

## Family Planning 4



# The economic consequences of reproductive health and family planning

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We consider the evidence for the effect of access to reproductive health services on the achievement of Millennium Development Goals 1, 2, and 3, which aim to eradicate extreme poverty and hunger, achieve universal primary education, and promote gender equality and empower women. At the household level, controlled trials in Matlab, Bangladesh, and Navrongo, Ghana, have shown that increasing access to family planning services reduces fertility and improves birth spacing. In the Matlab study, findings from long-term follow-up showed that women's earnings, assets, and body-mass indexes, and children's schooling and body-mass indexes, substantially improved in areas with improved access to family planning services compared with outcomes in control areas. At the macroeconomic level, reductions in fertility enhance economic growth as a result of reduced youth dependency and an increased number of women participating in paid labour.

### Introduction

In 2006, universal access to reproductive health by 2015 was added as a target to the Millennium Development Goals to help to improve maternal health. According to our analysis, access to reproductive health and family planning can also help to achieve some of the other Millennium Development Goals, such as those to eradicate extreme poverty and hunger, achieve universal primary education, promote gender equality and empower women, and ensure environmental sustainability.

According to the Malthusian argument, population growth puts pressure on scarce resources, leading to hunger and high mortality.<sup>1</sup> Economic studies have focused on whether demographic change is a result of more than just population growth.<sup>2</sup> Population increase resulting from health improvements and increasing life expectancy can have very different economic consequences from population growth resulting from high fertility or immigration; therefore, the source of population growth needs to be known to predict its social and economic effects.<sup>3,4</sup>

### Search strategy and selection criteria

We searched Web of Science and Research Papers in Economics (RePEc) for relevant work, published between 1980 and 2012, in any language, with the search terms "population and economic growth", "demographic dividend", "family planning and economic outcomes", and "fertility and economic outcomes". We also did searches for the two experimental family planning interventions discussed in this paper with the search terms "Navrongo and family planning" and "Matlab and family planning". We focused our selection on empirical studies that provided evidence of the effects of fertility on economic outcomes at the household or macroeconomic level.

Improvements in reproductive health and access to family planning can benefit the economy by improving general health and reducing fertility. Antenatal and post-natal care can improve the health of mothers and children. Access to family planning not only reduces total fertility (ie, the average number of children that would be born to a woman over her lifetime, in accordance with reported age-specific fertility rates), but also reduces the numbers of high-risk births for women of very young maternal age (ie, those younger than 18 years) and women at high parities. Contraceptive use can also improve birth spacing, which can further benefit the health of mothers and children, reducing maternal and child mortality.<sup>5</sup> Parents can invest more money and time per child in health, nutrition, and education when they have fewer children. Early childhood investments in health and nutrition can have large effects on physical and cognitive development and educational outcomes and income in adulthood.<sup>6-8</sup>

### Key messages

- Family planning programmes can reduce fertility in resource-poor settings such as rural Bangladesh and Ghana
- Fertility declines are associated with an increase in women's health, earnings, and participation in paid employment
- The children of women who have had frequent home access to family planning and health services are healthier and better educated children than are those of women without such access
- Reduced fertility and child mortality lead to an increased proportion of working-age people within the population, with positive outcomes for economic growth
- Household-level behavioural effects on the female labour supply, child health, and education can lead to large macroeconomic demographic benefits

Published Online

July 10, 2012

[http://dx.doi.org/10.1016/S0140-6736\(12\)60827-7](http://dx.doi.org/10.1016/S0140-6736(12)60827-7)

S0140-6736(12)60827-7

This is the fourth in a **Series** of five papers about family planning

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Although fertility decline is driven mainly by reductions in desired fertility,<sup>9</sup> reproductive health and family planning interventions can help families to achieve their fertility goals. A reproductive health, child health, and family planning intervention in Matlab, Bangladesh, and a similar intervention in Navrongo, Ghana, both led to reduction in total fertility of about one child per woman compared with control areas.<sup>10,11</sup> Reproductive health and family planning services can thus be effective even in resource-poor settings.

Access to family planning and maternal and child health services is likely to have economic repercussions for families, extending beyond the reductions in fertility and improvements in health. For example, improved control of fertility and health of women and children will give women more opportunity to acquire skills that could raise lifetime earnings. Additionally, a reduction in total fertility might lead parents to accumulate more physical assets than they would have otherwise done, particularly if the assets are a partial substitute for the support and care they expect from a child. Moreover, human capital investments parents make in each of their children's health and schooling might rise as a result of reproductive health programmes that provide information and access to family planning.<sup>12–14</sup> Finally, general equilibrium effects might occur at the community or aggregate level if fertility declines exceed increases in child survival, leading to fewer young people in the community than in previous generations. Within two decades after a decline in fertility, fewer young adults than previously would reach working age, possibly causing wages to rise, at least for young people, because of a scarcity of workers (assuming the supply of other productive factors and technology does not change).

Acquisition of skills to boost earnings, accumulation of physical assets, and investments in children's health and schooling would take place only if resource substitutions occurred at the family level, which is plausible, but causal relations such as these are difficult to measure with purely observational data. The effects of fewer young adults reaching working age on the labour market would occur at the aggregate level, although the magnitude or importance of these effects in the era since the industrial revolution is questionable.<sup>15</sup>

Microeconomic evidence derived from survey and census data at the household level in areas where family planning and reproductive health programmes have been implemented as social experiments helps to assess the expected effects of these programmes. In these areas, household savings in the form of adult human capabilities might increase for women, the human capital of children would tend to rise, and physical capital might be accumulated for retirement. Increases in women's health and productivity would give families more resources for their children than they would have in areas without a family planning and reproductive health programme, and the resulting investments in

child health and education should increase prospects for the next generation, alleviating poverty by boosting labour productivity and capital accumulation, which adds to aggregate economic growth.

### Effects at the household and community level

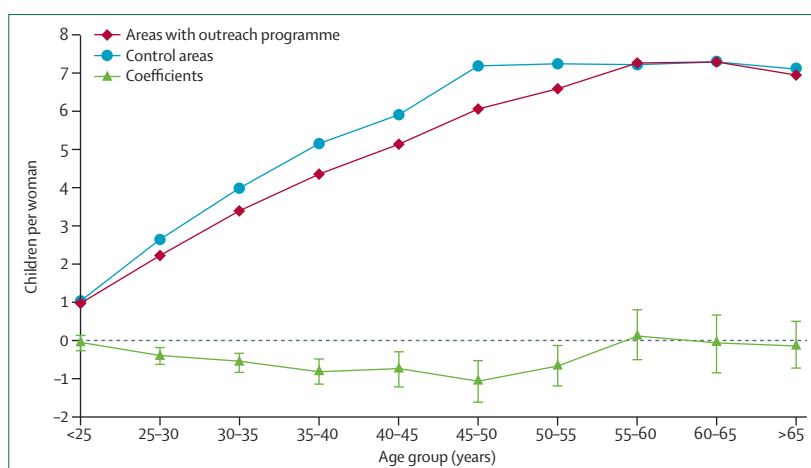
To estimate the empirical importance of increased access to family planning and reproductive health resources, a method is needed to identify variation in fertility and family health that is attributable to the effects of the particular family planning programme or policy rather than parents' preferences, economic and social endowments, opportunities, or unobservable determinants of the family's labour supply, investment behaviour, and other outcomes of interest. Outcomes in areas where family programmes have been implemented versus control areas provide the best available evidence for the causal effect of family planning programmes.

In the district of Matlab, Bangladesh, outreach family planning programmes were set up in 71 of 141 villages from 1977 to 1996. Community health workers were trained to visit the homes of all married women of childbearing age in the outreach programme villages every 2 weeks to offer them various contraceptives and child and maternal health services and supplies, with some additional services provided after 1982. Before the programme began, according to a 1974 census, all 141 villages had similar surviving fertility (ie, child-to-woman ratios), average schooling, and housing characteristics. Assessment of the effect of the programme was initially restricted to effect on birth rates,<sup>16</sup> but long-term follow-up provided more detailed evidence than was first obtained. 19 years after the programme started, child-to-woman ratios were 16% lower in villages with an outreach programme than in those that had access only to standard government family planning clinic services, after adjustment for village and year fixed effects. The faster decline in fertility in the treatment areas occurred against a backdrop of overall fertility decline, with the child-to-woman ratio (an indicator of surviving family size) declining by 39% in the control villages compared with 55% in the intervention villages between 1974 and 1996. Women aged 35–54 years in 1996 living in outreach programme villages had 23% fewer children than did those living in comparison areas, after adjustment for individual, household, and community infrastructure control variables. As expected, the effect of the intervention on the number of children ever born cumulated as women aged (as the proportion of their childbearing years with access to the programme increased), although the effect on the number of children born to women 55 years and older was small because these women were not (or only partly) exposed to the intervention in their childbearing years (figure 1). In 1996, mortality in children younger than 5 years born to women aged 35–54 years was 30% lower in villages with a family planning programme, and these women had

17% fewer living children than in control areas<sup>18</sup>—lower than the 23% difference in programme-related fertility decline, which compensates in part for the overall decline in child mortality.

In terms of the programme's benefits for women, the average body-mass index (BMI) of women aged 25–54 years was more than 1 kg/m<sup>2</sup> higher in the outreach programme area than in comparison areas. Another panel study of Matlab reported that a 1 kg/m<sup>2</sup> improvement in BMI in women (who had an average BMI of 18.4 kg/m<sup>2</sup> in 1996 in the control population) was associated with a 17% decrease in the hazard rate of mortality.<sup>19</sup> Women in villages with an outreach programme reported monthly earnings in 1996 that were 40% higher than were earnings in comparison villages, holding constant for age and schooling. Women of childbearing age in the outreach programme area also seemed to be healthier and more productive if they were part of the paid labour force than were those in the comparison area that did paid work. This advantage remained after correction for characteristics of women with paid jobs. Married women in programme villages reported 25% more physical assets per adult in their household than did those in control areas, and the composition of household assets in programme villages had shifted away from livestock, which depends on the availability of child labour, towards housing and financial assets, consumer durables, and jewellery.<sup>16</sup> Homes in villages with a family planning programme were more likely to have access to water for drinking and cleaning than were those in control areas, saving the time and effort of women and children.

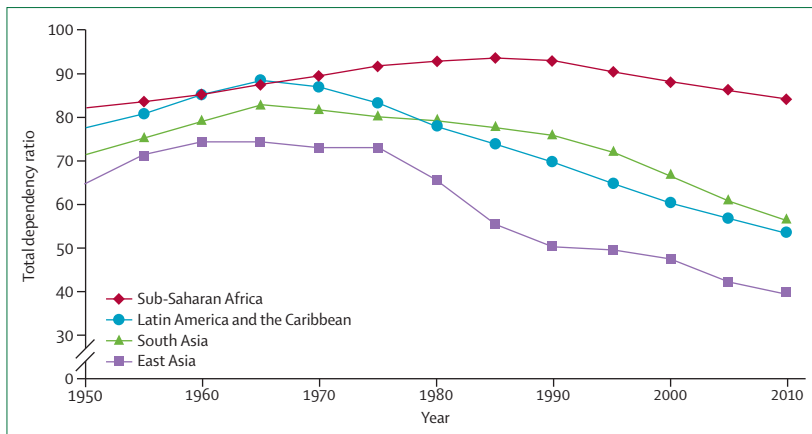
Effects of the programme on women's earnings and children's BMI and schooling support our hypothesis that access to reproductive health services has helped to achieve Millennium Development Goals 1, 2, and 3. Children aged 7–14 years in the outreach programme villages had completed significantly more years of schooling than had those in the comparison areas, and the average BMI of children aged 1–14 years was higher in the treatment programme villages (both expressed as age-normalised Z scores by sex, unadjusted for other covariates). However, after adjustments for parental schooling, household composition, and village infrastructure, these differences were significant only for boys' schooling (differed by 0.5 SD) and for girls' BMI (differed by 0.42 SD).<sup>18</sup> This programme therefore had important indirect benefits that accelerated the demographic transition and are linked to improved health and productivity of women, increased household assets per adult, and some increased health and schooling of the children of the women who resided in treatment programme villages in 1996. However, wages of men and young women (aged 15–24 years) were not affected by the intervention, as would be conjectured from Malthusian population pressures in this rural setting where agricultural production depends on a fixed amount of land.<sup>16</sup>



**Figure 1: Number of children ever born to married women in villages with and without family planning programmes in Matlab, Bangladesh, in 1996**

Coefficients are ordinary least-squares estimates of the differences in fertility in 1996 between women residing in areas with a family planning outreach programme (implemented in 1977), and those in an area with only the standard government family planning clinic service (control areas). Error bars show 95% CIs around the estimated treatment effects, adjusted for the sample weights implied by the survey design. Reproduced from a working paper by Joshi and Schultz,<sup>17</sup> with permission from the authors.

In a similar intervention study in Navrongo in northern Ghana, communities were randomly assigned to one of four groups: those that received home visits from female nurses who provided married women with contraceptive and health services; those in which a leadership network known as *zurugelu* was introduced, designed to involve men in health and reproductive issues through group discussions and to enrol community health volunteers to provide services; both interventions; or no intervention (the control group).<sup>11</sup> The combination of both interventions had an effect on age-specific birth rates in the first few years of the programme (1993–99). The desire to extend intervals between births is a frequently stated reason for contraceptive use. However, birth spacing might only delay childbearing rather than proportionately reduce the number of births a woman would have in her lifetime. In Navrongo, the combined intervention was more strongly associated with birth rates than with reported contraceptive use. This unclear result reinforces the need to study the long-term effects of family planning and family health-care programmes on fertility and family outcomes throughout women's lifetimes, rather than to focus only on reported short-term contraceptive practices.<sup>20</sup> Analysis of subsequent data from Navrongo has shown a 9% decrease in the number of children ever born to women living in communities with both interventions compared with the number born to women in control areas, which suggests that birth spacing might lead to smaller completed families. Most of the effect of the *zurugelu* treatment on fertility is, however, restricted to a small group of educated women.<sup>21</sup> Although these results have shown that a family planning intervention can lower fertility in a very poor rural area of Africa, and that visits by nurses



**Figure 2: Total dependency ratios in four developing regions, 1950–2010**

Total dependency ratio is the number of people in the population aged 0–14 years and 65 years and older per 100 people in the population aged 15–64 years. Data taken from the UN World Population Prospects (2010 revision).<sup>31</sup>

reduced infant mortality,<sup>22</sup> long-term follow-up studies of the health and economic effects of the interventions are still to be completed.

These findings showed that family planning services can affect fertility, health, and economic outcomes; however, in a randomised controlled intervention study providing access to contraceptive pills and condoms in Ethiopia, access had no effect on contraceptive use or 3 year birth rates. A possible explanation for this result is that injectable contraception was the desired method of family planning, but the programme did not provide this method.<sup>23</sup> Observational studies that look at the effect of family planning programmes and try to control for confounding factors tend to find beneficial effects. For example, roll-out of family planning services in Colombia enabled women to postpone their first pregnancy, increasing participation in the formal labour market,<sup>24</sup> and mobile clinics and community distribution increased contraceptive use in Zimbabwe.<sup>25</sup>

An increasing amount of more reliable microeconomic evidence for the effect of family planning programmes is being accumulated. Examination of non-experimental and randomised-experimental data for family planning and maternal and child health programmes has identified the important welfare benefits of these programmes for women and their children—at least in the Matlab and Navrongo long-term social experiments. The quantity and quality of comprehensive household surveys from low-income countries have also risen rapidly, and these data might be valuable for baseline planning and assessment of future programmes.<sup>26–30</sup> These household surveys might enable the assessment of programme effects for different segments of the population (rich and poor, rural and urban, and ethnic groups), which could help in the design of interventions that would reduce inequality in the distribution of health and social welfare benefits, or increase the efficiency of family planning

and reproductive and child health interventions by targeting the people who are most likely to benefit.

### Macroeconomic consequences

In theory, the effects of family planning interventions at the household level should add up to measurable effects on national income at the aggregate level, although interactions between effects might influence the final outcome, and some effects might occur only at the aggregate level. For example, population growth could put pressure on food and land prices, which affects everyone, not just families with many children. The interventions in Navrongo and Matlab were regional and captured aggregate effects in these areas, but population change might have indirectly affected other regions as well—eg, by migration.

One driver of aggregate economic effects is change in population age structure. Mortality decline tends to occur before fertility decline, so initially, rapid population growth takes place. This increase in total population leads to rapid urbanisation as births begin to exceed deaths in urban areas and as people migrate from rural areas where population growth and a rising labour supply have eroded rural wages.<sup>2</sup>

Most developing countries have large numbers of children and few working-age adults. This situation is exacerbated when child mortality declines. A decline in fertility reduces the youth dependency ratio (ie, the ratio of people younger than 16 years to those aged 16–64 years), expanding the working-age share of the population, and raising national income per person. Declining fertility has already lowered the total dependency ratio (ie, the ratio of people younger than 16 years, and 65 years and older, to those aged 16–64 years) in most developing regions, apart from sub-Saharan Africa (figure 2). Although a decline in fertility reduces youth dependency rates when fertility drops to less than the replacement level (the number of children needed for a generation to replace themselves, allowing for mortality before reproductive age is reached; about two children per woman), further fertility declines can contribute to a high old-age dependency rate.<sup>32</sup>

In addition to age composition effects, fertility declines can affect female labour market participation at the aggregate level, and are an important cause of the rise in women's participation in the labour force in high-income countries.<sup>33–35</sup> The rapid economic growth of the so-called Asian Tigers (Hong Kong, Singapore, South Korea, and Taiwan) was fuelled mainly by the rising proportion of people in paid work, which was due partly to increases in the proportion of people of working age in the population, female labour force participation, and educational attainment.<sup>36,37</sup> Although the working-age proportion of the population and female labour force participation cannot increase indefinitely and cannot generate indefinite economic growth, they can cause substantial spurts in economic growth.

Fertility declines are likely to have little effect on the female labour supply in the poorest developing countries, since almost all women in these countries already work.<sup>38</sup> These women mostly work at home in rural areas and are generally self-employed or do unpaid work for their family. In such settings, the household is a production unit and childcare can be combined with work, which might be why the family planning programme in rural Matlab had only a small effect on female labour market participation (most of the reported labour market effect of the programme was on the earnings of women aged 25–54 years). In urban settings in middle-income and high-income countries, the workplace and home are commonly separated and work and childcare are difficult to combine. However, even in these settings, participation in paid work is not a simple binary choice. Women with young children might do flexible, informal work, rather than leave the labour market completely,<sup>39,40</sup> which suggests that the effects of decreased fertility on participation in the female labour market might be seen mainly in educated women in urban areas.

The effects of fertility reduction on age structure and the female labour supply can arise quickly and are clearly seen in aggregate cross-country data. In the long run, benefits from improved reproductive health, reduced fertility, and longer intervals between births would be expected in the form of better nutrition, health, and education of children. Reduced fertility might increase the resources available to each child. Investments in children's education have substantial effects on earnings as an adult, with each year of schooling associated with about a 10% increase in wage.<sup>41</sup> Early childhood health and nutrition—in utero and in the first few years of life—strongly influences physical and cognitive development and, eventually, earnings as an adult.<sup>42–45</sup> At the aggregate level, countries that have long life expectancy subsequently have higher economic growth than those with short life expectancy,<sup>46</sup> although whether this effect is causal remains controversial.<sup>15</sup> The long lag between improvement in early childhood health and its economic consequences, and the fact that both population size and worker productivity are affected, makes inference from aggregate data difficult.

Economic effects of health improvements in children and mothers depend on whether mortality and adult morbidity have decreased, and whether lifespans have lengthened. Reductions in infant and child mortality increase population numbers and youth dependency rates, which tends to impede economic growth in the short term. However, if mothers and children are healthier and have longer prospective lifespans than before fertility decline, economic benefits would be expected. Evidence on adult height (an indicator of underlying health) suggests that reductions in infant mortality are associated with improved childhood health and nutrition,<sup>47</sup> although this association might not be true in sub-Saharan Africa.<sup>48,49</sup> In the short term, improvements in health and child survival will possibly increase youth dependency and reduce income

per head, and the productivity benefits of improved health might take a long time to materialise.<sup>50</sup> An important issue, however, is whether improvements in reproductive health and child survival are themselves an important determinant of fertility reduction.<sup>51</sup> Improvements in child survival mean that households can achieve their desired number of children with lower fertility than before the increase in child survival.<sup>52</sup>

Estimates of the sizes of these effects have been used in a simulation model to examine the association between a reduction in total fertility rate of one child per woman in Nigeria.<sup>53</sup> This reduction would be associated with a 13·2% increase in gross domestic product per person above baseline forecasts after 20 years, rising to a 25·4% increase after 50 years when long-term effects are realised. Findings from empirical studies of economic growth have shown that reductions in the youth dependency ratio and rises in the working-age share of the population are associated with rapid economic growth,<sup>54</sup> which partly explains the economic take-off in India and China (gross domestic product per person is rising by 1·0% per year in China and 0·7% per year in India as a result of age-structure effects).<sup>55</sup>

Macroeconomic data provide evidence of an association between reproductive health, family planning, and fertility reduction and improved aggregate economic outcomes. However, detailed studies of the causal relations between poverty reduction and family planning at the household level are needed. Household-level findings generally suggest that poor households benefit substantially from access to reproductive health and family planning services, and that the empowerment of women (measured, for example, by the education gap between men and women) might affect the success of these services. Universal access to reproductive health and family planning services should benefit mainly poor families and will stop intergenerational transmission of poverty, although the responses to these programmes are likely to vary across subpopulations.

Up to now, productivity gains in agriculture have overcome the problem of land scarcity. However, several severe Malthusian challenges caused by a scarcity of global fixed resources might emerge in the future. One challenge is depletion of traded commodities such as fossil fuels. As the supply of these traded goods decreases, price rises are expected to encourage innovation that will increase efficiency of use and development of substitutes. Large-scale environmental degradation of forests, fisheries, water tables, and the atmosphere, particularly damage caused by emissions that lead to global warming, is a more worrying development than depletion of traded commodities because the absence of price mechanisms means there is no automatic market incentive to respond. In this case in particular, reduced fertility and slowed population growth might have benefits,<sup>56,57</sup> although rising income per person, which accompanies reductions in fertility, might well generate its own environmental pressures.



## Conclusion

Declines in fertility and decreases in population growth have played a central part in countries that have escaped from the Malthusian trap and whose economies are now growing.<sup>58</sup> Evidence from Asia and Africa suggests that access to family planning can have substantial effects on fertility. The resulting reduced fertility and improved birth spacing directly benefit maternal and child health and children's physical and cognitive development, educational outcomes, and adult productivity.

Fertility declines lead to a boost in income per head caused by decreased youth dependency rates, and also change the social and economic position of women, reducing gender inequality and allowing women more opportunity to enter formal employment than before the fertility decline. In addition to these immediate economic benefits, fertility decline will have long-term effects on economic growth when the next generation of healthier and better educated children enter the labour force.

### Contributors

DC and TPS searched for relevant published work and DC wrote the first draft of the introduction, the section about macroeconomic results, and the conclusion. TPS analysed the results from the Matlab study and wrote the first draft of the section about effects at the household and community level. Both DC and TPS responded to comments from the referees and finalised the review.

### Conflicts of interest

We declare that we have no conflicts of interest.

### Acknowledgments

This Series paper is a revised version of a paper prepared for the Working Group Meeting on Population, Family Planning and Achievement of the Millennium Development Goals, Chapel Hill, Dec 1–3, 2010. The authors thank the participants in that meeting for their comments. DC and TPS both received funding support for related research from the William and Flora Hewlett Foundation.

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