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# Women's Education: Harbinger of Another Spring? Evidence from a Natural Experiment in Turkey

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**Summary.** — We use Turkey's 1997 Education Law that increased compulsory schooling from 5 to 8 years to study the effect of education on women's fertility and empowerment. Using an instrumental variables methodology, we find that a 10 percentage-point increase in the proportion of ever-married women with eight-years of schooling lowered pregnancies by 0.13 per woman; increased the proportion paying an antenatal-visit during the first trimester by 6 percentage points; using contraceptives by eight points and with knowledge of the ovulation cycle by five points. There is weak evidence that schooling decreased child mortality; no evidence that it changed attitudes toward gender inequality.


*Key words* — health, education and inequality, education and economic development, marriage and fertility, Middle East, Turkey

## 1. INTRODUCTION

The impacts of women's education on their wellbeing and the wellbeing of their children have been widely documented. [1] But almost all of the research is based on non-Middle Eastern countries. Cultural norms and social environments in Middle Eastern societies discriminate against women, limit their economic and educational opportunities, and relegate them to a lesser status than men (UNDP, 2005). The returns to women's education may be different in a social and cultural environment that discriminates against them than in societies that accord them a more equal status. Despite its significance, there is limited empirical research to estimate the effects of women's education within the social and cultural settings of a Middle Eastern country. Such research is critical in light of recent papers that cast doubt on previous findings of negative effects of maternal education on fertility and infant health (Lindeboom, Llena-Nozal, & van Der Klaauw, 2009; McCrary & Royer, 2011; Zhang, 2012).

In this paper, we take advantage of Turkey's Compulsory Education Law, and variation in the intensity of its implementation across regions in Turkey, to study the effect of women's formal years of schooling on a range of measures that capture women's fertility, empowerment, and child mortality. Turkey is the largest economy in the Middle East and by many measures, a relatively modern society. Despite its growing economic and geopolitical influence, the position of women in Turkey continues to be defined along traditional lines: In 2010, only 27% of women (*versus* 47% of men) had a secondary or higher education and a mere 24% worked for wages (*versus* 70% of men)—a proportion that declined from 32% in 1990 (UNDP, 2011). Surveys indicate that a third of women in Turkey have been exposed to physical violence at home (Altınay & Arat, 2007). In 2011, Turkey was ranked 124th (out of 135 countries) in the gender equality index of the World Economic Forum (Hausmann, Tyson, & Zahidi, 2012). Gender inequality portends poor child wellbeing: in 2010, infant mortality in Turkey was 15.8 per 1000 births compared to 5.1 in the European Union and 27.6 for the Middle East and North Africa. [2] Whether women's education can improve child health and women's reproductive health and empowerment, the focus of our study, is therefore an issue of considerable policy relevance not just for Turkey, but for the entire Middle East.

In 1997, Turkey passed the Compulsory Education Law that increased mandatory formal schooling from 5 to 8 years. Individuals born after 1985 (who were 11 or less in 1997) were the target of the Compulsory Education Law. Its primary objective was to prepare Turkey's entry into the European Union (EU) by increasing educational attainment and reducing geographic and gender-specific educational disparity. Access to education has been widely acknowledged by the EU as a means of enhancing economic and social development in Turkey as well as in bringing economic and social cohesion across its eastern and western regions. To accommodate the expected increase in enrollment, the government devoted additional resources on school infrastructure and in hiring new teachers leading to a 36% increase in primary school teachers during 1996–2003 (Dülger, 2004; State Institute of Statistics, 1999; Turkish Statistical Institute, 2006).

We capitalize on the 1997 compulsory school reform legislation to estimate the causal effect of women's schooling on a range of outcomes relating to child mortality, women's reproductive health, and measures of empowerment, including age at first marriage, age at first child birth, contraceptive use, antenatal visits, fertility, and attitudes toward gender equality. We form a treatment group of women who were born during 1986–90 and were affected by the legislation and a corresponding comparison group of women who were born during 1979–85 and were not affected. Investment in new teachers varied

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across the sub-regions of Turkey. Within each sub-region, we exploit variations across cohorts in the number of primary school teachers in the sub-region of residence at age 11 to construct an instrument to predict the educational attainment of young women. The predicted education variable is then used to estimate the effect of education on a variety of outcomes experienced by the treatment group of women and their offspring from information obtained when the treatment cohort was between the ages of 18 and 22 and the comparison cohort was between the ages of 23 and 29.

## 2. REVIEW OF LITERATURE

Economists argue that more educated individuals are more efficient producers of health and more educated parents are more efficient in producing healthy children (Grossman, 2006). Knowledge helps parents make informed decisions on their children's nutrition and healthcare. It influences health-related behaviors (such as smoking, drug abuse, and binge drinking) and lifestyles (e.g., physical exercise), and parents', in particular mother's, health behavior and lifestyle impact child health (e.g., birth weight). Parental education is also the most basic component of socio-economic status, which according to epidemiologists is the key determinant of own and child health (Adler & Newman, 2002). Further, education may affect attitudes toward gender equality empowering women (Mocan & Cannonier, 2012). Because mothers are often the primary caregiver for infants and young children, their empowerment is likely to channel family resources toward mother- and child-wellbeing.

There is extensive empirical evidence of the association between parental education and child health. [3] Because genetic endowments are a key determinant of a child's health, it is challenging to provide convincing evidence that the correlation between parental education and child health implies causality: that parental education improves child health. Arguably, heritable ability may result in more able women seeking higher education and having more able children who have better health (Behrman & Rosenzweig, 2002). Further, a future orientation may cause mothers to acquire more education and invest in their children's health (Fuchs, 1982). In short, an unobserved third factor may be causing both higher education among women and better health of their children.

Two studies have applied increases in parental education resulting from policy changes to study the effect of an exogenous increase in parental education on the health outcomes of their children. Breierova and Duflo (2004) exploit a large-scale school construction program in Indonesia and Chou, Liu, Grossman, and Joyce (2010) use changes in compulsory education laws in Taiwan. Both studies conclude that parent's education has a negative effect on child and infant mortality. In contrast to the findings of these investigations, a recent innovative study that uses the decline in maternal education triggered by high-school closures during the Cultural Revolution in China from 1977 to 1984 finds that women who completed high-school were more likely to use prenatal care and were more likely to work off-farm, but their high-school completion had no effect on premature-births, low-birth weight, neonatal mortality, and infant mortality (Zhang, 2012). [4] Two other studies, one based on US data and the other on British data, reached similar conclusions. McCrary and Royer (2011) used school entry policies in the US to identify the effect of mother's education on fertility and infant health and found these effects to be small and possibly heterogeneous. Lindeboom *et al.* (2009) used British compulsory schooling laws and found that postponing the school leaving age of parents by 1 year had little effect on the health of their children. These findings thus cast doubt on previous research on the effects of mother's education on child health and its applicability across diverse cultural and institutional settings.

Researchers have also investigated the effect of education on early marriage and childbearing in adolescence—both are known to have adverse consequences on mother and child health (WHO, 1995). This is an important issue in many Middle Eastern countries where marriage and child bearing in adolescence are high. For instance, approximately 17% of ever-married women aged 20–45 in Turkey are married before the age of 16 and 13% have a child before they turn 17. [5] A reduction in childbearing in adolescence is likely to improve birth outcomes and mother's and child's health. Becker's human capital model, for instance, predicts that education results in a quantity–quality trade off in fertility: more educated parents opting for fewer children of higher quality—e.g., better health (Becker & Lewis, 1973).

Empirical studies also suggest that more educated couples have wider knowledge, and make more efficient use of contraceptive methods (Breierova & Duflo, 2004; Rosenzweig & Schultz, 1989). If mother's education causes a reduction in early marriage and childbearing and improves fertility outcomes, it will improve mother- and child-health. Establishing causality between mother's education and early marriage, early child-bearing, and fertility outcomes is also a challenge because low level of empowerment and high dependency may result in women marrying early and having children thus forgoing education. While this phenomenon may be more prevalent in Middle Eastern countries, in western societies too, teenage pregnancy may limit the options of young mothers and interrupt their schooling. [6] In this context, fertility will be endogenously affecting schooling (Angrist & Evans, 1998). In general, the observed association between low-education and early marriage and fertility could simply be on account of reverse causality or an unobserved third factor causing both low education and early childbearing.

Here again researchers have used "natural experiments" to determine the direction of causality between education and marriage and education and teenage fertility. Currie and Moretti (2003) use data on opening of two and four-year colleges during 1940–90 in the US as an instrument to predict maternal education to study the effect of the predicted education variable on mother's marriage, infant health, use of prenatal care, and smoking and find that mother's education has a positive impact on infant health, prenatal care and a negative impact on smoking. Similarly, Osili and Long (2008) exploited the Universal Primary Education Program introduced in Nigeria in 1976 and exposure to this program by age and region to study the effect of women's education on their fertility and found that increasing female education by 1 year reduced early fertility by 0.26 births. Using the extension of compulsory education from 6th to 9th grade in Mexico in 1993, Andalon, Grossman, and Williams (2013) find that raising women's education beyond the 6th grade improved their knowledge and use of contraception. Again, whether findings from these studies can be generalized across cultural and institutional settings is an empirical issue and we investigate that in the context of a Middle Eastern country.

Our study builds on the existing literature and makes three contributions. One, we study the effect of education on a range of outcomes, including women's empowerment, utilization of modern family planning methods, and knowledge of the ovulation cycle, that have not been widely studied in previous research. Two, we study the effect of education on child