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Long-Term Effects of Civil Conflict on Women's Health Outcomes in Peru

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Summary. — Peru's internal conflict resulted in over 69,000 deaths and disappearances from 1980 to 2000. We investigate the long-term health effects on women exposed to this conflict *in utero* and in early life. Utilizing recent Demographic and Health Surveys (DHSs) and district-level conflict data, we find that exposure *in utero* has long lasting impacts on a woman's height (an indicator of long-term health), even controlling for life-cycle factors (education and wealth) and the availability of public health centers. We find no long-term effects on short term health (anemia and Body Mass Index (BMI)) or psychosocial indicators (domestic abuse).
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1. INTRODUCTION

Recent literature in economics and epidemiology has documented important and long-lasting effects of shocks experienced in early life, either *in utero* or in early infancy. The usual story is that shocks to nutrition in a critical stage of human development can have permanent deleterious effects on an individual's health over her life-course because they have permanent effects on her physiology (Barker, 1998). A number of recent papers have documented long-lasting effects of such shocks on adult height (Case & Paxson, 2010), on adult socioeconomic outcomes (Almond, Chay, & Lee, 2005; Currie, 2009), on adult self-reported health, on child development (Currie, 2009), and on educational outcomes (Cutler & Lleras-Muney, 2008). Evidence has been gathered in both developed countries (Almond, 2006; Currie & Hyson, 1999; Currie & Moretti, 2007; Oreopoulos, Stabile, Walld, & Roos, 2008) and developing countries (Maccini & Yang, 2009), from childhood (Paxson & Schady, 2005) to old age (Case, Fertig, & Paxson, 2005; Grimard, Laszlo, & Lim, 2010).

Making the case for this critical period programming hypothesis is complicated by two major problems of identification. First, the effects of shocks *in utero* or in early infancy on outcomes later in life will be confounded by their indirect effects though the acquisition of human capital and the determination of adult socioeconomic factors. Put differently, if nutritional shocks in a critical period have effects on cognitive ability (Walker, Chang, Powell, & Grantham-McGregor, 2005), then educational attainment will also be affected. Meanwhile, a vast literature in labor economics documents important returns to education, which influence earnings, both of which influence adult health through health information or investment in health inputs. And past investment in education may affect risk and time preferences in ways that influence adult behavior and hence outcomes ranging from the socioeconomic to the psychosocial, all of which affect the individual's quality of life. These life-course or pathways channels are qualitatively important because they can help reverse some of the negative effects experienced by shocks in the critical period. They are also policy relevant because they imply that pro-human capital investments can counter the long-term effects of these shocks.

The second identification challenge is to find a credible source of exogenous variation in outcomes during the critical period which can affect nutrition. Early generations of studies of this issue pointed to maternal socioeconomic outcomes (Barker, 1998; Currie, 2009). The notion here is that more able, educated, and wealthy mothers will be better fed during pregnancy and breastfeeding and so infant outcomes will be better. The problem with this strategy is that such variation is not exogenous if we consider the likely genetic transmission of, say, cognitive ability. One influential study linked exposure to the 1918 influenza pandemic *in utero* and adult economic outcomes (Almond, 2006). In this case, the swiftness and virulence of the flu through the US population generated a credible source of exogenous variation and the children of pregnant women exposed during the pandemic fared much worse than their counterparts with mothers who escaped the flu in their pregnancy months. Similarly, Maccini and Yang (2009) exploited regional variation in rainfall at birth to explain a host of adult socioeconomic outcomes (especially height), and in doing so finding evidence of the critical period programming.

In this paper, we consider the effects of the Peruvian civil conflict of the 1980s and 1990s on women's health and psychosocial outcomes. We focus on Peru because it provides a unique opportunity to seek for evidence of the critical period programming hypothesis due to the extensive geographic and time variation in the intensity and extent of conflict. It is possible to do so thanks to the work published by the Truth and Reconciliation Commission, which investigated and reported

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detailed events data at the district level covering a 20-year period. The conflict is believed to have caused significant economic losses to affected households due to theft and destruction of homes, agricultural plots, and other farm assets. In extreme cases, people lost loved ones who were also income earners. They also abandoned their land or dwelling to seek shelter to avoid being caught in the fighting, and such displacement can lead to susceptibility to disease. In addition, prenatal stress induced by the conflict likely affected individuals' cognitive development (Entringer, Buss, Kumsta, Hellhammer, & Wadhwa, 2009; King & Laplante, 2005; Laplante, Brunet, Schmitz, Ciampi, & King, 2008). The literature cited in Entringer *et al.* (2009) suggests prenatal stress affects cognitive development via neurological factors. There are thus three possible mechanisms through which exposure to conflict in early life can lead to lower health status later in life, independently of their effects on determining socioeconomic status: (i) shocks to nutrition resulting from the death of income earners and the loss or theft of assets, (ii) shocks to health because of unsanitary environments during displacement, and (iii) prenatal psychosocial stress shocks. Similarly, prenatal stress can influence long-term outcomes via its effect on birth outcomes. Indeed, Mansour and Rees (2012) documented the effect of conflict-related prenatal stress on birth weight in the context of the al-Aqsa Intifada. Similarly, Yehuda, Mulherin Engel, Brand, Seckl, Marcus, and Berkowitz (2005) found a positive association between uterine exposure to the 2001 World Trade Center attacks and the probability of low cortisol levels in the offspring, a risk factor in the ability to cope with stress.

We focus on women because it is believed that women tend to suffer disproportionately from adverse shocks. The development literature has documented a great deal of evidence that in times of economic hardship, girls bear the brunt of intra-household re-allocation in the face of negative shocks to disposable income (Escobal, 2007; United Nations, 2008). While Peru ranks 17th out of 102 non-OECD countries in the OECD's Social Institutions and Gender Index, a rating indicative of low gender discrimination, Peruvian women nonetheless experience higher poverty and unemployment rates than men, and domestic violence and psychological and sexual abuse against Peruvian women is unfortunately a common reality.¹ These facts and the central stage that women hold in the Millennium Development Goals justify our focus on considering the long-term effects of civil conflict on women's outcomes. In addition, we are able to answer these questions thanks to the information contained in the primary data set we utilize, which focuses on women.

We utilize three datasets to conduct our analysis. Our outcome variables come from the 5th round of the Peru Demographic and Health Survey (DHS), which is a continuous survey from 2004 to 2008 of over 41,000 women aged 15 to 49 years. From this data set, we extract information on women's health and psychosocial outcomes: height, Body Mass Index (BMI), anemia, and domestic abuse. This dataset also provides us with important socioeconomic controls such as wealth, education, and ethnicity. The main explanatory variable that allows us to measure stress in early infancy comes from Peru's Truth and Reconciliation Commission report (Comisión de Verdad y Reconciliación (CVR), 2003). The CVR provides detailed data at the district level of violence over the 1980–2000 period. We construct from these data dummy variables on whether a woman's birth district experienced deaths and/or disappearances in her month and year of birth and adjacent months/years. The CVR estimates that over 69,000 Peruvians died or disappeared over the course of the conflict at the hands of the Shining Path or government

forces. These variables, which exhibit considerable space and time variation, provide us with the basis for the empirical strategy we use to determine whether the negative shocks in early life have long-lived effects. To capture long-term effects, we consider only women over the age of 18 years, so we restrict our sample to include only women born between 1970 and 1990. Finally, we use the 1992 health infrastructure census, provided by Peru's Ministry of Health, Censo de Infraestructura Sanitaria.

Our paper thus contributes to several literatures. First, it contributes to the literature on critical period programming (Barker, 1998; Case *et al.*, 2005; Case & Paxson, 2010). Second, it contributes to an important emerging literature on the microeconomic effects of armed conflict. Akresh and colleagues have investigated the effects of armed conflict on children's health outcomes in the contexts of the Burundian civil war and Rwandan genocide (Akresh & DeWalque, 2010; Akresh, Verwimp, & Bundervoet, 2011; Bundervoet, Verwimp, & Akresh, 2009). Blattman has investigated the socioeconomic and psychosocial effects of abduction and child soldiering in the context of the Lord's Resistance Army in Uganda (Annan & Blattman, 2010; Annan, Blattman, Mazurana, & Carlson, 2011). León (2012), Sanchez (2010), Galdo (2013) and Laszlo and Santor (2009) have utilized data from the CVR to explain socioeconomic outcomes: the first finds short- and long-term effects of violence on educational attainment, the second on children, height for age z -scores, the third on monthly earnings and the fourth uses CVR data to instrument for migration patterns in analyzing migrants' access to credit.

We find that civil conflict events during the year preceding birth have measurable deleterious effects on women's height, even controlling for observable adult socioeconomic status such as education and wealth. Events at older ages have either no effect, or weaker effects. We also find little to no evidence of the effects of conflict in early life on short-term health or psychosocial indicators. That we find such little persistence in effects over the long run suggests a number of encouraging underlying explanations. First, it could be that Peruvian women are resilient. Such resilience has been documented in Annan and Blattman (2010) and Annan *et al.* (2011) who show that former child soldiers and abductees are able to reintegrate into society, limiting the long-term effects of abduction on socioeconomic and psychosocial outcomes. Second, though related, they suggest that positive events can reverse the deleterious effects of negative shocks *in utero* and during early infancy. Indeed, the 1990s saw a tremendous increase of publicly funded social programs in Peru, and especially in poor rural regions that would have been particularly hard hit by the conflict.

2. PERU'S CIVIL CONFLICT AND SHOCKS AT BIRTH

We first discuss the possible mechanisms through which the Peruvian internal conflict could be associated with worse infant outcomes. The existing economics literature on the microeconomic effects of conflict have identified two important channels through which conflict could worsen childhood outcomes. First, Akresh and DeWalque (2010), Akresh *et al.* (2011) and Bundervoet *et al.* (2009) argue, in the contexts of the conflicts in Burundi and Rwanda, that conflict created unanticipated shocks to income (theft or destruction of assets including livestock and grain stocks, death, or abduction of income earner). Since these shocks are unanticipated, affected households are unable to adjust in the short-term, and so

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