments.

Type of displacement[19]*:*

Appendix Table A2 shows evidence of pre-existent differences among households with reactive and preventive displacement. The proportion of single-parent households in the place of origin was high in all the families; however, the proportion was greater for those households that were victims of direct violence or threats (73% vs. 65%). Despite that the level of education of household heads was slightly higher in households that displaced as a preventive reaction, these household head's participation in the labor market was lower compared to the participation of those that suffered direct victimization. There are also differences in the reasons for choosing the arrival municipality for both types of households. In particular, it is noted that both the amount of time and certainty when choosing the municipality of arrival between them. Although the existence of social capital (family and friends) was an important reason for selecting the reception town for both types of households, a higher proportion of households with preventive displacement answered that contacts in the place of arrival and the proximity to the place of expulsion were important features when selecting the reception site. Conversely, a greater distance to the place of origin, the search for anonymity, and the aid received by the government were the main reasons that motivated the choice of the arrival place for households exposed to direct victimization in their hometowns.

The previous results show differences in the displacement process for households with reactive displacement versus those with preventive displacement. While

[19] There are two type of displacements: reactive displacement which is caused by direct threat and victimization in the hometowns and preventive displacement which is the result of precautionary measures due to the generalized violence in the origin site.

households that were victims of direct attacks had less time to leave their hometown and thus less information and certainty to choose the arrival municipality, households that displaced as a precaution had more time to make an informed choice on the selection of the reception town. Given these differences in preparation, it is expected that the impact of each type of displacement on early nutritional development differs. Since more time and information presumably helps to mitigate households' vulnerability at arrival sites, I expect that children whose households were displaced as a result of a direct threat face greater disadvantages in terms of health.

Table 8 summarizes the results of the estimates obtained by using the instrumental variables approach for each type of displacement. The first panel shows the results for households that were exposed to direct victimization in their hometown and the second panel shows the results for those households that displaced due to precautionary reasons. It is not possible to reject the null hypothesis of validity of instruments in the Hansen test for all the estimations using reactive displacement as the independent variable. The instruments are also exogenous in the estimates of preventive displacement on nutritional indicators; however, the validity of the instrumental variables cannot be proved when estimating the impact of precautionary displacement on health indicators such as incidence of diarrhea. In all cases the F is large enough to reject the null hypothesis of weak instruments.

I do not find significant impacts of preventive displacement on any indicator. Although it is likely that households that displaced as a precaution have been able to mitigate a part of the shock, finding no impact on nutritional development was unexpected. A possible reason for this finding may be related to the small number of observations for this kind of displacement (321) which limits an accurate calculation of the coefficient. Further research needs to be done in order to explain these results.

Reactive displacement does have an impact on health and nutritional outcomes. Children whose households were victims of direct attacks have an 18.8 percentage points higher probability of chronic malnutrition compared to that of non-displaced children. Moreover, their z score of height for age displays a reduction of 0.5 standard deviations after displacement. This effect of reactive forced displacement on the anthropometric measure of height for age is significant at 5 percent.

The evidence presented sheds light on the relationship between the household's pre-displacement preparation in each type of displacement, and the magnitude and persistence of the impacts. Households that decide to move as a precautionary measure may try to protect themselves from potential losses through the sale of assets and the procurement of better information about the reception sites before leaving their hometowns. Conversely, households that are forced to move immediately as a result of a direct threat are not able to use any type of insurance mechanism and suffer heavier losses in terms of consumption and income (Ibáñez and Vélez, 2005). This pre-displacement preparation has a direct impact on children's development in terms of health and nutrition.

Age at the moment of displacement:

Since breastfeeding and proper nutrition during the first months of life lay the foundation for good nutritional development, the age at which the shock is received is a decisive factor in terms of magnitude and impact duration. Therefore, if breastfeeding and the intake of essential nutrients for growth are interrupted as a consequence of forced displacement, it is expected that younger children will suffer from lower nutritional development and growth.

Table 9 summarizes the results of the impact of forced displacement on the status of nutrition and health by children's age at the time of the shock. I find a positive and significant impact of forced displacement on the probability of occurrence of chronic malnutrition for children displaced at younger ages (18.8 pp) but no significant impact for children displaced at age 3 or older.

Results indicate that there are differential effects depending on the age at which children receive the shock. Children who were displaced during a crucial stage of their development (0 to 2yrs) experience a deterioration of their long-term nutritional indicators while children who were displaced at age 3 or older only experience deterioration on their short-term health.

Duration of displacement (intensity):

Nutritional and health indicators may also vary according to the time (number of months) since the household was displaced. Evidence indicates that displaced households show improvements in terms of consumption after receiving assistance from social programs for some time (Ibáñez and Moya, 2010). Furthermore, since there is an increased supply of health services in the municipalities of reception, after some months the health coverage rate for displaced households exceeds the levels reached in the places of origin (Final Report, Evaluation of the program *Familias en Accion* for displaced population).

The results of forced displacement's impact on health and nutritional indicators by duration of displacement are presented in Table 10. I find no evidence of significant impacts on short-term nutritional indicators for children in households with less than one year of displacement; however, the findings suggest that during the first months of displacement children have a higher probability of occurrence

of illnesses such as diarrhea and flu. It seems that these short-term indicators improve with time since the magnitudes of the impacts for children in households with more than a year of displacement are lower (18.3 vs. 32 and 38.5 vs. 42).

Conversely, the results indicate that the long-term nutritional indicators of displaced children deteriorate with time. I do not find any significant impact on the incidence of chronic malnutrition for the group of children in households with less than a year of displacement; however, this coefficient becomes significant when using the group of children in households with more than one year of displacement. Children in households with more than 12 months of displacement have a 17.6 percentage points higher probability of chronic malnutrition than children in non-displaced households from the same town of origin.

5. Conclusions

This study attempts to determine the impact of forced displacement on early childhood nutritional development in order to find a channel through which armed conflict in Colombia deteriorates long term household welfare. I use two identification strategies in order to address the endogeneity caused by the potential correlation between forced displacement and the unobserved heterogeneity of the household. Data comes from the impact evaluation of *Familias en Accion* (FA) for rural households and the impact evaluation of FA for displaced population. Using the instrumental variables approach, the first strategy compares the anthropometric outcomes of the displaced children with those of the children who stayed at the municipality of origin. The second strategy, which only uses the data on displaced households, takes advantage of the differences in the

time of exposure to the event by comparing cohorts of children within the same household that were born before and after displacement.

Forced displacement does not have any impact on any of the short-term anthropometric or health outcomes; however, it does have an impact on the long-term indicators of nutritional development. The probability of occurrence of chronic malnutrition increases between 12.6 and 18.1 percentage points. Additionally, once I control for household fixed effects, the results indicate that forced displacement causes a delay in linear growth. The height for age of children born before displacement is 0.35 standard deviations lower than for children in the same household born after displacement[20]. There is no significant effect on the incidence of acute and overall malnutrition or on the incidence of diseases such as diarrhea or the common cold when including household fixed effects. It is possible that increased access to social and health services in the municipality of arrival helps to mitigate the impacts on the prevalence of short-term diseases and recent weight loss.

The results differ in magnitude and significance depending on the type of displacement (reactive or preventive), the age at which the child moved, and the time of exposure to the shock (duration of displacement). There is a deterioration in short-term indicators for children who belong to the less vulnerable groups - those whose households made the choice to leave as a preventive measure or children that were displaced after the age of 3 whereas there is a long-term deterioration in the nutritional status of children who were displaced during the

[20] The impact results on height for age are similar to those found in the literature on conflict: a reduction of -0.38 s.d. in Iraq (Guerrero, 2009) and a reduction of 0.5 s.d. in Burundi (Bundervoet and Verwimp, 2005). The impact is also very similar to the 0.5 standard deviation reduction of height for age for children who live in cities receiving refugees from the Rwanda genocide (Baez, 2010).

most important years of development (ages 0-3) or belong to households that were victims of direct attacks. The evidence related to the time of exposure to the shock is worrying: even though the prevalence of diseases such as diarrhea and flu decreases with the time of exposure, the probability of occurrence of chronic malnutrition is significant and higher for those children in households with more than one year removed from the date of displacement (17.6 pp.).

These results have direct policy implications as they point to the need for rapid intervention by the national government and NGOs. Given the empirical evidence about the effects of early malnutrition on education, productivity, and later job performance (Alderman et al., 2001; Alderman et al., 2006; Glewwe y Jacoby, 1995; Glewwe et al. 2001), children from displaced households need special interventions that attenuate the long-term effect of malnutrition on their proper development and well-being. These interventions should consist of comprehensive programs that, in addition to humanitarian assistance, provide the households with tools such as training and access to credit in order to facilitate their entry into the formal labor market. Additionally, these programs should prioritize attention for the most vulnerable: children who were displaced during critical development ages (0-3) or belong to households that were victims of direct attacks in their place of origin.

The evaluations of two social programs that aim to improve the health and nutritional status during early childhood present evidence of the need for a comprehensive effort specific to displaced children. On one hand, the evaluation of *Familias en Accion* for displaced population indicate that despite the positive impacts in terms of education and health, the program does not have a significant

impact on long-term indicators related to nutritional development[21]. On the other hand, in spite of the improvements obtained in chronic malnutrition indicators and height for age as a result of the Program Hogares Comunitarios (HC), the impacts of the program are not sufficient to mitigate the deterioration in the nutritional development of children in displaced households. The results indicate that the HC program decreases the likelihood of chronic malnutrition incidence in 1.6 points (Bernal et al., 2009), while the impact of forced displacement on this indicator, in the most conservative scenario, is 12.6 points.

This is a first attempt to find the impact of forced displacement on early childhood nutritional and thus, the accumulation of human capital. Further research needs to be done in order to determine the transmission channels behind this effect. The lack of information about cognitive and psychosocial development for displaced children did not allow me to estimate the impact on those outcomes.

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[21] The program mitigates the recent loss of weight but has no impacts on height (Final Report, Impact Evaluation of the Program *Familias en Accion* for Displaced Population)

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Table 1. Comparison of outcome indicators by massacre intensity

Variable	Massacres median above national median			Massacres median equal or below national median			
	Mean	Obs.	(s.d.)	Mean	Obs.	(s.d.)	p-value
Overall malnutrition	0.12	284	0.33	0.14	2139	0.34	0.54
Acute malnutrition	0.04	284	0.20	0.05	2139	0.21	0.71
Chronic malnutrition	0.18	284	0.38	0.20	2139	0.40	0.40
Incidence of diarrhea	0.27	284	0.45	0.24	2139	0.43	0.31
Incidence of cough or flu	0.56	284	0.50	0.52	2139	0.50	0.18

***Difference statistically significant at 1%, ** 5%, * 10%

Table 2. Pre-displacement household conditions

Variables	Displaced households (n=1390)		Non-displaced households (n=1033)			
	Mean	(s.d.)	Mean	(s.d.)	p-value	
Single parent home (%)	0.713	0.453	0.202	0.402	0.000	***
Household size	5.776	2.858	7.239	2.652	0.000	***
Housing ownership (%)	0.578	0.494	0.528	0.499	0.013	**
Working mother (%)	0.369	0.483	0.383	0.486	0.473	
Working household head (%)	0.771	0.420	0.836	0.370	0.000	***
Mother's education (years)	5.078	3.497	4.249	3.177	0.000	***
Household head's education (years)	4.559	3.443	3.520	3.234	0.000	***

***Difference statistically significant at 1%, ** 5%, * 10%

Table 3. Current household conditions

Variables	Displaced households			Non-displaced households				
	Mean	Obs.	(s.d.)	Mean	Obs.	(s.d.)	p-value	
Female household head (%)	0.36	1390	0.48	0.19	1033	0.40	0.00	***
Children under 6 in home (%)	0.38	1390	0.15	0.31	1033	0.14	0.00	***
Household head's education (years)	4.56	1390	3.44	3.52	1033	3.23	0.00	***
Unemployed household head (%)	0.10	1390	0.30	0.01	1033	0.08	0.00	***
Household size	5.26	1390	2.13	7.24	1033	2.65	0.00	***
ln average expenditure per capita	1.26	1390	0.46	1.88	1027	0.64	0.00	***
Wealth index: Quintile 1[∂]	0.22	1390	0.41	0.18	1033	0.38	0.01	***
Wealth index: Quintile 2[∂]	0.18	1390	0.39	0.17	1033	0.37	0.26	
Wealth index: Quintile 3[∂]	0.25	1390	0.43	0.19	1033	0.40	0.00	***
Wealth index: Quintile 4[∂]	0.21	1390	0.41	0.24	1033	0.43	0.09	*
Wealth index: Quintile 5[∂]	0.14	1390	0.34	0.23	1033	0.42	0.00	***
Mother's age (years)	26.82	1390	6.84	31.23	1033	6.49	0.00	***
Mother's education (years)	5.08	1390	3.50	4.25	1033	3.18	0.00	***
Working mother (%)	0.33	1390	0.47	0.38	1033	0.49	0.01	***
Hours worked by the mother (weekly)	14.07	1390	34.98	8.68	1033	18.76	0.00	***

***Difference statistically significant at 1%, ** 5%, * 10%

[∂] Wealth index constructed by principal component analysis of ownership of fixed assets and access to services

Table 4. Children's health and nutritional status

Variables	Displaced			Non-displaced households				
	Mean	Obs.	(s.d.)	Mean	Obs.	(s.d.)	p-val.	
Child's age (months)	38.98	1390	24.42	43.94	1033	24.26	0.00	***
Attendance to growth programs	0.60	1390	0.49	0.33	1033	0.47	0.00	***
Breastfed	0.71	659	0.45	0.99	147	0.08	0.00	***
Breastfeeding duration (months)	9.16	159	5.22	7.08	95	4.65	0.00	***
Incidence of overall malnutrition	0.14	1390	0.35	0.13	1033	0.33	0.31	
Incidence of acute malnutrition	0.05	1390	0.21	0.05	1033	0.21	0.82	
Incidence of chronic malnutrition	0.23	1390	0.42	0.15	1033	0.36	0.00	***
Incidence of diarrhea	0.30	1390	0.46	0.17	1033	0.38	0.00	***
Incidence of cough and flu	0.65	1390	0.48	0.36	1033	0.48	0.00	***
Height for age (*z-score*)	-0.91	1390	1.49	-1.00	1033	1.06	0.10	*

***Difference statistically significant at 1%, ** 5%, * 10%

Table 5. Impact of forced displacement on the probability of malnutrition (OLS estimates)

Variables	Overall malnutrition	Acute malnutrition	Chronic malnutrition	Height for age (z-score)	Incidence of diarrhea	Incidence of cough and flu
Displaced	0.035	0.023	0.056**	0.101	0.124***	0.278***
	(0.023)	(0.015)	(0.025)	(0.084)	(0.027)	(0.031)
Tax income per capita in the municipality	11.241	18.523	24.015	-116.904	-38.930*	-107.535***
	(20.011)	(16.894)	(23.134)	(81.323)	(22.967)	(27.562)
Child's age (months)	-0.002**	0.000	-0.001	-0.015***	-0.001	0.002
	(0.001)	(0.001)	(0.001)	(0.005)	(0.001)	(0.002)
Child's age squared (months)	0.000	-0.000	0.000	0.000*	-0.000*	-0.000***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Sex (1 if male)	0.001	0.003	0.034**	-0.156***	0.048***	-0.028
	(0.014)	(0.009)	(0.016)	(0.053)	(0.017)	(0.019)
Attendance to growth and development programs	-0.010	-0.006	-0.019	0.149***	-0.016	0.059***
	(0.015)	(0.009)	(0.017)	(0.057)	(0.018)	(0.021)
Mother's age	0.004	0.006	0.010	-0.002	-0.014	-0.009
	(0.006)	(0.004)	(0.007)	(0.025)	(0.009)	(0.009)
Mother's age squared	-0.000	-0.000*	-0.000	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Mother's education (years completed)	-0.009***	-0.004**	-0.007**	0.040***	-0.004	0.003
	(0.002)	(0.001)	(0.003)	(0.009)	(0.003)	(0.003)
Working mother	-0.027	-0.009	0.006	-0.063	0.014	0.020
	(0.017)	(0.010)	(0.019)	(0.060)	(0.023)	(0.023)
Hours worked by the mother (weekly)	0.000	0.000	-0.000	0.001	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.001)	(0.000)	(0.000)
Female household head	-0.002	-0.003	-0.005	-0.049	-0.002	-0.010
	(0.016)	(0.009)	(0.020)	(0.065)	(0.021)	(0.023)

Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table 5. Impact of forced displacement on the probability of malnutrition (OLS estimates)

Variables	Overall malnutrition	Acute malnutrition	Chronic malnutrition	Height for age (z-score)	Incidence of diarrhea	Incidence of cough and flu
% children under 6 in home	0.068	-0.002	0.138**	-0.525***	0.031	0.055
	(0.054)	(0.031)	(0.062)	(0.202)	(0.068)	(0.074)
Household head's education (years completed)	0.001	0.000	-0.003	-0.005	-0.001	-0.002
	(0.002)	(0.002)	(0.003)	(0.009)	(0.003)	(0.003)
Unemployed household head	-0.025	-0.019	0.009	-0.126	-0.016	-0.019
	(0.030)	(0.015)	(0.038)	(0.129)	(0.039)	(0.042)
Household size	0.009***	0.001	0.011***	-0.035***	0.001	-0.000
	(0.004)	(0.002)	(0.004)	(0.013)	(0.004)	(0.005)
Wealth index: quintile 1	0.013	-0.015	0.054**	-0.220**	-0.008	-0.053
	(0.023)	(0.015)	(0.027)	(0.088)	(0.030)	(0.034)
Wealth index: quintile 2	0.013	-0.003	0.014	-0.127	-0.010	-0.063*
	(0.023)	(0.015)	(0.026)	(0.087)	(0.031)	(0.034)
Wealth index: quintile 3	0.016	0.001	0.015	-0.061	-0.021	-0.020
	(0.023)	(0.014)	(0.025)	(0.087)	(0.029)	(0.033)
Wealth index: quintile 4	0.039*	-0.008	0.046*	-0.209**	-0.099***	-0.102***
	(0.022)	(0.013)	(0.025)	(0.081)	(0.027)	(0.032)
Constant	0.062	-0.029	-0.095	-0.162	0.541***	0.558***
	(0.104)	(0.063)	(0.120)	(0.438)	(0.144)	(0.150)
Dummies by department	Yes	Yes	Yes	Yes	Yes	Yes
Observations	2,423	2,423	2,423	2,423	2,423	2,423
R-squared	0.047	0.041	0.056	0.083	0.087	0.132

Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table 6. Impact of forced displacement on the probability of malnutrition (IV estimates)

Variables	Overall malnutrition	Acute malnutrition	Chronic malnutrition	Height for age (z-score)	Incidence of diarrhea	Incidence of cough and flu
Displaced	0.095	-0.002	0.181**	-0.374	0.260***	0.397***
	(0.061)	(0.035)	(0.077)	(0.239)	(0.079)	(0.085)
Tax income per capita in the municipality	-7.608	26.303	-15.270	32.475	-81.756**	-144.913***
	(26.670)	(19.041)	(32.624)	(108.789)	(32.891)	(37.126)
Child's age (months)	-0.002**	0.000	-0.001	-0.016***	-0.001	0.003
	(0.001)	(0.001)	(0.001)	(0.005)	(0.001)	(0.002)
Child's age squared (months)	0.000	-0.000	0.000	0.000**	-0.000*	-0.000***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Sex (1 if male)	0.002	0.003	0.035**	-0.158***	0.049***	-0.028
	(0.014)	(0.008)	(0.016)	(0.052)	(0.017)	(0.019)
Attendance to growth and development programs	-0.019	-0.002	-0.038*	0.220***	-0.037*	0.041*
	(0.017)	(0.010)	(0.020)	-0.065	(0.022)	(0.024)
Mother's age	0.006	0.005	0.015**	-0.020	-0.009	-0.005
	(0.006)	(0.004)	(0.008)	(0.026)	(0.009)	(0.010)
Mother's age squared	-0.000	-0.000	-0.000**	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Mother's education (years completed)	-0.009***	-0.004**	-0.007***	0.042***	-0.004	0.002
	(0.002)	(0.001)	(0.003)	(0.009)	(0.003)	(0.003)
Working mother	-0.022	-0.011	0.015	-0.097	0.024	0.029
	(0.017)	(0.010)	(0.019)	(0.060)	(0.024)	(0.024)
Hours worked by the mother (weekly)	-0.000	0.000	-0.000	0.001**	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.001)	(0.000)	(0.000)
Female household head	-0.007	-0.001	-0.014	-0.014	-0.012	-0.019
	(0.017)	(0.009)	(0.020)	(0.067)	(0.021)	(0.024)

Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table 6. Impact of forced displacement on the probability of malnutrition (IV estimates)

Variables	Overall malnutrition	Acute malnutrition	Chronic malnutrition	Height for age (z-score)	Incidence of diarrhea	Incidence of cough and flu
% children under 6 in home	0.054	0.004	0.109*	-0.414**	-0.001	0.027
	(0.054)	(0.031)	(0.063)	(0.207)	(0.070)	(0.075)
Household head's education (years completed)	0.001	0.001	-0.004	-0.003	-0.002	-0.002
	(0.002)	(0.002)	(0.003)	(0.009)	(0.003)	(0.003)
Unemployed household head	-0.035	-0.015	-0.011	-0.048	-0.039	-0.038
	(0.032)	(0.016)	(0.039)	(0.133)	(0.042)	(0.043)
Household size	0.011***	0.001	0.013***	-0.045***	0.004	0.002
	(0.004)	(0.002)	(0.004)	(0.014)	(0.004)	(0.005)
Wealth index: quintile 1	0.006	-0.012	0.040	-0.166*	-0.023	-0.067*
	(0.024)	(0.015)	(0.028)	(0.089)	(0.031)	(0.035)
Wealth index: quintile 2	0.010	-0.002	0.008	-0.104	-0.017	-0.069**
	(0.023)	(0.015)	(0.026)	(0.087)	(0.031)	(0.034)
Wealth index: quintile 3	0.010	0.003	0.002	-0.011	-0.036	-0.033
	(0.023)	(0.015)	(0.026)	(0.089)	(0.030)	(0.034)
Wealth index: quintile 4	0.036*	-0.007	0.041*	-0.189**	-0.105***	-0.107***
	(0.022)	(0.014)	(0.024)	(0.081)	(0.027)	(0.031)
Constant	0.012	-0.008	-0.200	0.238	0.426***	0.494***
	(0.113)	(0.067)	(0.134)	(0.475)	(0.157)	(0.161)
Dummies by department	Yes	Yes	Yes	Yes	Yes	Yes
Observations	2,423	2,423	2,423	2,423	2,423	2,423
R-squared	0.044	0.039	0.046	0.070	0.077	0.130
Hansen test p-value	0.949	0.489	0.341	0.262	0.352	
F stat. for weak instruments	140.3	140.3	140.3	140.3	140.3	289.7

Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table 7. Impact of forced displacement on the probability of malnutrition (Household fixed effects estimates)

Variables	Overall malnutrition	Acute malnutrition	Chronic malnutrition	Height for age (z-score)	Incidence of diarrhea	Incidence of cough and flu
Born before displacement	0.063	-0.027	0.126**	-0.353*	0.067	-0.075
	(0.052)	(0.035)	(0.059)	(0.207)	(0.056)	(0.061)
Child's age (months)	-0.007**	-0.000	-0.007**	0.003	-0.012***	-0.001
	(0.003)	(0.002)	(0.004)	(0.012)	(0.003)	(0.003)
Child's age squared (months)	0.000**	-0.000	0.000**	-0.000	0.000**	-0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Sex (1 if male)	-0.040	0.011	0.023	-0.184*	0.078**	0.020
	(0.028)	(0.017)	(0.036)	(0.107)	(0.034)	(0.035)
Constant	0.258***	0.098**	0.251***	-0.703**	0.522***	0.735***
	(0.071)	(0.040)	(0.078)	(0.328)	(0.081)	(0.076)
Household fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	811	811	811	811	811	811
R-squared	0.584	0.496	0.611	0.666	0.678	0.741

Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table 8. Impact of forced displacement by type of displacement

Type of displacement		Overall malnutrition	Acute malnutrition	Chronic malnutrition	Height for age (z-score)	Incidence of diarrhea	Incidence of cough and flu
Reactive	Coefficient	0.132*	-0.009	0.188**	-0.504**	0.228***	0.410***
	Hansen p-value	0.885	0.758	0.178	0.250	0.923	
	F test for weak instruments	115.6	115.6	115.6	115.6	115.6	237.1
Preventive	Coefficient	-0.017	0.011	0.123	0.093	0.283***	0.354***
	Hansen p-value	0.214	0.711	0.828	0.315	0.0813	0.0192
	F test for weak instruments	72.56	72.56	72.56	72.56	72.56	138.1

***Difference statistically significant at 1%, ** 5%, * 10%

Table 9. Impact of forced displacement by age at which the child was displaced

Age at which the child was displaced		Overall malnutrition	Acute malnutrition	Chronic malnutrition	Height for age (z-score)	Incidence of diarrhea	Incidence of cough and flu
0-2 years	Coefficient	0.134	-0.028	0.211**	-0.220	0.262**	0.216*
	Hansen p-value	0.888	0.474	0.136	0.846	0.738	
	F test for weak instruments	53.14	53.14	53.14	53.14	53.14	108.9
3-5 years	Coefficient	0.056	-0.007	0.079	-0.366	0.165*	0.370***
	Hansen p-value	0.155	0.182	0.912	0.129	0.910	
	F test for weak instruments	71.58	71.58	71.58	71.58	71.58	143.1

***Difference statistically significant at 1%, ** 5%, * 10%

Table 10. Impact of forced displacement by time of displacement

Time of displacement		Overall malnutrition	Acute malnutrition	Chronic malnutrition	Height for age (z-score)	Incidence of diarrhea	Incidence of cough and flu
More than one year of displacement	Coefficient	0.104	0.030	0.176**	-0.293	0.183**	0.385***
	Hansen p-value	0.682	0.959	0.214	0.280	0.421	
	F test weak instruments	85.65	85.65	85.65	85.65	85.65	177.0
One year or less of displacement	Coefficient	0.048	-0.043	0.136	-0.454	0.320***	0.420***
	Hansen p-value	0.119	0.426	0.904	0.0895	0.701	
	F test weak instruments	75.55	75.55	75.55	75.55	75.55	151.2

***Difference statistically significant at 1%, ** 5%, * 10%

Table A1. Impact of forced displacement (First stage, IV estimates)

Variables	Displaced
Tax income per capita in the municipality	274.677***
	(18.418)
Child's age (months)	-0.002*
	(0.001)
Child's age squared (months)	0.000*
	(0.000)
Sex (1 if male)	-0.004
	(0.012)
Attendance to growth and development programs	0.130***
	(0.013)
Mother's age	-0.030***
	(0.006)
Mother's age squared	0.000***
	(0.000)
Mother's education (years completed)	0.002
	(0.002)
Working mother	-0.064***
	(0.017)
Hours worked by the mother (weekly)	0.001***
	(0.000)
Female household head	0.063***
	(0.014)
% children under 6 in home	0.244***
	(0.046)
Household head's education (years completed)	0.002
	(0.002)
Unemployed household head	0.136***
	(0.024)
Household size	-0.020***
	(0.003)
Wealth index: quintile 1	0.084***
	(0.020)
Wealth index: quintile 2	0.044**
	(0.022)
Wealth index: quintile 3	0.086***
	(0.020)
Wealth index: quintile 4	0.019
	(0.018)
Median of the massacres	0.069***
	(0.019)
Distance between origin and reception towns (km)	0.001***
	(0.000)
Constant	0.726***
	(0.091)
Observations	2,423
R-squared	0.657

Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table A2. Household characteristics by type of displacement

Variables	Reactive displacement (n=1069)		Preventive displacement (n=321)			
	Mean	(s.d.)	Mean	(s.d.)	p-value	
Retrospective characteristics						
Single parent home	0.732	0.443	0.651	0.477	0.005	***
Household size	5.748	2.892	5.869	2.746	0.507	
Housing ownership	0.585	0.493	0.558	0.497	0.390	
Working mother	0.381	0.486	0.330	0.471	0.100	
Working household head	0.804	0.397	0.664	0.473	0.000	***
Mother's education (years)	5.031	3.534	5.234	3.372	0.362	
Household head's education (years)	4.463	3.443	4.877	3.431	0.059	*
Mother's age	24.423	7.427	22.177	7.434	0.000	***
Reasons for choosing arrival site						
Family	0.634	0.482	0.720	0.450	0.005	***
Friends	0.456	0.498	0.442	0.497	0.677	
Close to origin site	0.369	0.483	0.458	0.499	0.004	***
Far from origin site	0.511	0.500	0.364	0.482	0.000	***
Offers assistance to DP	0.685	0.465	0.561	0.497	0.000	***
Is big and facilitates anonymity	0.650	0.477	0.526	0.500	0.000	***
More options to find work	0.699	0.459	0.589	0.493	0.000	***
Were relocated there	0.139	0.347	0.131	0.338	0.697	
Relocated by group decision	0.538	0.499	0.452	0.498	0.007	***
Past familiarity with the arrival site	0.562	0.496	0.583	0.494	0.519	
Asset ownership at the arrival site	0.051	0.221	0.047	0.211	0.735	
Other	0.021	0.142	0.028	0.165	0.428	

***Difference statistically significant at 1%, ** 5%, * 10%