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*World Development* Vol. xx, pp. xxx–xxx, 2017
0305-750X/© 2017 The Author(s). Published by Elsevier Ltd.


http://dx.doi.org/10.1016/j.worlddev.2017.02.007

# How Important is Parental Education for Child Nutrition?

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**Summary.** — Existing evidence on the impacts of parental education on child nutrition is plagued by both internal and external validity concerns. In this paper we try to address these concerns through a novel econometric analysis of 376,992 preschool children from 56 developing countries. We compare a naïve least square model to specifications that include cluster fixed effects and cohort-based educational rankings to reduce biases from omitted variables before gauging sensitivity to sub-samples and exploring potential explanations of education-nutrition linkages. We find that the estimated nutritional returns to parental education are: (a) substantially reduced in models that include fixed effects and cohort rankings; (b) larger for mothers than for fathers; (c) generally increasing, and minimal for primary education; (d) increasing with household wealth; (e) larger in countries/regions with higher burdens of undernutrition; (f) larger in countries/regions with higher schooling quality; and (g) highly variable across country sub-samples. These results imply substantial uncertainty and variability in the returns to education, but results from the more stringent models imply that even the achievement of very ambitious education targets would only lead to modest reductions in stunting rates in high-burden countries. We speculate that education might have more impact on the nutritional status of the next generation if school curricula focused on directly improving health and nutritional knowledge of future parents.


*Key words* — parental education, schooling quality, undernutrition, stunting

## 1. INTRODUCTION

Stunting contributes to overall child mortality (Bhutta *et al.*, 2013) and also reduces the productivity of survivors when they enter the workforce (Hoddinott, Alderman, Behrman, Haddad, & Horton, 2013). Thus, there is a strong economic as well as humanitarian rationale for improving nutrition. However, one authoritative estimate suggests that scaling up proven effective nutrition-specific interventions in the world's most malnourished countries would only reduce stunting globally by 20% (Bhutta *et al.*, 2013). Therefore, additional actions in "nutrition-sensitive" sectors will be critical components of any global strategy to eliminate undernutrition (Ruel & Alderman, 2013). Among these, education absorbs the largest share of the development budget in low- and middle-income countries, at just over a third (IFPRI, 2014).

The scale of education investments, of course, would avail nutritional health little if the investments did not have a sizeable impact on undernutrition. But although there has been extensive research on the associations between the education of adults and the health status of the next generation (Behrman & Wolfe, 1984; Behrman & Wolfe, 1987; Desai & Alva, 1998; Duflo and Breirova, 2004; Fafchamps & Shilpi 2014; Headey 2013; Thomas, Strauss, & Henriques, 1991), obtaining rigorous experimental evidence, which would permit stronger causal interpretation, is challenging. Impact evaluations would need to track the intergenerational effects of randomized education investments and cover a range of education levels. [1] Exploiting natural experiments is therefore a more common research strategy, though these too have limitations (Card, 2001). Perhaps unsurprisingly, then, the literature on the child health impacts of parental education is still characterized by several longstanding controversies.

The first is whether there is a threshold or minimum amount of education necessary to have measureable impacts on nutrition. This is important since many countries are now close to reaching the much lauded target of universal primary education although this progress has not yet translated to universal primary completion in many low-income settings (World Bank, 2016). Yet non-linear returns to education may emerge from many factors: primary and secondary schools might vary greatly in quality and in impacts on nutritional knowledge, labor force outcomes and marriage market outcomes; secondary schooling for girls, but not boys, might postpone childbearing; and education may complement or substitute for other factors, such as household wealth or women's empowerment. Thus, there is value in assessing non-linear impacts of education across a heterogeneous group of developing countries.

A second related question is whether maternal education yields greater health benefits for the next generation than paternal education. [2] Although many developing countries make extra efforts to keep girls in school, the evidence on there being greater social returns to maternal education remains controversial. Basic multivariate analysis typically suggests that, in developing countries especially, maternal education has stronger child health and nutritional associations than paternal education (Desai & Alva, 1998; King, Klasen, & Porter, 2008; Vollmer, Bommer, Krishna, Harttgen, & Subramanian, 2016). It is also widely perceived that women on average wish to have fewer children than men (Ashraf, Field, & Lee 2014), [3] and that mothers devote more resources to their children than fathers do (Yoong, Rabinovich, & Diepeveen, 2012). On this basis many international development institutions have strongly advocated investing in women's education (Summers 1992; King *et al.*, 2008; World Bank, 2012), and development targets often include gender

* The authors would like to thank Jere Behrman, Marie Ruel, Jef Leroy, and seminar participants from a presentation given at The International Food Policy Research Institute in late 2014. The usual disclaimer applies. Funding for this work was received through the Advancing Research on Nutrition and Agriculture (AReNA) project funded by the Bill and Melinda Gates Foundation (Grant Number OPP1112307). Final revision accepted: February 8, 2017.

parity in education outcomes as a stated goal.[4] However, more nuanced economic analyses argue that the least squares estimates of the effects of maternal education on child health are likely to be more biased than the corresponding estimates for paternal education in environments characterized by discrimination against women. Intuitively, in a discriminatory environment it is only mothers with innate ability or exceptional childhood circumstances (e.g. exceptionally well educated parents) that will be able to attain higher levels of education, leading to larger omitted variables bias relative to paternal education levels. Consistent with this intuition, several quasi-experimental studies find that standard multivariate analyses from observational data yield upward-biased estimates of the returns to education, particularly women's education, relative to more experimental econometric approaches (Duflo, 2012; Breierova & Duflo, 2004; Fafchamps & Shilpi, 2014).[5]

Finally, there remains a significant knowledge gap on the question of *why* parental education matters for the health outcomes of the next generation. A small literature has examined whether formal education influences nutrition primarily by imparting literacy and numeracy skills, or whether education empowers women, or whether schooling directly exposes future parents to health information and knowledge (Glewwe, 1999; Webb & Block, 2004). Yet, to our knowledge, these various linkages have not been tested with unit-level data for a wide range of countries.

In this paper we seek to sharpen our understanding of the role of education on undernutrition by exploiting the widely used Demographic Health Surveys (MEASURE DHS, 2015). Specifically, we analyze the linkages between parental education and child health from 134 Demographic Health Surveys (DHS) for 376,992 preschool children from 56 developing countries. These data permit us to address the various knowledge gaps described above. We first address the question of endogeneity biases by comparing a simple least squares model to a model with cluster fixed effects to control for community characteristics, and finally to a model that includes a parent's educational rank within their location-specific cohort as an additional control for unobservable ability or family characteristics, following Fafchamps and Shilpi (2014), who analyze parental education's impact on non-nutritional health indicators for Nepalese children. We then explore issues of parameter heterogeneity by exploring whether the returns to education vary with household wealth and gender norms, national stunting rates, and a simple proxy for educational quality based on functional literacy. Finally, we use the rich array of indicators in the DHS to explore some of the possible mechanisms that might explain differences in the returns to maternal and paternal education.

The remainder of this paper is structured as follows. Section 2 reviews our data and Section 3 our methods. Section 4 presents our main results directly linking child nutrition outcomes to parental education. Section 5 explores potential explanations of our findings, and their implications for policy. Section 6 concludes.

## 2. DATA

The DHS survey instrument focuses on health and basic welfare of women of reproductive age and their children, and is designed to be representative at a national level as well as at urban, rural and subnational levels. The DHS are widely regarded as high quality and are particularly advantageous for multi-country analysis because of their standardization. For this paper we merged all applicable DHS rounds across countries and rounds and standardized relevant indicators.

Summary statistics for the core indicators used in the majority of our regressions are reported in Table 1, while Table 2 reports descriptive statistics for HAZ scores and parental education for each of the five major developing regions, as classified by the World Bank.[6]

The primary outcome variable for this study is the Z score for height for age (HAZ) of children 25–59 months based on the current WHO norms available at http://www.who.int/nutgrowthdb/en/. Height for age is an indicator of cumulative nutrition and thus a measure of the stock of health that is produced, in part, by the stock of education. In order to estimate the full effects of parental education on pre-school nutrition we excluded children 0–24 months of age, which corresponds to the "first 1,000 days" of life a period over which most growth faltering takes place (Victora, de Onis, Curi Hallal, Blössner, & Shrimpton, 2009). Since parental education can influence nutrition through many postnatal as well as prenatal investments, including younger children (0–24 months) in the sample would underestimate the nutritional returns to education, because some of these returns would not have been fully actualized for very young children. For example, parental education might improve child feeding practices in the crucial 6–24 month period (a hypothesis we test below), but measuring HAZ at age 5 months would not capture this mechanism. After applying this important exclusion, we were left with a data set consisting of over 376,992 preschool children from 56 developing countries.[7]

As expected, given the DHS country selection, the mean HAZ score is a low $-1.64$, and 40% of our sample of children are stunted (HAZ $< -2$). Notably, almost 50% of our sample is from sub-Saharan Africa. In contrast, Eastern Europe and Central Asia—where child undernutrition is very low and education levels very high—has relatively few observations. Similarly, the East Asian sample contains surveys from only two countries (Cambodia and Timor-Leste) since other surveys in the region did not collect anthropometry. Thus, this subsample is underrepresented and excluded from some of our regional comparisons. Samples for some regions are also dominated by a few countries. Egypt—admittedly a large country with relatively high rates of stunting—accounts for almost three quarters of the Middle East and North Africa sample, and Peru accounts for just under half of the Latin America and Caribbean sample. Hence the non-representative nature of the selection of DHS countries should be borne in mind when interpreting some of the results below.

The primary explanatory variable in our study is the extent of parental education, as measured by years of formal schooling.[8] Tables 1 and 2 show tremendous variation in parental schooling, as reflected by large standard deviations in Table 1, and marked regional variations in Table 2. Unsurprisingly, education levels are easily the highest in Eastern Europe and Central Asia, where virtually all parents have at least completed primary school and gender gaps in education are relatively small. Levels of schooling attainment are also relatively high in Latin America and the Middle East and North Africa (6 to 8 years on average), but much lower in sub-Saharan Africa and South Asia (less than 6 years), where gender gaps are still quite large (1.3 years in the former and 1.6 years in the latter). Trends in parental education by age cohort also show very marked differences across regions. Figure 1 plots mean education levels by parental age cohorts for parents older than 21 years of age. Eastern Europe and Central Asia scarcely show any intergenerational expansion in education (since education levels there were already very