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Maternal education and child mortality in Zimbabwe

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ABSTRACT

In 1980, Zimbabwe rapidly expanded access to secondary schools, providing a natural experiment to estimate the impact of increased maternal secondary education on child mortality. Exploiting age specific exposure to these reforms, we find that children born to mothers most likely to have benefited from the policies were about 21% less likely to die than children born to slightly older mothers. We also find that increased education leads to delayed age at marriage, sexual debut, and first birth and that increased education leads to better economic opportunities for women. We find little evidence supporting other channels through which increased education might affect child mortality. Expanding access to secondary schools may greatly accelerate declines in child mortality in the developing world today.

1. Introduction

Across the world, studies have generally found that more educated people live longer and healthier lives, and they give birth to fewer but healthier children (Grossman, 2006). However, only a few of these studies have been able to identify causal evidence of the impact of education, and very few studies have been conducted in the developing world (Lochner, 2011). In addition, very few studies have been able to investigate mechanisms through which improved education might affect health outcomes. Given the disproportionate share of the burden of disease as well as persistently high child mortality and fertility rates in developing countries, there is a need to better understand what role education might play in improving development outcomes today.

The major challenge to better understanding these relationships has been identifying situations in which education has increased in a way that is unrelated to other factors that might also affect health. The most successful studies have looked at natural experiments, usually changes in compulsory schooling laws or age-at-entry policies, to identify plausibly exogenous changes in education. Generally, most of these studies have found that increased levels of education are associated with lower (own) mortality, improved healthy behaviors (including smoking), lower fertility, and lower child mortality; however, not all of the studies come to the same conclusions[1]. Although evidence is sparse, there is also some evidence that educating mothers might lead to different outcomes than educating fathers, and that higher levels of schooling may be more important than primary schooling (Lochner, 2011).

In 1980, following independence, Zimbabwe rapidly expanded access to secondary schools for black Zimbabweans, which provides an opportunity to estimate the impact of increased maternal secondary education on child health and fertility outcomes in a setting with both high child mortality and high fertility[2]. Using age-specific

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[1] For example, on the question of whether own education affects mortality, Lleras-Muney (2005), Mazumder (2008) and Clark and Royer (2013) reach different conclusions.

[2] It should be noted that this expansion also affected male education. However, as we explain in the results section we have strong reasons to suspect that our results are mainly driven by increases in maternal education relative to paternal education. However, we wish to point out that we cannot distinguish between the effects of

exposure to a set of policies that greatly increased secondary school opportunities for some women, we first estimate the impact of increased maternal education on child survival[3]. The magnitude of our main result is large: children born to mothers who attended some secondary schooling are 12 percentage points less likely to die, and an additional year of schooling decreases the probability of a child dying by about 21%. We find that the effects are much stronger in rural areas and among less wealthy mothers.

We next examine important pathways that might explain the relationship between maternal education and child survival. Since the data from the DHS are quite detailed, we examine mechanisms that encompass the broad categories of fertility (age at marriage, first birth, etc.), economic outcomes (household asset ownership, spousal quality, etc.), health service utilization (institutional delivery and vaccinations) and female empowerment (control over household finances and attitudes toward domestic violence). These outcomes are related to the classic theories of how education may improve health directly via allocative efficiency or productive efficiency mechanisms (Grossman, 2006) or indirectly through some of the other benefits of education such as increased income. For example, a mother's education may directly affect a child's health outcomes if it influences the likelihood that she completes all required pre-natal visits, she fully vaccinates her children, or she makes more informed choices with regards to healthcare providers. Alternatively, a more educated mother may have more economic opportunities and she may use these to gain access to more or better quality health care providers. As in McCrary and Royer (2011), we cannot distinguish between direct and indirect channels via which maternal education might affect child health. The health services provided to children of women were examined since it is believed that mothers have a great deal of discretion over the services that their children receive and because timely and more adherent treatment has been linked to improved child health outcomes. Across these broad categories, we find evidence that education affects fertility and economic opportunity related outcomes, but we find little evidence on other channels.

It is crucial to highlight that while Zimbabwean independence brought about other changes beyond expanding secondary schooling (Thomas and Maluccio, 1996), we exploit the idea that being 13 years of age and younger in 1980 allowed one to have greater access to secondary school as opposed to being a few years older and therefore less likely to take advantage of the opportunity to attend secondary school; the operating assumption in this paper is that the other broader changes due to independence did not differentially affect those just below and those just above 13 in 1980. We assess the validity of this assumption by examining mortality outcomes of children born to mothers who had dropped out of school by age 9. These are mothers who did not take advantage of the educational reforms. Hence, if simply being of a certain age during independence is a driving factor for our results, we should find that children of those mothers below 13 in 1980 and those children born to slightly older mothers to have very different mortality outcomes even in this sample, however, we do not find any effect in this sample. In addition, we also include year of birth fixed-effects for the children born to these women, in order to account for any year-specific trends that could have affected all children. Finally, we also examine the trends in child mortality in Zimbabwe before and after independence and find that child mortality rates were relatively stable during the time period when the most of the births in our sample take place.

Furthermore, we examine a few outcomes that are determined *before* independence, and outcomes that are not affected by education, and we find that just being of a certain age during independence is not driving our results. It should also be stressed that we examine the outcomes of children born many years after independence. Hence, if independence was accompanied by a better health system, then *all* children born after 1980 (regardless of when their *mothers* turned 13) would be exposed to the same post-independence health system. We find that even among children born many years after independence, those whose mothers happened to be below 13 *in 1980* have better survival outcomes than those whose mothers were just too old to have benefited from the policy changes in the education sector.

This paper is part of a number of studies that have looked specifically at the role of maternal education in improving health and fertility outcomes. Among developed countries, the opening of colleges to women in the United States has been linked to higher infant birth weight, increased gestational age at birth and lower fertility (Currie and Moretti, 2003; Grossman, 2006). Increases in compulsory years of education in Norway has also been linked to relatively large increases in weight at birth to children born to exposed women (Grytten et al., 2014; Lochner, 2011). However, children of women born in months just before primary school month-of-entry policies (who, hence, receive more education than women born in months just after such cut offs) in some parts of the United States were no healthier than babies born to women just after these cut offs, suggesting that not all gains in education have the same effect (Lochner, 2011; McCrary and Royer, 2011).

In the developing world, a handful of studies have investigated the role of expanded access to primary schooling on child health and fertility outcomes. A policy that led to increased years of compulsory primary education in Turkey has been linked to lower fertility and increased use of contraception (Dinçer et al., 2014) as well as less low birth weight babies and healthier children (Gunes, 2013). The introduction of universal primary education in Nigeria has been linked to lower early fertility among exposed women (Osili and Long, 2008). In a working paper, (Breierova and Duflo, 2004) use a large primary school construction program in Indonesia in the 1970s to find that female education was linked to delayed marriage and lower fertility, while the education of both parents was associated with lower child mortality. While our paper is similar in spirit, Breierova and Duflo (2004) have a rather weak first stage and are unable to examine detailed mechanisms.

A few studies have also investigated the impact of higher levels of education on health outcomes in the developing world. In Taiwan, an increase in the number of years of compulsory schooling (from 6 to 9 years), affecting mostly junior high school aged children, coupled with a large school construction program has been linked to improved infant health outcomes, including a reduction in low birth weight children and a small decrease in infant mortality (Chou et al., 2010). A similar expansion of compulsory schooling from 6th to 9th grade in Mexico has been linked to increased use of contraception (Andalón et al., 2014). Evidence from the long-term follow-up of a large-scale randomized experiment which reduced the costs of education for adolescent girls in Kenya found that increased retention of students in schools was associated with lower teenage pregnancy rates (Duflo et al., 2014). Similarly, teenage girls in Malawi who were induced to stay in school through a cash transfer program also had lower teenage pregnancy rates (Baird et al., 2011). A study that investigated the impact of a large high school closure program in China, which uniquely employed an identification strategy from a policy change that led to lower levels

maternal education per se and the effects of *differences* in husband versus wife's education.

[3] This school expansion has also been used in other papers. Exploit this to find that increased maternal education increases knowledge and awareness of HIV, but they are not able to measure the impact on HIV status. Aguero and Ramachandran (2010) use this large school expansion to show that children of more educated mothers are themselves more educated.