

**Research Program on
Fertility, Reproductive Health, and Socioeconomic Outcomes**

**Progress Report
September 2008**

Executive Summary:

1. The Hewlett Foundation awarded \$1.5 million grant for a two-year research program on fertility, reproductive health and socioeconomic outcomes at the World Bank. Since the Hewlett Trust Fund is a new grant facility and since it focuses on population issues which have suffered a general decline of interest at the World Bank, we treat this program as a pilot initiative to raise awareness about the impact of demographic change on economic development and, in particular, to elicit more evidence-based research on this topic.
2. This report summarizes the program's progress since July 2006. To show a full record of the highlights of the program, the report is a *cumulative narrative* from previous ones; periodic updates are flagged under new sub-headings. Section I summarizes program activities. Section II summarizes the research questions and approaches used in the studies under the program. Section III contains a brief description of the individual studies—their research questions, countries of focus and data sources. The attached Excel file summarizes the information on these studies, with their objectives, outputs, timelines, budgets, and progress to date.

Summary of Key Activities since July 2006

1. The research program has been launched, and a website developed for it. A call for proposals was put out, and the submissions subjected to review and consultations.
2. The selected studies fall into four areas: (1) HIV/AIDS; (2) women's labor force participation; (3) investments in child quality; and (4) macro-micro analysis of the impact of demographic change. Together, these studies will cover a broad range of potential consequences of demographic change, in a number of countries.
3. In the three months since the selection of proposals was finalized, the individual studies have also been launched. The studies are summarized below, along with progress to date. This information is included in the attached Excel chart, along with other information on the studies.
4. A meeting of the technical advisors and researchers is scheduled for April. The aims of the meeting are for the research teams to report on progress; to share information about databases, literature and methods; to identify topics for discussion, debate and working together, such as developing methods to deal with the endogeneity of fertility in estimating its consequences for the household and the economy; and to obtain feedback from the advisory panel.

Update July 2007:

1. Substantial progress has been made on the individual studies, as described below. An additional study was launched, on the topic of demographic change and women's labor force participation, using the Demographic and Health Surveys.
2. A meeting of the technical advisors and researchers was held in April. This interchange between the researchers and with the advisory panel generated a lot of useful feedback on the studies, which has fed into the subsequent work done on the studies.
3. John May, a demographer from the Africa Division of the World Bank, was added to technical advisors in July 2007, replacing Paul Gertler whose availability has not been forthcoming. We look forward to his contributions to strengthening the links between research, policy and Bank operations.
4. A meeting was held between our study researchers and those funded by the Hewlett Foundation through the Population Reference Bureau. It was organized jointly with Rachel Nugent of the PRB. The discussion was very lively, and gave us all an opportunity to learn about each other's work, and to learn from each other.

Update February 2008:

1. Damien de Walque attended the Hewlett meeting in Arusha (Tanzania) in December 2007 and presented the ongoing work and some preliminary results of the entire research program. Elizabeth King who was supposed to make the presentation could not attend due to flight problems. See Annex A for the PowerPoint presentation presented in Arusha. Damien also discussed the progress of his own study.
2. Tamara Fox and Sara Seims (Hewlett Foundation) visited on February 21 to discuss progress of the program with Monica Das Gupta and Elizabeth King. Monica and Beth requested a year's postponement of the completion date of the program, and Tamara and Sara agreed to this verbally. This was followed by a request for clearance to the Bank's legal and trust fund departments which has been granted.

Update September 2008:

1. An authors' workshop to discuss the preliminary results of the various studies under the program was held on April 22, 2008. The aim of the meeting was to take stock of progress in the individual research studies, ensure that the sharing of knowledge within the program involved all the teams, and obtain feedback from the advisory panel. Researchers reported on progress with respect to their deliverables, shared information about databases, literature reviews and empirical methods, and identified topics for further discussion, debate and working together, such as developing methods to deal with the endogeneity of fertility in estimating its consequences for the household and the economy. Excellent feedback was received from the participants, and from the discussants including Sara Seims, Tamara Fox, Rachel Nugent, Tom Merrick, Mayra Buvinic, and several highly-experienced researchers from different parts of the World Bank.
2. Several research products have been completed, including databases and draft papers, and plans have been drawn up for their dissemination. These are described below on page 6.
3. An external website has been set up, with information on the project and the individual studies. A pilot of this site had been set up previously on the internal website. The weblink is <http://econ.worldbank.org/WBSITE/EXTERNAL/EXTDEC/EXTRESEARCH/EXTPROGRAMS/EXTPUBSERV/0,,contentMDK:21179595~pagePK:64168182~piPK:64168060~theSitePK:477916,00.html>

Progress Report

The Hewlett Foundation awarded \$1.5 million grant for a two-year research program on fertility, reproductive health and socioeconomic outcomes at the World Bank. The Hewlett Trust Fund aims to engender more evidence-based research on how reproductive choices and demographic changes affect poverty and socioeconomic outcomes in developing countries. While the relationship between demographic changes, on the one hand, and poverty reduction and socioeconomic development, on the other, runs in both directions, the challenge set out by the Hewlett Foundation was to focus on how demographic shifts contributes or deters poverty reduction and socioeconomic development. We seek to use this trust fund to kick-start a program of research that can inform several aspects of the World Bank's work, those relating to human development areas, as well as to poverty and economic growth.

Since the Hewlett Trust Fund is a new grant facility and since it focuses on population issues which have suffered a general decline of interest at the World Bank, we treat this program as a pilot initiative to raise awareness about the impact of demographic change on economic development and, in particular, to elicit more evidence-based research on this topic. This is discussed in greater detail in the interim progress report sent to the technical advisers in December 2006, along with details of the overall research approach.

This report summarizes progress since July 2006, when the program was officially started with the transfer of funds from the Hewlett Foundation to the World Bank. Section I summarizes program activities so far. Section II is a brief overview of the research questions and approaches used in the studies under the program. Section III contains a brief description of the individual studies—their research questions, countries of focus and data sources. Together, these studies will cover a broad range of potential consequences of demographic change, in a number of countries. The attached Excel file summarizes the information on these studies, with their objectives, outputs, timelines, budgets, and progress to date.

I. Summary of Key Activities since July 2006

Overall progress: The research program has been launched, and a website developed for it. A call for proposals was put out, and the submissions subjected to rounds of reviews and consultations. The studies to be funded under this program have been selected, and work has begun on them.

Key dates:

- July 2006: First transfer of funds from the Hewlett Foundation to the World Bank
- December 2006: Final selection of research proposals
- January 2007: Researchers informed of selection and task codes created
- November 2007: Researchers' first workshop to present and discuss findings
- April 2008: Researchers' second workshop to present and discuss findings, with internal and external participation
- November 2008 (tentative): Special session at HD Week, World Bank
- April 2009 (tentative): Researchers' third workshop to present and discuss findings
- December 2009: New closing date for the research program, pending formal agreement by the Hewlett Foundation.

Update September 2008: The Trust Fund agreement between the Hewlett Foundation and the World Bank was formally amended on April 7, 2008. This amendment extends the completion date to December 2009 and the date by which all the funds are to be fully disbursed to April 30, 2010.

1. Process of selecting proposals for the research program

Eleven researchers submitted pre-proposals (usually two pages long) for funding in this program; after discussions with these researchers about their intended studies, nine were invited to flesh out their research plans (i.e. research hypotheses, data sources, team membership, budget, and timetable) and eight have been accepted. Several of the research proposals have gone through independent technical reviews previously as they rely on other sources of funding. The review process for the program focused more specifically on how each research team would address the overarching research issue of the grant, how they would measure economic consequences of demographic change, how they would address methodological problems such as the endogeneity of fertility in research involving household choices, what's innovative about the research, and how soon the researchers expect to have output. Researchers who were proposing related topics were encouraged to team up or to discuss methodological approaches.

Alan Gelb, one of the four technical advisers to the program, provided broad comments on the research program during a meeting with the project leader. He liked the approach of grouping the different studies into clusters in order to facilitate the sharing of methodological approaches among the researchers, and he found the topics of the clusters to be appropriate. He suggested that the technical advisers be invited to a meeting of the researchers. Such a meeting has now been scheduled for April.

Tom Merrick felt that all the studies are promising, with the possible exception of those on HIV/AIDS since AIDS research is already well-funded. In particular, he felt that the work on benefits attached to the reduction of adult mortality due to access to ARTs did not fit well with the program guidelines, and noted also that the project was already well-funded. We note that:

- a. The question being addressed is directly related to understanding the negative economic consequences of high fertility. The costs to children of a parent's HIV/AIDS morbidity and mortality are well-documented; similarly, the costs to relatives and the community of an adult's HIV/AIDS morbidity and mortality are well known. *Ceteris paribus* these costs are greater in settings where fertility is high than where fertility is low. In the countries covered by the studies in this program, the proportion of the population below age 14 ranges from 47% in Burkina Faso and Malawi to 32% in India and South Africa, a significant range. Estimating the consequences of these different fertility levels for children, their relatives and their communities in countries where prime-age adults face high morbidity and mortality provides a different perspective on the overarching research focus of the program.
- b. One study in Kenya suggests that ART can increase patients' labor-force participation with the benefit of improving their children's nutrition and schooling outcomes. Our study will test this hypothesis in several African countries, and also in India. This will enable us to compare outcomes in settings where the epidemic is mature (e.g. South Africa) and where it is still growing (e.g. India).
- c. The fact that we already have a large ongoing research project on anti-retroviral treatment of HIV/AIDS means that the additional Hewlett funds will leverage a great deal of insight into research questions that the current study would not otherwise include, and which would be very costly to study in the absence of the new data that the ongoing study is collecting. Note too that this ongoing study includes six African countries plus India.

- d. While it is true that HIV/AIDS research is generally well-funded, very little research has been done on the socio-economic benefits of anti-retroviral treatment and even less relates this back to fertility levels. Most of the funding goes to medical research or to research on prevention and behaviors. Analysis of 1) the socio-economic consequences of premature adult mortality due to HIV/AIDS and 2) what are the socio-economic benefits when mortality can be averted through antiretroviral treatment is crucial in developing a better understanding of how societies are coping with premature adult mortality in the context of the HIV/AIDS epidemic.

2. Current status of the work on the research program

The selected studies fall into four areas: (1) HIV/AIDS; (2) women's labor force participation; (3) investments in child quality; and (4) macro-micro analysis of the impact of demographic change.

The budget request for the studies under these four study areas total \$ 902,000. We plan to use another \$150,000 to (1) develop a publicly-accessible database comprising the datasets from the Hewlett-funded studies, as well as other datasets in the World Bank that would be useful for future research on the economic consequences of fertility and demographic change; and (2) further develop our area of research on women's fertility and labor-force participation. Remaining funds will be used for dissemination. Additional resources from other funding sources and the cost of Bank staff time for the studies currently total about \$3.5 million.

Three months after the selection of proposals was finalized, the individual studies have been launched. The studies are summarized below, along with progress to date. This information is included in the attached Excel chart, along with other information on the studies.

Two meeting with the technical advisors and researchers have been held. The aims of these meetings have been for the research teams to report on progress; to share information about databases, literature and methods; to identify topics for discussion, debate and working together, such as developing methods to deal with the endogeneity of fertility in estimating its consequences for the household and the economy; and to obtain feedback from the advisory panel.

Update July 2007: See update on page 1.

Update February 2008: See update on page 2.

Update September 2008: See update on page 2.

3. Progress towards outcomes and institutional changes related to the research agenda.

- (a) As proposed, the intermediate outcomes of this research agenda are to:
- Encourage collaboration between Bank staff from different units.
 - Develop linked initiatives across the Bank
 - Develop a database which will be available free to any user
 - Disseminate research findings broadly

Update March 2007:

- Members of different teams within the research department are involved, as well as staff outside the research department, in conducting these studies. These include Nishta Sinha from the PREM network and Mattias Lundberg from HD network;

partial funding for the HIV/AIDS study comes from the Africa region's Treatment Acceleration Program. One research cluster is being undertaken by DEC's Prospects Group.

- Websites have been developed to disseminate information about this research program (see attachment).
- The research is linked to the focus on labor supply issues in the Gender Action Plan.
- We have assessed databases for developing into a consolidated and expanded publicly-accessible database.

Update July 2007: See section (b) below.

Update February 2008: See section (b) below.

Update September 2008: See section (b) below

(b) The ultimate outcomes of this research agenda are to:

- Encourage research at the Bank on the overarching issues of the grant;
- Expand the World Bank's understanding of and attention to population issues, and in particular,
- Influence the World Bank's programming in the Health, Nutrition, and Population sector, as well in its monitoring activities such as the Global Monitoring Report.

Update March 2007:

- Since we selected the proposal for studying the program for providing financial incentives for investing in daughters in North India, there have been queries from senior management about estimating the impact of that program and so this study will respond to that interest.

Update July 2007:

- A dissemination event is planned for June 2008, where the researchers will present their work to an audience consisting of Bank staff and outside experts. It is anticipated that this will provide useful feedback to the researchers in finalizing their output, and also help build interest within the Bank in the issues addressed by the research.

Update February 2008:

- A researchers' workshop is now scheduled for April 22, 2008. Research results will be presented by each study team and will be discussed by experts from different parts of the Bank. The goal of the workshop is to take stock of findings thus far and to begin to disseminate these findings within the Bank. (See Annex B for the workshop agenda.)
- Further dissemination of this work is tentatively planned for Human Development Week which is scheduled for November 2008. We will organize a special session on this research, and will try to link this to the newly launched review work of population policies in the Bank. The Hewlett-funded research agenda is being recognized as an important input into this Bank review.
- A report on population issues and their place in the World Bank's aid program has just been launched, and is closely linked to the Hewlett-funded studies. This is described in (d) below.

Update September 2008:

- The researcher's workshop was held on 22 April 2008 (see details on page 2 above)
- Original databases have been prepared for the studies of marriage transitions and AIDS in Malawi, of HIV treatment in Africa, of family size and early childhood development in Ecuador, and of family size and investment in child tutoring in Vietnam.
- Draft papers have been prepared on the studies of HIV treatment in Africa, of the cross-national study of fertility and women's labor force participation, and of the cross-national study of family size and investments in children. Papers from the other studies are under preparation.
- To disseminate the results of the studies, we have asked for two special sessions at the upcoming Population Association of America meeting, and at the IUSSP general conference. Aspects of the HIV study are also being presented at a "research fair" organized by the Research Department for staff in the Bank's African region on 9 October 2008.

(c) Additional outcomes of this research program: None yet.

(d) Major changes within the World Bank or outside (e.g., in the community, the political landscape, etc.) that have had or will have an impact on the work supported by the grant. How have you responded to these changes, or how do you plan to respond to these changes?

Update March 2007:

- The Global Monitoring Report has improved the collection of data related to our research program, especially with comparable and timely data on labor force participation and wages. This will in particular facilitate our work on our research cluster examining the consequences of fertility on women's labor supply.
- The flagship World Development Report 2007 on Development and the Next Generation has drawn attention to the fact that having large youth populations puts pressure on resources, and poses special challenges to making the needed investments to reap the "demographic dividend" that can follow when fertility levels fall. This has led to discussions on how to respond to the challenges of large youth populations, and recognition of the costs and potential benefits associated with it.
- The new Health, Nutrition, and Population Sector Strategy does not explicitly recognize the importance of population issues on the challenges for strengthening health systems. We plan to disseminate our research findings in order to make the link between population and the pressure on health systems to increase coverage, be more efficient, and be more equitable.

Update July 2007:

- The Human Development Vice-Presidency is planning to prepare a report on population issues and its place in the World Bank's aid program, in collaboration with some of the people managing the Hewlett-funded studies.

Update February 2008:

- A concept note for a report on population issues and its place in the World Bank's aid program has been prepared for the Human Development Vice-Presidency, and was reviewed in March 2008. This new flagship report presents an opportunity to disseminate the findings of the Hewlett program quite broadly. Indeed, the note states that the report will draw heavily on the Hewlett-funded studies for its

discussion of the implications of reproductive change. Work on this report will proceed in parallel with our studies, and we will continue to work closely with the team preparing the report. The Hewlett program is contributing to a revival of interest in the World Bank on population issues; its emphasis at the outset on maximizing impact through engagement with other donors and client countries is paying off.

Update September 2008:

- The new flagship World Bank report on population issues is under preparation, with inputs from our research program.
- Elizabeth King and Maria Porter, plus another co-author, wrote a “Challenge Paper” for the Copenhagen Consensus Center on gender and development. The paper chose four policy options to address gender issues in development, of which one pertains to programs to support women’s reproductive roles. To argue for each of the policy options, the authors reviewed different literatures as well as identified and estimated the values of benefits and costs associated with the options. For the option on women’s reproductive roles, the paper reviewed a variety of benefits for a smaller family size and better maternal health. On the basis of the paper, this policy option is among the top ten “global solutions” prioritized by luminaries such as Douglass North, Robert Mundell, Nancy Stokey, Thomas Schelling, and Francois Bourguignon.

The research activities and progress made on them are described in the following section. The attached Excel file includes this as well as information on outputs and budgets in tabular form.

II. Studies under the Research Program

A summary description of the research activities and progress

As mentioned above, the selected studies fall into four areas: (1) HIV/AIDS; (2) women’s labor force participation; (3) investments in child quality; and (4) macro-micro analysis of the impact of demographic change. We summarize below each study’s research questions and data sources, along with progress to date.

A. Marriage, Fertility and Poverty in the Time of HIV/AIDS

HIV/AIDS is the leading cause of adult death on the African continent. Early sexual initiation, early marriage, risky sexual practices, and commercial sex work have all contributed to the transmission of the pandemic—with dire consequences for the wellbeing not only of the person who has AIDS, but also for others in their household. This makes it important to understand the socio-economic consequences of early marriage and non-marital sexual relations, and also of efforts to reduce premature adult mortality through the use of anti-retroviral therapy.

1 Marriage Transitions and HIV/AIDS in Malawi

This study collects innovative longitudinal data on a sample of young adults in Malawi to understand the links between non-marital relations and sexual experiences, transitions into marriage, socio-economic status (both prior to and after marriage), and the spread of HIV/AIDS. By following a cohort of young adults, it seeks to understand the socio-economic and other

conditions that precipitate marriage, including early marriages. By continuing to study newly married couples, we will then explore the fertility outcomes and socio-economic consequences associated with marriage, including incidence of HIV/AIDS, and the variation in outcome by the characteristics of marriages. Specifically, the study will interview 1,000 unmarried women and men in the Salima district in Malawi. We will follow them over at least 3 years, continuing to collect detailed socio-economic information, sexual partnering information, and HIV status of respondents and their new spouses.

Update March 2007: The team is hiring a firm to collect baseline data starting in May or June, 2007.

Update July 2007: The household survey sampling and field work began in mid-June and is successfully underway. Household interviews will be completed by mid-September and data entry by the end of September. HIV testing for a random sub-sample will begin in August and will take one-month.

Update February 2008: A total of 1,185 not-married young adults in Salima district were successfully interviewed. Data entry was finished by second week in September. Each respondent completed a household questionnaire, included detailed information on schooling, dating, marriage search and expectations. The research team is preparing for the first round of Partnership Interviews (in the field in February 2008) at which time we will conduct HIV testing. HIV testing was postponed due to delays in research permission from the Nation Health Science Research Committee (since granted in December 2008).

Update September 2008: The team successfully re-interviewed three quarters of their sample in February-March 2008, using a new survey instrument called “Partnership Interviews”, which focused on the sexual activity and partnership behavior of the subjects since the interview at baseline six months before

The team is currently conducting follow-up survey round I for the full sample, with a randomly selected half of the sample receiving VCT (for HIV testing). The cleaned data from all three rounds should be available by October, 2009. A second round of the Partnership Interviews is scheduled for February-March, 2009.

Analysis of the panel data will start in late Fall 2008, with draft working papers to hopefully follow in the first half of 2009.

2 Socio-economic impact of reducing HIV/AIDS adult mortality in Africa

The objective of this research is to measure the socio-economic impact of reductions in adult mortality due to HIV/AIDS at the household level. To do this, this study will examine the socio-economic benefits of anti-retroviral therapy. Over and above prolonging lives which is the first-order benefit of treatment, the distribution of anti-retroviral therapy is expected to produce a socioeconomic benefit for the entire household: both the patient and the family members who were giving him care should be able to return to the labor market, children might be able to return to school, the welfare of the family should increase. We will also carefully analyze whether those impacts vary across genders. Our evaluation will measure these effects, using a set of longitudinal household and health facility surveys being conducted in seven countries. It will also attempt to determine under which conditions these socio-economic effects can be maximized, by comparing different delivery modes and assessing which ones are more likely to not only promote adherence

and postpone the development of resistance, but also to maximize the socio-economic benefits of ART.

Update March 2007: A baseline survey was completed in Rwanda (data currently entered); and one is ongoing in Burkina Faso. Baseline surveys are also planned in Ghana (April 2007), Mozambique (June 2007), South Africa (August 2007), India (April 2007) and Kenya (May 2007).

Update July 2007: Baseline survey is ongoing in Burkina Faso. Baseline surveys were launched in Ghana (April 2007), in Mozambique (June 2007), India (April 2007) and Kenya (May 2007). Baseline survey prepared in South Africa (October 2007).

Update February 2008: Baseline survey have been completed in Burkina Faso, Ghana, Mozambique. Surveys are ongoing in India and Kenya. Baseline survey is ongoing in South Africa. A follow-up survey has been launched in Ghana and Rwanda. Results from the baseline survey in Rwanda were presented by Damien de Walque at the Hewlett conference in Arusha in December 2007.

Update September 2008: Baseline surveys completed in India, Kenya and South Africa. Follow-up surveys ongoing in Burkina Faso, Ghana, Rwanda, Mozambique. Results from the baseline surveys in Burkina Faso and Mozambique presented at the International AIDS Conference in Mexico in August 2008.

B. Demographic change and women's labor force participation

1 Demographic change and women's work and earning

This study will examine the impact of changes in fertility and childbearing practices on women's labor force participation in Bangladesh. Since fertility is not independent of other decisions taken by the family, we will examine both supply and demand-side factors that determine these decisions, and attempt to identify correctly the impact of changes in fertility on changes in work.

The rich longitudinal database collected in Matlab, Bangladesh, will be used to examine changes in fertility and work practices over time. The database covers a very large population over decades. In addition to regular demographic surveillance, comprehensive socioeconomic surveys were conducted in 1982 and 1996. The combined data will permit the examination of fertility outcomes on women's employment, income, ownership of productive assets, and belonging to a credit or savings group.

This study will take on two specific tasks. The first is to estimate correctly the relationship between fertility and work decisions. The second is to test the hypothesis that the type of fertility change – whether delayed initiation, earlier cessation, or increased spacing – affects the time-allocation decisions made by mothers.

Update March 2007: A preliminary investigation of data sources was conducted.

Update July 2007: A review of literature was conducted. Investigation of Matlab Health and Socioeconomic Survey (1996) data initiated.

Update February 2008: Data analysis of the MHSS 1996 carried out. Preliminary tabulations of data on women's employment, fertility history, marital history, individual assets and non-labor income carried out.

Update September 2008: A first round of regression analysis has been completed. The results suggest that higher fertility is not a deterrent to female work. Further investigation of data is being undertaken to “unpack” this finding.

2 Fertility and women's labor force participation

This study focuses on the relationship between fertility outcomes and women's labor market behavior. As fertility declines around the world, childbearing patterns change in three ways: women may delay their first birth, space their births, or stop having children at an earlier age than previous cohorts. Indeed, the pattern of fertility change differs considerably around the world. Each of these changes is likely to have a different impact on the ability of women to work outside the home and on the decisions they make regarding work and child-bearing.

One critical estimation issue in this study is how to address a potential problem of endogeneity between fertility and labor market behaviors of women. Most previous studies of the relationship between fertility and labor force participation have relied on cross-sectional data, but with cross-sectional data, it is difficult to correct for both the endogeneity of fertility and the impact of unobserved heterogeneity among women. In the absence of natural experiments that may affect fertility choice but not otherwise affect other behaviors such as child outcomes, an econometric approach is needed in order to identify and quantify such an effect.

In this study, we use a set of household survey data (49 Demographic and Health Surveys) to estimate the relationship between women's labor market behaviors and fertility. These household surveys are particularly suited to this analysis because they contain detailed information on births and labor supply. Although these survey data are, for the most part, cross-sectional, we are able to take advantage of the availability of similar information across 36 countries (a number of which were surveyed several times) to obtain a large enough sample of women of child-bearing age who had at least one multiple birth. More precisely, three percent of the 567,990 women in the sample had at least one multiple birth. We use this information as an instrumental variable to address the endogeneity problem discussed above. In addition, we are able to examine the heterogeneity of the impact of fertility on women's labor supply, that is, whether the labor-market consequences of child bearing is more or less likely to be severe for poor and less educated women, for example.

Update July 2007: Preliminary investigation of the data conducted. Preliminary results indicate that having a multiple birth reduces the probability that a woman has worked in the last 12 months by a factor of one (the natural log of the probability that a woman has worked in the last 12 months divided by the probability of not doing so decreases by 0.05 units).

Update February 2008: A preliminary draft of the paper has been completed. The paper compares the effect of having a multiple birth in the first birth on fertility and labor supply decisions of women in developing countries during different stages of the life-cycle. Using the Demographic and Health Surveys, it adopts the framework used by Rosenzweig and Wolpin (1980) for their study on the U.S. to examine women in developing countries who primarily work in agriculture or are self-employed. In contrast to what was found in the U.S., there is evidence that women in developing countries who are over 25 and have had a multiple birth in the first

birth were not less likely to participate in the labor force. Moreover, the pattern of the effect on women's labor supply in different stages of the life-cycle is quite different between the U.S. and the developing world. Women under age 25 or over age 35 are less likely to work all year round when the first birth is a twin, but women between 25 and 34 are more likely to work all year round.

Update September 2008: Additional Demographic and Health Survey data was added to the analysis. Women in developing countries who are over 25 and had twins in the first birth are not less likely to participate in the labor force. However, the effect differs by age. Women under 25 are 17% less likely to work all year round if the first birth is a twin, while women 25 to 34 are 17% more likely to work all year round when the first birth is a twin.

In addition to examining the effect of the occurrence of a multiple birth in the first birth, the sex of first births was examined using a strategy similar to that of Angrist and Evans (1998). Women whose first two births are the same sex have more children. Having a boy in the first or second birth reduces women's fertility, particularly for women 25 and older. These results reflect the commonly perceived notion that women prefer having children of multiple sexes, and prefer sons to daughters. In addition, this exogenous shock to fertility lowers women's labor force participation. Women 25 and over whose first child is a boy are 4% less likely to participate in the labor force, and women 35 and over whose second child is a boy are equally less likely to participate in the labor force. Interestingly, while the effect on fertility of having children of the same sex in the first two births is similar in magnitude to the effect of having a son in the first birth, same sex births do not significantly impact labor supply.

C. Impact of family size on child welfare and other child outcomes

This component aims to improve understanding of the relationship between fertility and child welfare indicators. The studies under this component focus on different sets of child outcomes and use different methods to address the issue of endogenous fertility. It will include four different studies:

1. Cross-country comparisons of fertility's impact on child outcomes using household survey data
2. Financial incentives for female births and parental investments in daughters in North India
3. Family size and investments in early childhood development
4. Declining fertility and rising investment in private tutoring

1 Cross-country comparisons of the impact of family size on child welfare

This study will explore the impact of family size on child welfare outcomes, using Demographic and Health Survey data from over 120 household surveys from more than 60 developing countries. For the identification strategy to be valid, we require a country-level preference for the specific gender composition of children (i.e. at least one son, or at least one son and one daughter, etc.) and the inability to affect the gender of actual births. The actual fertility stopping rules may vary across countries, and in fact exploring the research question in a variety of settings with culturally specific instrumental variables is one strength of this proposal. We will also use unanticipated multiple births, as an identifying variable, and results with this instrument will be contrasted with those from the gender composition instrument.

The DHS is a particularly attractive set of datasets for this analysis in part because they include a variety of child welfare related outcome indicators. These are measured similarly across countries, thus ensuring a global analysis utilizing comparable high-quality, micro-level data. The main set of child outcomes enabled by the data, and which we plan to analyze, include:

- neonatal and non-neonatal infant mortality, as well as child mortality more generally
- antenatal and infant health seeking behavior on the part of the household
- anthropometric measures of child nutritional status, as well as blood hemoglobin measures available for a subset of countries
- school enrolment for all children over five

Another benefit of the use of DHS is that the same analysis can be replicated on large numbers of developing countries, thus ensuring a global analysis of the research question at hand utilizing comparable high-quality micro-level data.

Update March 2007: Preliminary analysis has been carried out of over 100 DHS surveys, and this has identified that the sex ratio of children is indeed a predictor of an additional birth--thereby validating the identification approach adopted in this study. The multi-country database will now be developed, linking the sex ratio information to the data on investments in children's human capital.

Update July 2007: The multi-country database has now been developed, and includes information on family size, sex ratio at each birth order, anthropometric measures for children under 5; educational attainment for youth 6 to 14 (and some countries 17); labor force participation for adult women; and household SES indicators. Classification of countries with regards to stopping rules linking the probability of additional births to sex ratios is currently underway; preliminary analysis suggests that family size is only weakly related to human capital investments, but additional work will yield more nuanced results.

Update February 2008: Analysis on the multi-country database has continued. Numerous tables have been generated that summarize observed differential stopping behavior across regions and countries as well relative differences in stopping behavior by mothers' birth cohort, education level, and rural/urban location. For countries that present evidence of differential stopping behavior, this behavior has been used to instrument for family size in explorations of determinants of observed gender differences in human development outcomes such as school enrolment and anthropometric measures.

Update September 2008: The data have been analyzed, and the results drafted into a paper. The paper is being circulated for comments and peer review, and will be revised in light of the feedback.

2 Financial incentives for female births and parental investments in daughters in North India

This study will examine how parents' fertility choices affect investments in children's human capital. A methodological issue in analyzing this relationship is that an exogenous source of variation in fertility is needed since fertility and children's human capital are both choices made by parents and are determined by the same set of prices and household resource constraints. The approach used in this study is to rely on a program aimed at lowering parents' financial cost of raising daughters. This program effectively reduces the "price" of fertility, allowing the identification of impacts on children's human capital.

Since the 1990s, several states in India have introduced financial incentive programs to discourage son preference among parents and to encourage investments in daughters' education and health. While beneficiary assessments have been carried out, there have been no impact evaluations. This study will focus on one such program in the state of Haryana, the *Apni Beti Apna Dhan* (Our daughter, Our Wealth) program. Using household survey data on fertility and child health, we will estimate the impact of the program on children's health (mortality, nutritional status) and schooling, focusing on gender differences in impacts. We will also study the impact of the program on fertility. The data to be used are the three rounds of the National Family and Health Surveys spanning the period 1993 (one year before the program was introduced) and 2005-6, and the Reproductive and Child Health Survey 2002-04.

Update March 2007: The literature review for the paper is being completed. Information has been gathered on the details of the *Apni Beti* program, including on new components added to the program between 1994 and 1998. We will shortly begin analysis of the three rounds of National Family and Health Surveys.

Update July 2007: During this period the team has focused on three areas: (i) gathering program details and information on other programs introduced around the same time as the ABAD; (ii) reviewing the possible econometric techniques to be used to estimate program impact given data limitations; (iii) data cleaning and preliminary analysis. The first two parts have been completed. The team is now analyzing the sample for Haryana state from the 1992/93 and 1998/99 rounds of NFHS.

Update February 2008: The team estimated the impact of the program on girls' health and nutritional status using a difference-in-differences approach, comparing eligible girls (those belonging to poor households and certain castes) before and 2 years after the program was introduced and controlling for parental and other household and village level characteristics. The estimates suggest that while the program had no significant effect on girls' nutritional status it did have an effect on girls' probability of receiving childhood immunizations. The program appears to have increased the probability that girls receive childhood immunizations, particularly immunization against measles. The team is now focusing on updating and extending the analysis using the latest round of NFHS data available for 2005-2006.

Update September 2008: The team is analyzing the latest round of NFHS data to extend the analysis along two dimensions – estimating the impact of the program on girls' education and also estimating the impact on boys' outcomes.

3 Family size and investments in early childhood development

A longitudinal study in Ecuador has been evaluating the impact of intervention programs that improve circumstances surrounding birth, maternal and child health, and parenting "quality" on child cognitive and physiological development. Baseline data have already been collected for a baseline, and follow-up surveys conducted that include information on an unusually rich set of outcomes and controls and track a panel of mothers and children.

This research will extend this study, focusing on how family size interacts with the use of the ECD interventions and how it mediates the impact of those interventions on child cognitive outcomes. Supplementary funding is being requested for follow-up visits to the same households in order to collect data on outcomes beyond pre-school ages and thus to be able to link the ECD

interventions also to school-age investments. The longitudinal household survey data in this study, the existence of discrete interventions regarding ECD, and presence of an impact evaluation of those interventions are very attractive features for examining the effect of family size on investments in children. Some of the issues to be investigated will be how children's very early nutrition and health conditions affect their future outcomes, how these conditions relate to sibsize and parity, what child-specific investments parents make, and also how the children do as they begin to enter school.

Update March 2007: Preliminary analysis has been done of the first wave of the follow-up longitudinal survey. This analysis suggests that children in Ecuador who benefited from a variety of interventions were able to reverse a substantial fraction of the deficits in physical, motor, cognitive and behavioral outcomes observed at baseline. Improvements occurred among children who were 3-4 years old at baseline, as well as those who were 5-7 at baseline, suggesting there is some potential for "catch-up". Children who benefited from ECD interventions were also more likely to enroll in preschool or school earlier. Next, we will analyze differential effects by family size and composition. The next round of the survey, which will be collected in late 2007, will focus on outcomes for children who were *in utero* or infancy at the time they received interventions, but were too young to be tested in the first two rounds of the survey; it will also assess how the older children who have already been analyzed progress as they enter school.

Update July 2007: The team is in the process of designing the second follow-up survey. This will include a larger sample of households, including households with large numbers of children and households with closely-spaced births. On this basis, the team will be able to estimate the effect of family size and spacing on ECD outcomes. The survey is expected to go into the field in late 2007-early 2008.

Update February 2008: Preliminary analysis has been completed of the baseline and first follow-up surveys, and they suggest that children who have more siblings have significantly worse nutrition and cognitive outcomes than those with fewer siblings. The firm to carry out the follow-up survey described above has been selected, and the team is in the process of designing the survey instrument. Training of enumerators and the pilot of the survey will take place in March 2008, and data collection will take place between April and July. Analysis of the data is expected to start in September, with a draft paper by December 2008.

Update September 2008: The data collection of the second follow-up survey in the study was completed in July 2008. The survey included a series of cognitive tests, achievement tests, anthropometrics, hemoglobin measures, household information, education and a consumption module. There is a new effort to recover some households that have moved to other provinces, could not be accessed, or that rejected to participate in the study, to minimize attrition. All data will be coded by the end of October. A draft of the paper on the impact of family size on cognitive outcomes, including the data from the second follow-up, should be available by the end of February 2009.

4 Declining fertility and rising investment in private tutoring

This study will investigate how fertility decline and smaller family sizes make it possible for households to invest in their children's human capital—not only through leaving them in school longer, but also by increasing direct outlays on private tutoring and schooling generally. Specific questions to be answered include the following:

1. Does lower fertility correlate with higher expenditures on private tutoring (and private education in general) in a broad cross-section, after controlling for other factors?
2. Is there a causal relationship running from lower fertility to higher investment in tutoring (and private education more generally)?
3. What effects are fertility decline and corresponding increase in investment on children likely to have on educational outcomes, wages and inequality?

These relationships will be studied using a cross-national database, and one pertaining to Vietnam. Two databases will be constructed for this purpose: (1) a cross-national database of variables extracted from World Bank Living Standards Measurement Surveys, concentrating on household surveys from a group of countries for which data on private tutoring expenditures is available: Albania, Bosnia and Herzegovina, Brazil, Ghana, India, Jamaica, Tajikistan, and Vietnam, and (2) a database of variables extracted from the panel data from the Vietnam Household Living Standards Survey (VHLSS) 2002, 2004, 2006. For the Vietnam analysis, these household variables will be merged with a national database of university entrance examination takers at the Ministry of Education, if the Ministry of Education can be convinced to share the data.

Update March 2007: Preliminary investigation has been made of the survey data sources. In addition, the possibility is also being explored of gaining access to data from a smaller University of Minnesota household survey focused specifically on private tutoring in Vietnam.

Update July 2007: The team is working with a University of Minnesota researcher and the Bank's Hanoi office to design a household survey focused specifically on private tutoring in Vietnam. One of the authors traveled to Vietnam in May to help pilot-test the survey instrument, gather background information, and negotiate agreement with Government Statistical Office. The survey to go into the field in the fall of 2007.

Update February 2008: The Vietnam household survey is now in the field. Much of the survey data have already been collected and data collection should be finished by the end of January. In addition, during the fall a review paper was completed (already accepted for publication in the *World Bank Research Observer*); it examines the evidence on the causes and effects of private tutoring, including what little is known about the effects of demographic factors. The findings of this paper will be used as a springboard for writing up the Vietnam study. Finally, the team has started to pull together the LSMS data set that will be used for cross-country analysis.

Update September 2008: The paper on the multicountry evidence on private tutoring has come out in the Fall 2008 issue of the *World Bank Research Observer*, and has gotten some response already. For example, it was written up in the June 2008 *Atlantic Monthly*, and also led to a meeting with one of the authors requested by an adviser to the WB Executive Director for the Gulf region, who complimented the research for its policy relevance for his region. For the Vietnam study, the GSO has provided the data for the household survey and the associated school survey. One of the authors has spent a lot of time over the past couple of months cleaning the data (in part because of some implementation problems by the GSO, especially on the matching of the surveys), in collaboration with our colleagues from the University of Minnesota and the Bank's Hanoi office. The data should soon be ready for preliminary analysis.

D. Demographic trends, economic growth, and distribution dynamics: Cross country analysis

Fertility decline in much of the developing world has led to changes in dependency ratios, the size of the labor force and spending and savings behavior. This has been called a “demographic dividend”, as workers become a larger share of the population and the scope for savings and per-capita income growth is boosted. When these large cohorts of young people reach old age, this trend is expected to reverse.

This study will analyze the economic impacts of a delayed or a quickened decline in fertility rates in developing countries. Three hypotheses will be tested: delay of the decline in fertility rates will during the next two decades:

- increase income inequality and slow poverty reduction;
- slow the increase in urbanization rates;
- strain education systems, making Millennium Development Goals more difficult to achieve.

The study will use a combination of macro models (economy-wide general equilibrium models) and micro models (based on household survey data). The main methodological contribution of the study will be the development of methods that make the macro and micro approaches more mutually consistent, which is a still under-researched area. The research will benefit from a global general equilibrium model (distinguishing some 80 countries or regions and some 40 sectors) and a global database with household surveys of 95 developing countries, both developed at the World Bank and applied in recent work carried out by the Development Prospects Group in the Bank

Although the scope of the project is global, we also plan to study a number of representative countries in some detail. A comparison of the effects of delaying declines in fertility across countries at very different stages of their demographic transition - for example studying a country from East Asia, where the transition is at an advanced level, and an African country, where the transition is still at an early stage – should be a very instructive exercise. The country comparison will also allow us to incorporate country-specific information to the analysis and explore, in a more precise way, the implications of changes in the fertility rates in terms of urbanization rates and educational achievements.

Update March 2007: Coded Stata commands to manipulate and prepare data as well as execute the microsimulation methods within the Global Income Distribution Dynamics (GIDD) model. Drafted a basic User Guide with a detail explanation of how to install and run the Stata commands developed for the GIDD. Hired a research assistant to help with updating and standardizing data. We will shortly begin a literature review on the relationship between demographic transitions and income distribution.

Update July 2007: The team standardized the household survey data for the 80 countries included in the GIDD’s framework. After several meetings with researchers involved in a previous effort to create a dataset measuring income distribution at a global level (WDR06), the data base is ready to be analyzed. Given the enormous efforts involved in the data construction, we decided to produce a document explaining the assumptions behind the household survey standardization as well as the advantages and limitations of this new dataset. A draft called “A New Dataset on Global Income Distribution” has been produced. Progress has also been made on the literature

review on demographic transition and income distribution. A document with the main lessons is being drafted.

Update February 2008: The team started the draft of methodological paper with the procedures undertaken within the GIDD. The methodological paper explains how using a novel re-weighting technique, a household survey can be modified to reflect future demographic characteristics. This represents the core part of the methodological contribution of our project. Additionally, the team started planning (together with the IT personnel) the project's web page.

Update September 2008: The team finished the methodological paper and this was presented in the *Economist's Forum 2008*, in Washington DC and in the annual conference of the *Review of Income and Wealth* in Portoroz, Slovenia, August 2008. The methods developed in this paper are being currently applied to the GIDD's household-level dataset, paying particular attention to the relationship between demographic transitions and development outcomes in Sub-Saharan Africa.