Evaluating the Long-Term Impact of Gender-Focused Investments and Policy Reforms: Building Resilience to Global Change

A Report for the Canadian International Development Agency (CIDA)

Siwa Msangi, Principal Investigator

and

(in alphabetical order)

Michelle Adato

Mandy Ewing

Shelley Feldman

Mateusz Filipski

Marzia Fontana

Karen Hardee

Leiwen Jiang

Zhenya Karelina

Luisa Natali

J. Edward Taylor

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ACRONYMS

BRAC	Bangladesh Rural Advancement Committee
CAFTA	Central American Free Trade Agreement
CCT	Conditional Cash Transfer
CGE	Computable Gender Equilibrium
CHT	Chittagong Hill Tracts
CIDA	Canadian International Development Agency
CV	Compensating Variation
DfID	Department for International Development, United Kingdom
DIY	Do-It-Yourself
DR	Dominican Republic
DREM	Disaggregated Rural Economywide Model
FTE	Fast Track Education
FFE	Food for Education
FESP	Female Secondary School Stipend Program
FPU	Food Production Unites
FSSAP	Female Secondary School Assistance Project
GET	Global Education Trend
GNP	Gross National Product
GTAP	Global Trade Analysis Project
IFPRI	International Food Policy Research Institute
ID	Index of Dissimilarity
ILFS	Integrated Labor Force Survey
ILO	International Labor Organization
IRDP	Integrated Rural Development Programme
MDG	Millennium Development Goal
NBS	National Bureau of Statistics (Tanzania)

NGO	Nongovernmental Organization
PESP	Primary Education Stipend Programme
PROGRESA	Programa de Educación, Salud y Alimentación (the Education, Health, and Nutrition Program)
PUCMM	Pontificia Universidad Católica Madre y Maestra
REOPA	Rural Employment Opportunities for Public Assets
ROSC	Reaching Out of School Children
RPS	*Red de Protección Social*
SAM	Social Accounting Matrix
SL	Sustainable Livelihoods
SNA	System of National Accounts
SRMP	Social Risk Mitigation Program
SSC	Secondary School Certificate
TFR	Total Fertility Rate
TGNP	Tanzania Gender Networking Programme
TUS	Time Use Survey
UN	United Nations
UNDP	United Nations Development Project
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNICEF	United Nations Children's Fund
UNRISD	United Nations Research Institute for Social Development
VGD	Vulnerable Group Development
WTFS	Wanted Fertility Scenario

EXECUTIVE SUMMARY

A substantial literature is now available indicating gender biases at both the micro- and macro-levels. For example, advancements in the household economics literature demonstrate that women and men have differential access to and control of household production and human capital formation assets. In addition, macroeconomic research examining the linkages between the household and the wider economy has elucidated gender biases in labor markets, credit access, and land tenure. Insight gained from these studies indicates that gender-focused interventions could bring wider benefits in terms of greater economic growth and human welfare by explicitly addressing gender differences in access to assets and labor market opportunities. The aim of this report is to present new knowledge and insight about the importance of gender-targeted investments and policy interventions in reducing poverty and hunger, while improving key measures of human well-being.

To carry out the project goals, we collaborated with experts who have key insights into the analysis of gender-differentiated impacts, and who were able to greatly broaden and enrich the scope of issues that were addressed within the project. The specific contributions of each paper are summarized here, followed by a synthesis of wider policy implications.

The intersection of gender relations, control and ownership of key assets, and positive development outcomes

The first paper in this report undertakes a review of the most promising gender-aware investments for improving rural livelihoods. Among the most effective types of interventions identified are: (1) Reducing the amount of time spent by women and girls in collecting fuel wood and water through improvement of water delivery services and promoting local-level renewable energy initiatives; (2) Increasing access to productive assets in agriculture, including technology, land, labor, credit, and extension services through reform of national- and local-level institutions and promotion of community-level initiatives that have effective targeting of needy households; and, (3) Increasing female secondary education enrollment rates through direct investments in public schooling as well as effective and well-targeting cash-transfer programs that encourage girls to stay in school. Many programs aimed at alleviating malnutrition and hunger through conditional cash transfers (such as PROGESA in Mexico and 'Bolsa Familia' in Brazil) can also help to achieve these goals, if appropriately modified in their design.

Although lessons from the review provide valuable insights, they also point to some of the difficulties in quantifying these approaches, and especially in applying them at a macro-level of analysis. A number of the issues that we raise have been discussed in the literature with respect to the empirical context of specific regions, but have not been subjected to the kind of quantitative analysis that we have done here to make the link between investments in these sectors and outcomes of nutrition, health and well-being. Where quantitative evaluations have been done, little attention has been paid to the differential impacts on men and women, or to which delivery mechanisms may be more effective in reaching different groups of women and men. Furthermore, because gender norms are complex and site specific, it is difficult to say what impact interventions will have in different sites, depending on shifting economic, political, and cultural forces.

Quantitative experiment of gender-focused investments

To provide the quantitative analysis that policy makers need to guide investment, the second paper analyzes some of the key socio-economic linkages identified to have the greatest relevance to gender and quantifies the magnitude of impacts of specific investments in the literature review. Two important gender-specific assets are identified to have a substantial impact on welfare: secondary education and clean water access. The International Food Policy Research Institute's (IFPRI) International Model for Policy Analysis of Agricultural Commodities and Trade (IMPACT) provides insight into the magnitude

of the benefits that improvements in these two indicators could bring not only to women, but also to rural livelihoods in general. By projecting future global food scenarios to 2050, IMPACT explores the potential implications of investments in female secondary education and improved water supplies, and how these interventions at the macro-level effect child malnutrition in the developing world. In the case of increased investment in female secondary education, the model shows that developing country governments and the international community are able to reduce the number of food-insecure people, leading to a worldwide decline in hunger. The costs of increasing female secondary enrollment rates are also estimated using the model. When comparing these additional costs to the potential reductions in malnutrition, a small percent increase in spending produces a relatively large decrease in malnutrition. Under the scenario conditions, all incidences of malnourishment in children in China under 5 years old can be eliminated by 2040 by increasing spending per student by 2.6 percent. These results indicate the high priority that should be given to female secondary education in terms of policy objectives and targeting.

The model results also indicate that improving clean water access in the developing world reduces the incidence of water-borne illness and malnutrition. Both of these conditions have strong gender implications given the unpaid work that women do to care for the sick and undernourished. As a result of higher investment and increased coverage, the risk of waterborne illness drops by 30 percent in the worst-affected regions of Africa, reducing the exposed population by nearly 21 million in 2050. The exposure rate to waterborne illness drops less dramatically but still by significant levels in South and Southeast Asia and the Western Pacific. Similarly, investments that improve access to clean water reduce the levels of malnutrition for all the regions considered in our analysis, with the greatest impacts taking place in Africa, and in the worst-off regions of the Western Pacific. Specifically, in 2030 the incidence of malnutrition in the Western Pacific Region is reduced by 452,000, while the worst-off regions of Africa see a reduction in malnutrition levels of 637,000 people. From a food security perspective, it can be concluded from these simulations that investments in female secondary education bring greater reductions in malnutrition than investments in clean water access; however, both investments demonstrate widespread human welfare benefits for the world's poor.

The implications of gender disparities in time use

The third paper addresses the significant burden placed on women in carrying out critical types of unpaid household work and takes the first necessary step in describing the economies of care that are supported by women and often hidden from the typical Systems of National Accounts (SNA). By analyzing time use survey data from Tanzania, the authors describe the distribution of time use between men and women of various demographic and socio-economic classes, identifying those who are overly-burdened by activities which are necessary to nurture and support the household. The collection of water, fuel wood, and the preparation of food are the most prominent among these unpaid household activities, and receive the most attention in this study. The data show that Tanzanian women spend three times as much time as men collecting water and caring for other household members, and that this time burden is comparatively heavier for those who are poorer and live in rural areas. The data also show that children within poorer households tend to be more involved in unpaid work, and that girls tend to take on a larger share of the load, especially within male-headed households. The authors advocate using such time use information to make economic models both gender aware and better able to illustrate the gender-differentiated effects between the macro-level drivers of economic change and the micro-level welfare effects.

Illuminating the role of policy on girls' education and its outcomes for economic growth

As identified in the literature review and quantified in the policy experiment, educating girls is an important step in improving overall household welfare and reducing malnutrition. Despite this, a number of barriers exist that reduce female enrollment rates, especially in secondary education. To better understand the institutional and socio-cultural constraints that might reduce the effectiveness of investments aimed at increasing female education, this paper analyzes the reception and outcomes of one

of the main policy instruments used by governments to increase female school enrollment: conditional cash transfer (CCT) programs. The data used for this study are from two impact evaluations of the CCT programs in Bangladesh and Turkey. Qualitative data collected from interviews and focus groups reveal that CCTs can provide a direct economic benefit if the willingness to send girls to school exists *a priori*; however, there is enormous complexity surrounding thedecision-making about girls' school enrollment beyond the economic consequences to the family. Schooling demand depends on such straightforward economic reasons as poverty, school expenses, and cash availability, but social concerns about autonomy, sexuality, reputation, honor, and authority also appear to be important considerations that are sometimes independent of financial constraints. On the other hand, supply-side constraints posed by the school system include the poor quality of teachers; the distance of schools, particularly secondary schools, from girls' rural communities; parental concerns for girls' reputations and honor; and the limited number of female teachers to serve as role models for girls and their families.

In response to these constraints, policy makers have a number of options to complement or substitute for CCTs. Supply-side issues, such as teacher quality and school distance can be resolved by improving the number and location of schools, solving transportation problems, and making school environments safer. In addition, implementing CCTs can successfully alleviate the financial constraints of sending girls to school. Socially-motivated concerns about girls' schooling, however, require changing perceptions of the value of educating women. This study finds that efforts by the Turkish Government and NGOs to promote girls' education through public outreach campaigns were on the right track, and showed that these kinds of approaches are feasible, even though they were not part of the CCT program. CCT programs that do organize women by providing training and promoting a discourse around women's importance and rights have had important impacts. Their culturally-appropriate integration into the design of programs should be prioritized.

The second paper examining education moves further away from the micro-level situations to a macro-level country model, and seeks to understand the relative importance and interaction between investments in education and family planning. The paper uses population modeling and demographic projections from India to examine alternative scenarios for gender-focused socio-economic policy interventions. Using baseline data from India's 2001 Population Census on fertility, mortality, and education transition rate, the analysis shows that population size projections vary depending on investments in education and family planning. In scenarios with a faster education transition rate for women, the national total fertility rate will decline by 0.15 in 2021 and 0.7 by 2051, compared to a case with a constant education transition rate. Therefore, investment in education, particularly girls' education, does contribute to slower population growth. Moreover, this analysis also shows that the impact of educational investments on population growth is relatively small in the short term, whereas investments in family planning and reproductive health generate an immediate and more significant impact on population growth. Holding other factors constant, expanding family planning programs to help Indian women in each education category gradually achieve their wanted fertility rate by year 2021 will result in the overall total fertility rate declining from 3.05 in 2001 to under replacement level (defined as 2.1 children per couple) by year 2021, and further to 1.97 by year 2031. Under this scenario, India's population in 2051 will be 260 million less than the baseline case. It clearly takes more than just investment in education to achieve population stabilization in a developing country like India. Promoting family planning and reproductive health services is also very important, and provides an important complement to expanding education.

Looking at policy interventions and gender disparities from an economywide perspective

The final paper constructs a "gendered" disaggregated rural economywide model (DREM) for the Dominican Republic and uses it to simulate the impacts of the Dominican Republic-Central American Free Trade Agreement (DR-CAFTA) on agricultural production, wages, and rural incomes and welfare. By nesting agricultural household models into a general equilibrium framework, DREMs makes it

possible to model the responses of heterogeneous actors to policy shocks in an economywide setting. It appears that if DR-CAFTA reduces agricultural goods prices, agricultural producer households lose in terms of net welfare and some rural non-agricultural households suffer from labor-market effects. The simulations uncover substantial differences in the impacts of trade reforms by gender. The difference between the responses of female and male wages to the shock is substantial, and female-headed households tend to do better in terms of welfare shock than comparable male-headed households.

Policy recommendations and areas of continued research

The policy recommendations based on the expert contributions to this report are as follows:

- Increase female secondary education rates. This will require responses to both the demand for female schooling and the quality of schooling opportunities. This report has pointed out the enormous welfare gains that can be achieved, including the reduction of malnutrition and more desirable fertility outcomes for women. The detailed analysis on fertility also shows that having access to reproductive health and family-planning services is also an important component, and has been shown to improve retention of girls in schooling as well – providing positive feedbacks and mutually-reinforcing benefits.
- Decrease the time spent collecting fuel wood and water overall, and especially for women and girls, through the provision of water, sanitation and access to electricity or other renewable forms of energy. Some successes with solar cookers have been demonstrated on a small-scale, if they are appropriately designed to local conditions and needs. The opportunities for local bio-energy initiatives is being explored in many places, but not fully exploited in regions where it could make more of a difference for households if targeted towards heating, cooking and lighting needs – and not just liquid biofuels for transportation uses, which is the predominant focus of current policy.
- Increase the collection of time use data in surveys that capture time spent in production, leisure, and reproduction – where many of the unpaid activities that support and enable the productivity of household members on the wage markets do not get reflected adequately in economic accounting. The analysis of time use data can strengthen policies in key sectors such as agricultural commercialization, infrastructure, and employment. It can also provide guidance in prioritizing sectoral allocation of public expenditures to ensure gender-equitable outcomes and support a badly-needed information bank and knowledge base that can be used for monitoring, targeting and other decision-support activities.

In addition to these policy recommendations, five key areas are identified in which work urgently needs to be done to improve the conceptual and empirical foundations for building more sophisticated analytical tools and models that can capture important gender issues. These are: (1) Improving the treatment of gender in labor markets; (2) Improving the treatment and representation of reproductive,non-paid work done within the household; (3) Relaxing the standard, neo-classical assumption of the unitary household decision-making model driven by the economic objective of self-satisfaction; (4) Addressing important considerations such as risk and uncertainty within household decision-making and economic behavior, and (5) Capturing the dynamics that underlie household investment decisions that balance important trade-offs between investments in care and nurturing and the future returns to productivity and reciprocal care from children. This type of a research agenda addresses a real gap to be filled in our knowledge of how the gender intersect with economic behavior at the micro-level of the household, and how these relate to market-level effects and macro-level policy changes. By improving our knowledge of the micro-and macro-level dimensions gender, better-targeted policies can be designed to more effectively reduce time-use burdens, increase individual-level productivity, and enhanced the educational and economic achievement for millions of men and women in the developing world.

1. INTRODUCTION

A Gendered Approach to Evaluating the Long-Term Impact of Policy Interventions on Agricultural Productivity and Human Welfare

By Siwa Msangi

The past few years have witnessed rising interest among development scholars and practitioners about the relationship between gender inequalities and agricultural productivity. The World Bank's mention of gender issues in its World Development Report 2008, *Agriculture for Development*, marked a significant departure from its earlier volumes on the topic. That report was quickly followed by an 800-plus page multi-donor funded volume, the *Gender in Agriculture Sourcebook*, providing a new compilation of findings and guidance on gender issues in a wide range of subsectoral topics, including not only the familiar areas of crop agriculture, extension, and livestock, but also new areas such as innovation, governance, crises, infrastructure, and rural finance. Studies and handbooks on integrating gender into agricultural value chains are emerging, alongside new research on gender and assets in rural communities.

A disjuncture remains, however, between the findings from numerous local-level qualitative and quantitative case studies that document the impact of specific project efforts on gender relations and the broader goal of modeling the impact of national policies on the status of men and women in the population. The papers presented here aim to bridge that gap. They are products of the three-year grant (2006-2009), "Evaluating the Long-Term Impact of Gender-Focused Policy Interventions," that was awarded to the International Food Policy Research Institute (IFPRI) and funded by the Canadian International Development Agency (CIDA).

This project set out to identify opportunities where paying closer attention to gender issues can improve the targeting of policy interventions and investments that in turn lead to improved outcomes and enhanced levels of welfare and human well-being for both women and men. It builds on the scholars who have studied the linkages between agriculture growth, economic development, and the improvement of human well-being from a nuanced and gendered perspective.[1] With few exceptions, however, to date the mainstream economics literature examining the linkages between the development of agricultural economies and the improvement of human welfare ignores key issues of gender. The research often over-simplifies the problem (and its solution) or it neglects consideration of the gender-based constraints that often prevent policy interventions from achieving their intended effect.

To supplement the smaller-scale quantitative studies and the qualitative research found in the existing literature that informed the direction of the study, this project also employs *ex ante* simulation methods that have been adapted to incorporate sex-disaggregated data more explicitly. The models resulting from these methods suggest insights about the key policy-impact linkages and move between the micro- and macro-level perspectives. In this way, the effectiveness of gender-targeted investments and policy interventions in enhancing poverty and hunger reduction and improving key measures of human well-being can be assessed.

Four topical areas addressing assets, time use, education, and economywide models, offer particularly useful information for improving our understanding of the links between policy formulation and positive gendered policy impacts, each of is further developed in one or more of the papers in the volume.

[1] An annotated bibliography of key resources from this literature is provided in Annex B.

The intersection of gender relations, control and ownership of key assets, and positive development outcomes

Research on assets has been growing steadily in recent years. There is now broad awareness about a large global gender gap in asset ownership: women are much less likely than men to have formal ownership of land, to have access to hired help from labor markets, to have bank accounts or to be eligible for credit from most banks, or to have graduated from higher education programs. The implications of this gap have also been well-studied, finding that a narrowing of the disparity is associated with positive development outcomes. Control of income by women is associated with better child nutrition; more education for girls results in reduced fertility; and land ownership is associated with higher productivity and better stewardship, among other findings (Quisumbing 2003; World Bank 2001, 2009).

In large part, the awareness of the importance of strengthening women's access to and control over assets for positive development outcomes has been informed by the Sustainable Livelihoods (SL) approach popularized in development work largely by the UK's Department for International Development (DfID). It offers a narrative that identifies the role of five types of assets (human capital, social capital, productive capital, natural capital, and financial capital) that are utilized to create sustainable livelihoods. Women's relationships to each type of asset are clarified, and the consequences of any development policy or project intervention can be assessed by their support or interference with these relationships. Policy makers have the ability to influence both men's and women's access to assets through these structures, which include markets, governmental programs, and services, and through the creation of process-based institutions such as laws and regulations. The framework helps to highlight the drivers that influence access to assets and the synergies that exist among the assets. By mapping of the initial asset conditions and the changes as a result of interventions, the SL framework provides an overall orientation to the context that produces and maintains different types of gender asymmetries.

An overview by Quisumbing and Pandolfelli (2008) found that among the most effective types of interventions for increasing women's control over agriculturally important assets are:

- strengthening women's control assets that can be used either directly in productive efforts or as collateral for obtaining loans to invest in agricultural enterprises, e.g., land, water, and other natural resources;
- developing and achieving adoption of relevant and affordable agricultural technologies;
- creating agricultural extension systems that reach women and mobilize women's social networks to disseminate information diffusion;
- reducing market barriers for women;
- addressing obstacles to form credit by supporting non-land-based collateral options and reducing social and cultural disincentives; and,
- supporting women's groups and women's active participation in economically-oriented groups.

The results of this insightful review highlight the need for better methods to quantify the potential benefits of these approaches. Most of the innovations have not yet been rigorously evaluated. Where evaluations have been done, little attention has been paid to the differential impacts on men and women, or to which delivery mechanisms may be more effective in reaching different groups of women and men. The complexity and site-specificity of gender relations and norms makes it particularly difficult to generalize about the impacts that interventions will have in different locations and among different ethnic or income groups.

The overview paper by Siwa Msangi and Mandy Ewing, "Gender-Focused Interventions and Micro-Macro Linkages: Examining Gender, Rural Economic Growth, and Human Welfare," builds on the findings about gender inequalities and access to assets that are developed in the Sustainable Livelihoods framework to construct a framework that can inform a more quantitative approach. It sets the stage for looking at the gender-relevant dimensions of policy interventions, and discusses the methodology and analytical approaches that promise advances in addressing these issues.

By postulating the linkages that connect the asset ownership of women to their activities and to the type of outcomes that are realized, a better understanding is obtained of the pathways through which policy can relieve key constraints to productivity and welfare enhancement. Through empirical quantification, the relative importance of the various impact pathways in improving the livelihoods of women, through targeted investments and policy interventions, can be judged. Two empirical examples are then presented in the paper—one looking at education and the other one at water. They demonstrate the economic benefit that would result from specific policy changes. The policy experiment shows that policy support to girls' education, if increasing girls' enrollment in secondary education by 50 percent, can result in a dramatic decrease in childhood malnutrition, given the importance of girls' education as a determinant for household nutrition outcomes (Smith and Haddad 2000). We will discuss the linkages between investments that provide access to education and clean water, to human well-being outcomes like malnutrition in more detail in the next chapter. In the case of water, the costs and benefits of improving the supply of clean water to rural and urban populations are calculated, concluding that the benefits of a healthier and more productive population along with household benefits associated with a reduction in women's time burden are significant.

The implications of gender disparities in time use

The next step toward drawing more systematic conclusions about the interrelationships of policy and human welfare was to analyze country-level time use data. The goal of the analysis was to better understand the time constraints that women face in the household and in the marketplace, and to articulate how trade-offs in time use impact welfare, using a rich data set collected in Tanzania that measured time spent in both productive and reproductive tasks for men and women (Budlender 2008).

The paper by Marzia Fontana and Luisa Natali in this report, "Gendered Patterns of Time Use in Tanzania: Public Investment in Infrastructure Can Help" finds that in Tanzania, as in many developing economies, unpaid activities are significant and mostly undertaken by women. The paper shows how the burden of collecting water, fetching fuel and preparing food varies by sex, location and income. It highlights that these are strenuous and time-consuming activities particularly for women and children living in low-income rural households. Women in these households must allocate a large portion of their day to unpaid tasks to compensate for the lack of physical and social infrastructure necessary to ensure adequate standards of living for their families. These household responsibilities further exacerbate their position of disadvantage relative to other men and to women in higher income groups. Gender disparities in time use not only limit the income-earning potential of women, but also diminish their opportunities for human development and personal fulfillment.

The last section of the paper offers preliminary quantification of the time that could be saved in a year if interventions to reduce specific aspects of unpaid work were implemented. These results point to the potential benefit from well-targeted, public investment in water supply for domestic use, irrigation, sanitation services, electrification, roads and transport services. It also suggests that efforts to promote alternative cooking technologies that require less firewood collection could also help greatly, as well as technologies that offer alternative sources of renewable energy for heating and lighting. These investments would have a substantial positive distributional impact by benefitting most those women who are doubly disadvantaged by their income and time poverty. Integrating this kind of gendered time use analysis into a macro-model would be highly desirable as a way to capturing more fully the extent of the many direct and indirect benefits generated by alternative infrastructure interventions.

Illuminating the role of policy on girls' education and its outcomes for economic growth

Education studies, particularly on girls' education, have, like those in health, collected and analyzed a great deal of sex-disaggregated quantitative information in comparison to studies in agricultural productivity more broadly. The next two papers in the report focus on two aspects of gender disparities in education. Michelle Adato and Shelley Feldman, in the paper, "Gender-focused Investments in Education: Understanding how Gender Relations shape outcomes of Conditional Cash Transfer Programs" are interested in teasing out the reasons for gains in girls' school attendance and retention. The authors provide a study of two countries, Bangladesh and Turkey, where the policy instrument of conditional cash transfers, or CCTs, has been relatively successful. The programs offer cash to families who keep their daughters enrolled and attending school.

The analysis set out to understand the factors that explain the success of the programs as well as its limitations, at both micro- and macro- levels. The analysis seeks to identify the types of contextual factors that influence success and to clarify the types of complementary interventions or policies, alongside CCTs, that could more successfully facilitate the attainment of educational objectives. For example, CCTs have been important in helping to overcome those constraints to girls' schooling that revolve around household income, such as schooling costs and the loss of income from child labor. But other factors wield their own influence: gender and related socio-cultural norms that push girls out of school and into marriage and childbearing, beliefs around sexuality and honor; the inadequate availability and quality of "supply" (teachers, materials, infrastructure and transportation), the existence or lack of role models, education levels of mothers, fathers and siblings; and girls' and their families' perceptions of the value of education and resultant aspirations and actions. Each of these influences needs to be understood at the appropriate level of specificity across and within different countries and regions. Gender norms and associated discriminatory practices continue to be critical constraints on girls' education, even as some girls and their family members skillfully adapt to them in ways that enable them to avail themselves of new resources. Nonetheless, the broader economic and institutional environment, as shaped by policy interventions, also slowly alters such norms and practices.

The second paper examining education moves further away from the micro-level situations to a macro-level country model, and seeks to understand the relative importance and interaction between investments in education and in family planning. Leiwen Jiang and Karen Hardee, in the paper "Projecting the Effects of Women's Educational Attainment and Wanted Fertility in India: Application of a Multistate Population Projection Model" uses population modeling and demographic projections of India to examine alternative scenarios of gender-focused socio-economic policy interventions. The paper constructs six scenarios of fertility, mortality, and education transition rate to study the relationship between investments in both education and family planning and their impact on India's population projections. A comparison of the results from the six scenarios finds that the impact from investment in the family planning program and reproductive health services will be much more immediate and significant than investments in education only. Therefore, to stabilize population in a developing country like India, investment in education only will not be enough. Promoting family planning and reproductive health services is also critical, and provides an important compliment to expanding education.

Investment in family planning and education will also affect population composition. Fertility reduction will change the population age structure, increasing the proportion of population of labor force age, creating a "demographic window" that offers India an opportunity for rapid economic growth. When combined with investments in education that create a more skilled labor force, the likelihood of rapid economic growth increases. The analysis in the paper reveals investment in girls' education and achieving gender equality in education will be the most effective measure to increase India's population education level and improve its overall values of human capital.

Looking at policy interventions and gender disparities from an economywide perspective

Contextualized detail on time use or on constraints to girls' education can be enormously useful, as outlined in the papers described above. To extend those findings cross-sectorally in a national context, the report turns to an example that builds on sex-disaggregated data to integrate gender dimensions in an economywide modeling framework. This quantitative method can best highlight the linkages between markets, productive activities, and livelihoods to allow a better perspective of how major shifts in the macro-economic environment can cause differential impacts on household welfare.

The paper, "Trade Reform, Poverty and Gender in a Diversified Rural Economy: CAFTA and the Dominican Republic" by Mateusz Filipski and J. Edward Taylor takes the Dominican Republic (DR) as an example of a small, developing nation that is greatly affected by globalization-driven shifts in the socio-economic landscape. It employs a disaggregated rural economywide model (DREM) to explore how trade reform embodied under the Central American Free Trade Agreement (CAFTA) can lead to changes in the livelihoods of both agricultural and non-agricultural households. The innovation behind the DREM (Taylor et al. 2005) is its ability to capture the interactions of households with a variety of productive activities and markets, but at a much higher level of socio-economic disaggregation then is normally done with country-level CGE models, for example, distinguishing effects on migrant households (mostly from Haiti) and Dominican households, as well as between both male- and female-headed households. CAFTA brought changes in tariffs for both agricultural and non-agricultural goods. The DREM allows the interactions across a variety of sectors and through a number of interlinked markets to become visible in household responses and adjustments to these shocks. The fact that agricultural households are both producers and consumers of some of the commodities affected by CAFTA reform, means that there are countervailing effects when prices change, with a net positive or negative outcome.

The paper reports that female-headed agricultural households were less adversely affected by the CAFTA reforms, compared to male-headed households within the Dominican Republic, since the crop systems for which they work as laborers are the export-oriented coffee, tobacco and fresh vegetables, and these were not affected in the same way as the food crops that are produced in male-headed farm households. This created increased wage opportunities for women in the agricultural sector, as well as for the Haitian migrants who also worked in these sectors. The example of the Dominican Republic supports the observations of authors (e.g., Fontana 2009) who have shown that women tend to benefit from working as laborers in export-oriented crop sectors, even though these type of commercialized agricultural sectors tend to be dominated more by men in most regions (von Braun and Kennedy 1994). Besides the differential effect of the CAFTA-driven policy reforms on male and female wages and income, the different consumption preferences and expenditure patterns of female households also leave them better off than their male-headed counterparts, interestingly contrasting with other studies, which consistently show the disadvantage faced by female-headed households in dealing with trade-driven shocks.[2]

Carrying out these *ex ante* policy experiments within a disaggregated rural economywide modeling framework presents a more nuanced quantitative approach for understanding the socio-economic heterogeneity of developing, rural economies in a way that can speak to policy formulation. A comparison of the simulated outcomes from a gendered and non-gendered version of this economywide model reveals that making the distinction between male and female activities and labor markets has a significant effect upon the welfare conclusions that one can draw with respect to the impact of reform on human well-being. This argues, therefore, in favor of embedding a high degree of socio-economic and gender disaggregation in the analysis of macro-level reforms on household-level welfare, and indicates the high payoffs that can be realized by introducing these kinds of modeling improvements in *ex ante* policy simulations.

[2] For a broader review of the literature concerning the gender effects of trade liberalization, see Fontana (2009).

The Way Forward

The conceptualization of this project involved two overarching goals:

1. to clarify, using both qualitative and quantitative studies, the main gender-differentiated linkages between household-level behavior and human well-being, markets and services, physical and human capital, and policy interventions; and,
2. to develop a micro-macro modeling framework capable of utilizing a high level of socio-economic disaggregated data to uncover key entry points through which policy can act to improve rural livelihoods within developing agricultural economies, and the gendered character of the linkages through which these interventions must act.

This introduction summarizes the findings from the project-specific papers. The project papers serve as the background for further investigation towards a macro-level analysis of growth and change within agricultural economies and the implications that gender-targeted interventions can have on future human welfare impacts. The completed papers already highlight the value-added that is gained by disaggregating key components of our analysis by gender, and the improvements in welfare and human productivity that can be realized by designing better policies from this perspective.

To vet the findings of the project papers with a wider audience of peers, a workshop, "Modeling gender within a micro-macro framework," was held at IFPRI in Washington on September 15 and 16, 2009. It brought together a group of scholars and practitioners to consider not only presentations of several of the papers in this report, but also new work from other workshop participants (see Annexes C and D). The workshop helped to identify directions for future research and gaps to be filled to advance the awareness of social scientists and researchers who work in the field of socio-economic development and policy.

A review of the workshop discussions completes this volume. Five key areas were identified in which work urgently needs to be done to improve the conceptual and empirical foundations for building more sophisticated models that can capture important gender issues. These are: (1) Improving the treatment of labor markets; (2) Improving the treatment of reproductive work within the household; (3) Relaxing the assumption of the unitary household decision-making model driven by the objective of self-satisfaction; (4) Addressing the important considerations such as risk and uncertainty, and (5) Capturing the dynamics that underlie household investment decisions that balance important trade-offs between investments in care and nurturing and the future returns to productivity and reciprocal care from children.

It was clearly recognized that no single modeling framework can adequately address all of these areas at one time, and that a variety of stylized prototypes would have to be developed to address parts of the larger puzzle. Having teams of researchers who combine the talents of theoreticians, modelers and policy experts work in parallel on specific areas of the wider agenda was agreed to be the most fruitful way of making progress. Interdisciplinary teams, in particular, could provide the necessary level of concentration and focus on the key areas needing improvement. Maintaining the interaction and dialogue among these various teams and revisiting the overall goals and objectives as a group was also deemed to be a useful strategy for creating a vibrant discourse and an active community of practicing professionals that can help push the development of gender-aware economic models to the level needed to address the urgent and important issues confronting policy- and decision-makers today. In this way analysts and researchers can make better use of the research and evidence that exists on gender inequalities and on women, agriculture, and economic welfare, to design more effective gender-focused interventions to improve welfare outcomes at the household level.

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Gender-Focused Interventions and Micro-Macro Linkages: Examining Gender, Rural Economic Growth, and Human Welfare

By Siwa Msangi and Mandy Ewing

Abstract

Advancements in both the household economics and macroeconomic literatures demonstrate that women and men have differential access and control of assets related to household production and human capital formation, and that there are also gender biases in the institutional arrangements of labor, credit, and land markets. These studies indicate that gender-focused interventions could result in greater economic growth and human welfare by explicitly addressing gender differences in access and control of key assets. To help policy makers understand the magnitude of impacts that specific policy interventions could have on gender-specific outcomes, this paper presents a simplified framework to capture the key socio-economic linkages that have the greatest relevance to gender: secondary education and clean water access. Using the International Food Policy Research Institute's (IFPRI's) International Model for Policy Analysis of Agricultural Commodities and Trade (IMPACT) reveals the magnitude of benefits that improvements in these two indicators could bring not only to women, but also on rural livelihoods in general. By increasing investment in female secondary education, the model shows that developing country governments and the international community are able to reduce the number of food-insecure people, leading to a worldwide decline in hunger, and that a small percent increase in spending produces a relatively large decrease in malnutrition. The model results also indicate that improving clean water access in the developing world both reduces the incidence of water-borne illness and malnutrition by 30 percent in the worst affected regions of Africa, and less dramatically, but still significantly in South and Southeast Asia and the Western Pacific.

Introduction

In recent years, there has been a significant expansion of literature addressing issues of gender in the context of socio-economic development. There has also been increasing recognition of the importance of gendered socio-economic relationships in determining how policy interventions affect household-level welfare. Many of the advances in the household economics literature, for example, come from relaxing the classical assumptions of having only a single, unitary decisionmaker within the household, and that the preferences of consumer choice and behavioral response are also homogeneous with respect to male and female household members. At the macro level, examining the linkages between the market economy and the household economy has elucidated gender biases in labor, credit, and land access. While these advancements in the literature have begun to shape project planning at the community and regional level, national policies that consider gender-differentiated impacts have proven more difficult to design, given the complexity of the socio-economic interactions involved.

Much of the literature on the socio-economics of gender has been qualitative, with little quantitative analysis to provide hard numbers describing the impacts of specific policy interventions on gender-specific outcomes. Indeed, understanding the character of underlying linkages between policy interventions and socio-economic shocks on gender-specific welfare and behavioral impacts is important, even from a qualitative perspective. But policy makers need more quantitative indications to better inform and guide their decisions about where to target interventions, on identifying key trade-offs, and on the likely magnitude of the impacts that they can expect, from specific investments and policy interventions. There is therefore a growing need for more quantitatively-focused work to complement the work being done to understand qualitative socio-economic linkages that are most relevant to differences in gender.

This paper explains key micro-macro socio-economic linkages that underlie gendered social dynamics that need to be considered when designing gender-focused interventions to improve welfare outcomes at the household level. The study summarizes, synthesizes, and interprets a wide array of

quantitatively-based literature that looks at gender-relevant policy linkages at both the micro- and macro-levels. A simplified framework captures the key socio-economic linkages that have the greatest gender relevance, to better illustrate the possible constraints that can impede the effectiveness of gender-aware interventions and their ability to enhance household productivity and welfare. Using this approach, a quantitative policy experiment follows to highlight critical findings that deepen the understanding of the important micro-macro linkages relevant to gender-differentiated welfare and policy.

The next section describes the framework that highlights the gender-relevant socio-economic linkages of interest, while the subsequent section builds on that framework to look more closely at specific connections. It is followed by a discussion of the various dimensions through which the productivity and welfare of women is constrained, as illustrated in the literature, and the possible pathways for policy action. Two important gender-specific assets are identified to have a substantial impact on welfare: secondary education and clean water access. In the penultimate section, a quantitative policy experiment is conducted using the International Model for Policy Analysis of Agricultural Commodities and Trade (IMPACT) to provide insight into the magnitude of benefits that improvements in these two indicators could bring to not only women, but rural livelihoods in general. The final section concludes with suggestions for future research and the policy implications of the available evidence.

Assets and the Socio-Economics of Gender

This section explores gendered socio-economic linkages from the perspective of assets and the access that women have to them within different institutional and cultural arrangements. This perspective allows an examination of nuances of gendered socio-economic relationships that would otherwise not be possible if production and consumption activities were considered from a traditional and more aggregate perspective. The Sustainable Livelihoods (SL) Framework, developed by the UK Department for International Development (DfID 1999) frames this discussion. The SL framework is useful for conceptualizing the activities that the poor—and in this case poor women—undertake in their daily lives. In addition, it shows the type of constraints that women face when adjusting or adapting to shocks or socio-economic change. Later on, this perspective is reoriented within a modified framework that allows for the underlying linkages to be brought out more explicitly.

The SL approach provides a narrative for characterizing a woman in relationship to her assets, which can be supported and regenerated in any development scenario or policy intervention. The framework is useful to comprehend the drivers that increase access to assets, and the synergies that exist among the assets. By focusing on women in relation to their access and control of assets, such as productive inputs or education, the SL framework provides an overall orientation within which gender asymmetries take place.

Figure 1.1 presents the SL framework. In this diagram, three main interactions are shown to produce livelihood outcomes. The first is the representation of the five asset types that women can control or access: human capital, social capital, productive capital, natural capital, and financial capital.[3] Tangible assets include those that can be owned or liquidated and encompass all asset categories except social and human capital. Social and political[4] capital are considered intangible and represent a women's ability to participate and advocate on her behalf and to access civil rights and equal protection of law. All livelihood assets can be influenced by both transforming processes and structures and by shocks, trends, and seasonality. Policy makers have the ability to influence access to assets through structures such as markets, governmental programs, and services, and through process-based institutions such as politics and law. On the other hand, the vulnerability context represents external phenomena that are not controllable. Strengthening women's assets, however, can minimize the risk associated with shocks such as weather disasters, macroeconomic recession, and disease.

[3] For the theoretical development of the asset-welfare nexus see, for example, Carter and Barrett 2006.
[4] Although not explicitly shown in Figure1, political capital is assumed to be a component of social capital.

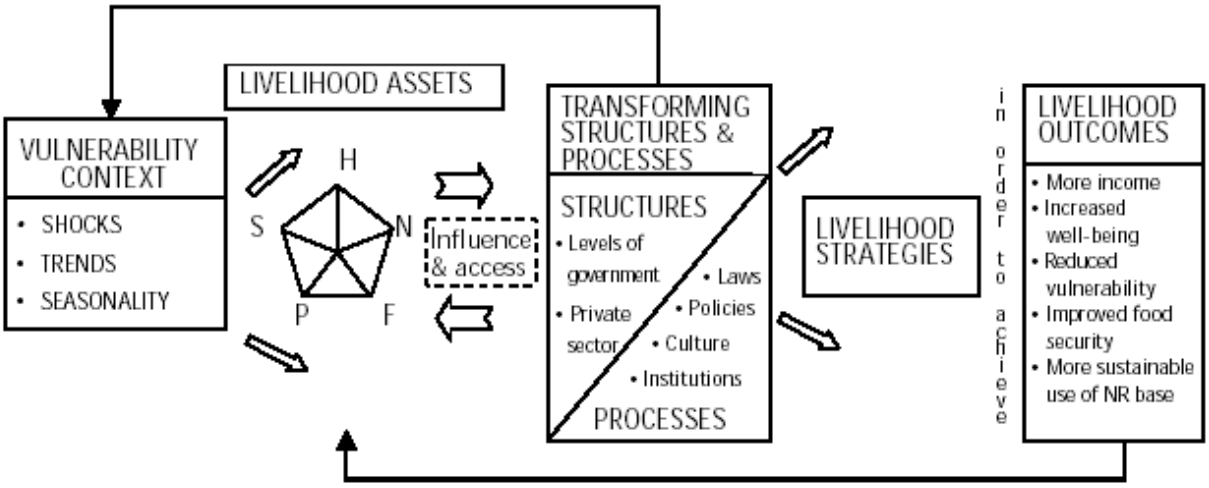

Figure 1.1: Assets-based framework for gendered socio-economic interactions.

Source: DFID 1999.
Notes: H = Human capital; S = Social capital; P = Physical capital; F = Financial capital; N = Natural capital.

An example of how this narrative can identify impact pathways that enable multiple livelihood outcomes is to consider the provision of education services. A Millennium Development Goal (MDG) is to eliminate gender inequality in primary education. Providing education to women and girls enables multiple, self-reinforcing results, such as increasing the control over and access to other conditions like fertility, employment, and nutrition. Focusing on the needs and challenges facing women, within the context of this conceptual framework, reveals a variety of alternative livelihood strategies that could be developed in a way that is appropriate to each person's personal and household-level endowments, and reveals several policy options that could be used to close gaps in education and human capital formation. One strategy is to increase women's efficient time use through the supply of reliable water and sanitation infrastructure that takes into account women's preferences and concerns surrounding this service. If water collection time is decreased, women could decide to use the additional time for their own care, to work for wages, or to develop other livelihood strategies. Another policy may be to develop off-farm employment opportunities that have increased returns to education.

Conceptualizing Key Gendered Socio-Economic Linkages

This section presents the analytical framework of a modified household economic model to show the gendered socio-economic linkages that connect targeted policy interventions to changes in human welfare and well-being. The conceptual model is fairly stylized, but is constructed that way in order to highlight the essential elements of the selected policy problem. Most studies of gender-specific socio-economic interactions have been fairly descriptive in nature, and have not provided policymakers with enough information to fully evaluate the underlying tradeoffs that exist when targeting investments and policy interventions towards improving the welfare outcomes for women. A later section builds on this conceptualization to design some simple quantitative illustrations to address this gap and add value to the understanding of important gender issues that are addressed in the current literature.

Figure 1.2 shows in a different way the type of gendered socio-economic linkages that were discussed previously and illustrated in Figure 1.1. By looking more explicitly at the linkages that connect the asset ownership of women to their activities and to the type of outcomes that are realized, a better understanding is obtained of the pathways through which policy can act to relieve key constraints to productivity and welfare enhancement. Through empirical quantification, the relative importance of the

various impact pathways in improving the livelihoods of women, through targeted investments and policy interventions, can be judged. This modified framework will help in designing such a quantification scheme.

The framework shown in Figure 1.2 illustrates the choices that are made at the household-level regarding resource allocation, production, consumption and expenditure and how they interact with socio-economic conditions (such as market opportunities) to lead to well-being outcomes like nutrition and human health. The key choices between different types of labor, e.g., for production activities outside the household or "reproductive" activities within the household, are each shown here with its own pathways of impact upon human well-being.[5] The well-being status of each household member, including the important component of nutrition, also has a feedback linkage to labor productivity, and is enhanced and mediated through the intervention of nurture and household care.

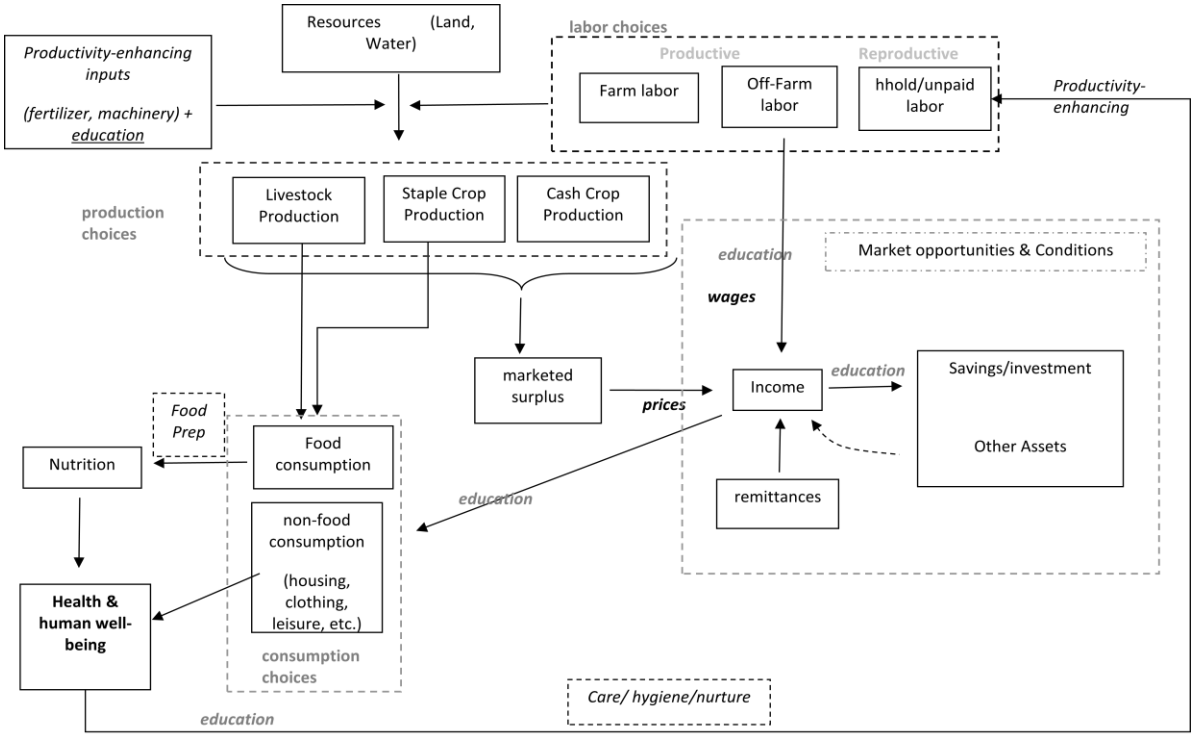

Figure 1.2. Modified framework for examining gendered socio-economic linkages.

Source: Developed by authors.

In effect, nurture and care constantly reproduces labor and they allow for the time allocations that are made for on-farm or off-farm income-generating activities to be more effective and productive. Some choices made at the household level concern how income is allocated to immediate spending or savings and investment; others concern whether spending is allocated to food or non-food items, such as services, housing, clothing, and other durable or non-durable items. For purchased food commodities to be transformed into items that can be consumed within the household and provide nutrition and well-being, they must be transformed with the use of other purchased or non-purchased commodities (like energy and

[5] There is some limitation as to how to the terminology and logic of neo-classical economics can be applied to decisions about productive and reproductive decisions within the household. But it is beyond the scope of this paper to offer a modified theoretical framework that can sufficiently redress these deficiencies when trying to convey the immense complexity of a sex-disaggregated, non-unitary household decision-making process.

water) and with the time that is devoted to the meal preparation. These activities are reproductive in nature, and are an important requirement for the maintenance of human well-being within the household.

The fundamental micro-economic decision framework that underlies the relationships shown in Figure 1.2 can be summarized in the following heuristic "welfare-maximizing" decision problem, facing the economically-driven decisionmaker.

$$\max Welfare = w(\{consumption_i\}_{i=mkt,hhold}, Time_{leisure})$$

subject to

$$(price_{cons} \times consumption_{mkt}) + (price_{inputs} \times inputs)$$

$$\leq income_{fixed} + \mathrm{R} + \left(wages \times Time_{paid}^{prodn}\right) + revenue_{production}$$

$$consumption_{hhold} = c(consumption_{mkt}, Time_{unpaid}^{reprdn} \mid \Theta^{hh})$$

$$revenue_{production} = f(Time_{unpaid}^{prodn}, inputs, mkt\ conditions \mid \Theta^{mkt})$$

$$Time_{paid}^{prodn} + Time_{unpaid}^{prodn} + Time_{leisure} + Time_{unpaid}^{reprdn} = Time_{total}$$

In this theoretical model, the maximization of welfare is constrained by available resources and time. The neo-classical utility function, $w(\{consumption_i\}_{i=mkt,hhold}, Time_{leisure})$, provides the decisionmaker with the objective of maximizing satisfaction that is derived from the consumption of goods that are both produced within the household and purchased from the market. In this framework, the decisionmaker also derives satisfaction from leisure, which implies that there is dis-utility from time spent working either within the household or on the wage market.[6] The tradeoff between different types of consumption goods and productive activities is implied by the "full income" constraint, which takes all sources of income into account (including remittances, *R*), and the various types of costs which must be met for activities of production or consumption to occur. Here, a distinction is made between those consumption goods that are obtained directly from the market, and those which are consumed within the household, after some "transformation" that depends upon specific reproductive activities (such as cooking, cleaning, collection of firewood and water, etc.) shown in Figure 1.2 and discussed above. Of course, some of these reproductive activities could be purchased from the market (in the form of hired help).[7] Therefore, there is a "production function" that generates revenue for the household and accounts for the income that comes through the mediation of markets, and there is a production relationship that determines the availability and consumption of key household goods that are necessary for welfare, such as clean clothes, cooked food, good health and a safe domestic environment. There is also a clear trade-off between the allocation of time—both paid and unpaid—between various activities, and the gains they provide in terms of welfare, which is also graphically shown in Figure 1.2. The labor that the household puts into the generation of on-farm revenue is depicted as unpaid, productive labor—although this can also be supplemented by hired labor from the market. In that case, it would be counted as an input to production that has its own market price ($price_{inputs}$).Various market- and household-level characteristics are represented that cannot explicitly be accounted for within this framework with the parameters $\Theta^{mkt,hhold}$, which represent a vector of various factors that can have highly gender-specific properties. The market conditions that are very relevant to gender (such as the wage received for paid work and the access to productive inputs like technology and education) are contained within this framework, and are also represented in Figure 1.2.

[6] This may not be true for some individuals, who derive pleasure from working, or who enjoy the interaction with their children that is provided by childcare or household activities. We have chosen this formulation as a simplification, but it can be generalized to address other cases.

[7] In this case we can depict it as another type of market good – but that is not a case which we will devote our discussion and analysis to.

A summary of key issues raised in this literature follows next. It frames the key relationships that link gendered socio-economic interactions with welfare and well-being outcomes to set the context for the empirical policy experiment presented in Section 5.

Linking Gender Inequalities to Productivity and Welfare

In reviewing the literature on the gender linkages between agricultural productivity, economic growth, and household welfare, the focus is on the types of assets that women have differential access to: labor saving technologies, including efficient water supply and energy resources; productive assets such as control over agricultural inputs and access to extension services; and human capital assets including access to education, adequate nutrition, and health care. The review covers both qualitative and quantitative studies, but more attention is given to empirical results that illustrate differential access in low productivity and well-being (see also Annex B).

The literature is presented in three sections:

- studies that quantify the potential time savings for women as the result of rural service delivery;
- discussions about gender gaps in access to productive assets and how these asymmetries translate to low production; and finally,
- discussions about gender gaps in education and their implications for fertility, nutrition, and productivity.

The literature review concludes with a discussion about where gender targeted investment could have significant impacts on productivity and well-being, and some suggested methods for developing relevant policies.

Gendered dimensions of time use

Domestic chores and reproductive activities are vital to the survival and the well-being of households. Women and girls throughout the world undertake the majority of this non-paid work. Women in the developing world are disproportionately charged with activities such as transporting water and fuel wood, processing agricultural goods, preparing food, and care giving. Historically, the household responsibilities of women and girls have not been accounted for by planners and policy makers as a means to impact economic growth. Economic literature that makes quantifiable links between gender focused time savings and increases in productivity and well-being is emerging (e.g., Kes and Swaminathan 2006). In addition, incorporating women's reproductive work into national systems of accounts can assist in determining the trade-offs between time spent in labor, leisure, and reproduction (Fontana and Wood 2000; Sinha and Sangeeta 2000). This gendered literature provides the basis for characterization of the socio-economic impacts of non-paid work.

For many poor women and girls in countries with low levels of service provision, fetching water and collecting fuel wood are time intensive and burdensome daily tasks. Recent time use surveys from sub-Saharan Africa show that women and girls in rural areas spend more time collecting firewood and fetching water than men and boys (Charmes 2006). For example, in Benin rural girls spend on average 1 hour and 20 minutes collecting water and fuel per day, while boys spend only 31 minutes on the same tasks. Overall, each of the national surveys reports that women dedicate more of their day to domestic activities, while men spend that time studying, socializing, commuting, and at leisure. An earlier study by Malmberg-Calvo (1994) found similar results in villages in Ghana, Tanzania, and Zambia, where women were responsible for 76 to 93 percent of the 1,120 to 1,490 hours spent annually collecting firewood, fetching water, and transporting crops to the grinding mills.

The results of the surveys point to a potential time savings that rural services and infrastructure can bring. By one estimate, nearly 40 billion hours could be saved by eliminating the need to haul water for Africans—mainly women and children—every year (Cosgrove and Rijsberman 1998). The time saved can enable opportunities for women to participate in other productive activities or for girls to have time to attend school. One study in India found that decreasing travel time to collect water to under one hour per day increased women's participation in local microenterprises, increasing their annual earnings between 750 and 5,520 rupees (Verhagen et al. 2004). Another study from South Africa found that women in villages with accessible and reliable water service were more likely to have vegetable gardens, fruit trees, microenterprises like beer making and hairdressing, and to own livestock—all typically women's sectors—compared to villages that had no reticulated water supply (Perez and Castresana 2004). These time savings would also extend to the provision of alternative cooking technologies that reduce the burden and requirements for collecting firewood (or purchasing it with scarce resources). Many of the local-level initiatives to promote solar cookers, for instance, have demonstrated time savings in firewood collection, such as within refugee camps (Loskota, 2007, in the case of Chad) and other village contexts within Africa (Kwach and Onono, 2008, for Kenya; Vetter, 2006, for Madagascar), Latin America (UNDP and GEF, 2003, Costa Rica) and other contexts. These technologies in themselves, however, do not offer a complete solution unless questions of appropriateness, adaptability to local conditions and cost-effectiveness are taken into account (Shäffler, 2006)

The provision of clean and accessible water sources, in particular, is a critical service that enables both direct and indirect time savings. In addition to directly reducing the need to transport water, improved water sources enhance sanitation and hygiene, leading to healthier and more productive populations. It is estimated that the deficiency of safe drinking water claims the lives of nearly 4 million children per year as a result of water-borne disease and illnesses (Cosgrove and Rijsberman 1998). Moreover, malnutrition rates are closely linked to lack of access to safe drinking water (Smith and Haddad 1999). As the principal caregivers of the sick, women sacrifice time that would otherwise be dedicated to other reproductive and productive activities. A study by the World Health Organization estimates 413 million healthy baby days could be gained globally by eliminating diarrhea infections through the provision of improved water supply, having a direct impact on a mother's time use (Hutton and Haller 2004). The same study also found that with the elimination of diarrhea, school attendance for adolescents could increase by 28,708 million days, while 919 million productive days could be recovered.

To maximize the responsiveness of water and sanitation infrastructure, woman should be included in all stages of planning and design (Lewis and Havaligi 2007). Poorly conceived infrastructure can actually increase the time burden of women through long lines and rationing (Malmberg-Calvo 1994). Cross country research shows that successful water and sanitation projects incorporate the full participation of women in their design (Gross et al. 2001). For example, women village council leaders in India chose different priorities in designs for water systems than their male counterparts, emphasizing safe drinking water over irrigation (Chattopadhyay and Duflo 2004).

Similar results are found for other infrastructure projects that improve women's access to efficient and clean energy sources and roads. Analysis of rural household transportation surveys from Burkina Faso, Uganda, and Zambia show that women and girls could save nearly 900 hours a year by creating centralized woodlots (Barwell 1996). Building roads that women feel safe using gives them access to a range of essential resources including markets, health care, and schools (Turner and Fouracre 1995; Porter 2007). The review shows clearly that labor saving technologies planned and designed with the full participation of women beneficiaries have the ability to increase reproductive and productive time use for women and children.

Gender differentials in access to productive assets in agriculture

Women are important economic actors in agricultural production systems. Women account for over 75 percent of the food produced in representative regions of sub-Saharan Africa (Saito et al. 1994). Despite

their prominent roles, women have been found to adopt technology differently, and their output lags in comparison to men's (Doss and Morris 2001; Gilbert et al. 2002). In addition, female headed households tend to have less labor availability, smaller landholdings, and lower incomes (Doss 2001; Njiro 2006). This type of gender-differentiated behavior has important implications for raising productivity.

This section reviews the literature that sheds light on the nature of asset distribution between men and women. In attempting to explain differing rates of maize production technology adoption between women and men in Ghana, Doss and Morris (2001) discovered that while gender as an explanatory variable could not account for the differing rates, access to inputs including land, labor and extension services, showed significant and positive relationships—and women had less access to all of them than men. The authors suggest increasing women's access to these resources to improve their production efficiency. Similar conclusions were drawn by Gilbert et al. (2002) in Malawi concerning the disproportionate rate at which women applied fertilizers, mirroring their control over land, extension services, and credit.

These studies indicate that more attention needs to be paid to women's relative lack of assets. Doss (2001) draws attention to the many factors that contribute to the gender gaps in access to productive assets in agriculture in Africa, including technology, land, the existence and efficacy of extension services, and labor availability. It can be inferred that there is significant missed potential in earnings and well-being resulting from these gender gaps. In other words, if women had similar access to credit, land, extension services, labor, and technology as the men who are their counterparts, to what extent could output and well-being be enhanced? Alderman et al. (2003) projected that by reallocating fertilizer and labor inputs to women, total household yield would increase 10 to 20 percent in rural Burkina Faso. In Kenya, models projected that yields could be increased by 20 percent if women controlled the same quantity and quality of assets as men (Saito et al. 1994).

Another important dimension of women's time use in agriculture is the inordinate amount of time that is spent in weeding, and the constraints this puts on overall crop productivity for the household. Fafchamps (1993) demonstrated that the time needed for weeding limits the amounts of productive inputs households can use,8 and restricts their flexibility in timing for carrying out other types of tasks. The greater share of weeding work is done by women, and often entails arduous effort and hundreds of hours per hectare in a stooped position, with long-term health consequences such as chronic back pain and a "bent" posture (IFAD/FAO/GoJ 1998). In cassava fields across Africa, women spend up to 126 hours per hectare weeding (Enete et al. 2002). Field studies from Nigeria indicate that out of all farm labor, including field preparation, planting, weeding, harvesting, and storing crops, women allocate between 90 and 100 percent of their time to weeding, while men tend to the non-weeding on-farm activities (Ukeje 2004). This study indicates the large time savings potential that reducing weed infestations could make especially in Sub-Saharan Africa, where this problem is prevalent. The application of herbicide or the use of new crop technologies with built-in weed inhibitors will give significant relief to the time burden of women and greatly increase the productivity of smallholder agriculture.

Gender gaps in education

Educating girls is one of the most important steps in human development. Beyond the intrinsic value of possessing analytical capabilities and literacy, educated women pass on their knowledge in ways that improve well-being for others. This section highlights the perpetuation of benefits that result by providing educational opportunities for women, including improved nutrition and control over fertility decisions, as well as healthier infants and children. Inequality in education has resulted in an overwhelming amount of potential human development forgone, including not only human capital assets, but also in productive realms related to growth.

[8] Since they want to avoid fertilizing (or irrigating) the weeds, along with their own crops. Weeds often have a agronomic advantage in absorbing nutrients, which makes them such a hindrance to crop growth.

According to the 2005 report from the UN Millennium Project Task Force on Education and Gender Equity, the number of girls who complete primary school increased from 65 to 76 percent in the developing world between 1990 and 2000 (Birdsall and Levine 2005). Over the same period, the percent of boys completing primary school increased only six percent, from 79 to 85 percent. These figures suggest that the gender gap is closing, albeit by 8 percent over the 10 year period. Regional data from sub-Saharan Africa indicate that the completion rate for boys actually decreased a point to 56 percent, while girls' rates increased a meager three points to 46 percent. Latin American data, on the other hand, indicate that the rate of girls completing primary school surpasses that of boys (85 versus 81 percent in 2000).

While some Latin American countries have bridged gender gaps, the overall global figures indicate dismal progress. As a result, the MDG Goal 3, Target 4 to eliminate gender disparity in primary and secondary education preferably by 2005 has not been achieved. The wider implication of this failure affects the quality of human development, not only for the current population, but for generations to come. Those countries that did not meet this target can expect that by 2015, annual average growth will have slowed 0.4 percent, women will be having 0.6 more children, childhood malnutrition will increase by 2.5 percent, and an additional 15 children will die per 1,000 births (Abu-Ghaida and Klasen 2004).[9]

Increased levels of female education have been shown to improve child health and nutrition (Smith and Haddad 1999) and decrease infant and child mortality (Hill and King 1993; Benefo and Schultz 1994; Shultz 1994; Subbarao and Raney 1995; Shultz 1997; Klasen 1999; Abu-Ghaida and Klasen 2004). In a cross-country review of the determinates of child malnutrition, women's education was found to be responsible for 43 percent of the total reduction in child malnutrition in developing countries from 1970 to 1995—twice as important as per capita food availability (Smith and Haddad 1999). In another cross-country study, the impact of female education on infant mortality substantially exceeded other relevant control variables, such as family planning and the existence of health programs in developing countries (Subbarao and Raney 1995).

Educating women has also been shown empirically to decrease fertility (Benefo and Shultz 1994; Schultz 1994; Subbarao and Raney 1995; Shultz 1997; Klasen 1999; Lam and Duryea 1999; Abu-Ghaida and Klasen 2004; Osili and Long 2008). The reduction of fertility is realized through behavior changes such as delaying the timing of a first birth (Derose and Kravdal 2007; Murphy and Carr 2007) and/or marriage (Mensch et al. 2005), and by improving the use of contraception (Castro Martin 1995; Dang 1995; Ainsworth et al. 1996; Shultz 1997; Lloyd et al. 2002). The analysis of data spanning from 1960 to 1990 indicates that female education has a strong negative relationship with fertility across 109 countries (Klasen 1999). Similar results were found for sub-Saharan African countries (Ainsworth et al. 1996; Osili and Long 2007). An analysis of a 1999 Nigerian Demographic and Health Survey shows that for everyone one year increase of female education, fertility declines by 0.26 births (Osili and Long 2008). These changes, however, can only be sustained through the continued focus on increasing educational attainments. A decline in enrollment, as witnessed in sub-Saharan Africa during the 1980s and 1990s, can reverse trends in fertility, even in the presence of a relatively better educated community (Derose and Kravdal 2007).

National economic growth rates also depend on levels of female schooling (Hill and King 1993; Shultz 1993; Klasen 1999; Forbes 2000; Klasen 2002; Knowles et al. 2002; Abu-Ghaida and Klasen 2004). In selected developing countries, female education has a strong positive impact on levels of GNP (Hill and King 1993). Other cross-country studies have found that 0.4 to 0.9 percent of the difference in annual per capita growth rates between East Asia and sub-Saharan Africa, and South Asia and the Middle East can be explained by gender gaps in education across these regions (Klasen 2002). Specifically in

[9] For background of the theoretical underpinnings of the socio-economic impacts of female education, see, for example, Herz et al. (1991) and Hannum and Buchmann (2005).

sub-Saharan Africa, gender gaps in education explain 1.3 percent of the differences in growth between Uganda and Botswana (Blackden et al. 2006).

In 1992, the World Bank president stated that educating girls was the most important strategy in human development (Summers 1992), and his statements are confirmed by the empirical literature. In the 15 years since his speech, much has been accomplished to reduce gender gaps in education, but there is much more to achieve. In the next section, we conduct some simple policy experiments to illustrate the importance of gender-focused policy and investments in education, and the pathways through which they act to affect important socio-economic outcomes and indicators of welfare.

Quantitative Experiment of Gender-Focused Investments

The review of the literature has indicated some of the key socio-economic linkages that have the greatest gender relevance in informing the design of effective gender-aware interventions for enhancing household productivity and welfare. Two important gender-specific assets identified are secondary education and clean water access. The International Food Policy Research Institute's (IFPRI's) International Model for Policy Analysis of Agricultural Commodities and Trade (IMPACT) can provide insight into the magnitude of benefits that improvements in these two indicators could bring to not only women, but rural livelihoods in general. By utilizing the empirical relationships discussed in the preceding sections, IMPACT explores the potential implications of investments in female secondary education and improved water supplies, and how these interventions at the macro-level effect child malnutrition in the developing world.

The International Model for Policy Analysis of Agricultural Commodities and Trade (IMPACT) Model

The IMPACT model was developed by the International Food Policy Research Institute (IFPRI) for projecting global food supply, food demand and food security to year 2020 and beyond (Rosegrant et al. 2008).[10] It is a partial equilibrium agricultural model for crop and livestock commodities, including cereals, soybeans, roots and tubers, meats, milk, eggs, oilseeds, oilcakes/meals, sugar/sweeteners, and fruits and vegetables. It is specified as a set of 115 country and regional sub-models, within each of which supply, demand, and prices for agricultural commodities are determined. Large countries are further divided into major river basins. The result is 281 spatial units, called food production units (FPUs). The model links the various countries and regions through international trade using a series of linear and nonlinear equations to approximate the underlying production and demand functions. World agricultural commodity prices are determined annually at levels that clear international markets. Growth in crop production in each country is determined by crop and input prices, the rate of productivity growth, investment in irrigation, and water availability. Demand is a function of prices, income, and population growth and contains four categories of commodity demand—food, feed, biofuel feedstock, and other uses.

The IMPACT model incorporates the empirical equation estimated by Smith and Haddad (1999) that estimates the functional relationship between child malnutrition and four significant socio-economic indicators: per capita kilocalorie availability; the ratio of female to male life expectancy at birth; total female enrollment in secondary education (any age group) as a percentage of the female age-group corresponding to national regulations for secondary education, and; the percentage of the population with access to safe water. This estimated functional relationship used to project the percentage of malnourished children in the model is presented as Equation (1). To explore food security effects, the model calculates

[10] We provide an overview of the IMPACT model here and refer interested readers to Rosegrant et al. (2008) for technical details.

the percentage and absolute number of malnourished preschool children (0–5 years old) in developing countries.[11]

Equation (1)

$$MAL = -25.24 * \ln(KCAL_t) - 71.76\ LFEXPRAT_t - 0.22\ SCH_t - 0.08\ WATER_t$$

where *MAL* = percentage of malnourished children

KCAL = per capita kilocalorie availability

LFEXPRAT = ratio of female to male life expectancy at birth

SCH = total female enrollment in secondary education (any age group) as a percentage of the female age-group corresponding to national regulations for secondary education, and

WATER = percentage of population with access to safe water.

Most of the data used for the variables on the right-hand side of the equation comes from the following sources: the World Health Organization's Global Database on Child Growth Malnutrition (WHO 1997), the United Nations Administrative Committee on Coordination- Subcommittee on Nutrition (ACC/SCN 1992), the World Bank's World Development Indicators (World Bank 1998, 2006), the FAO FAOSTAT database (FAO 1996, 1998), and the UNESCO UNESCOSTAT database (UNESCO 1998). Specifically, projections of total female enrollment (SCH) and water access are taken from previous global assessments, including the Millennium Ecosystem Assessment (MA 2005), and the UNEP GEO-4 outlook (UNEP 2007), which encompassed important public services such as education and sanitation. The per capita calorie consumption variable is derived from two components: these include the amount of calories obtained from commodities included in the model as well as calories from commodities outside the model.

The percentage of children malnourished derived is then applied to the projected population of children 0–5 years of age to compute the number of malnourished children, as shown in Equation (2).

Equation (2)

$$NMAL_t = MAL_t \times POP5_t,$$

where *NMAL* = number of malnourished children, and

POP5 = number of children 0–5 years old in the population.

Alternative investment scenario: Increased female enrollment in secondary education

To examine the impact of improving assets related to female well-being, the empirical relationship between malnutrition and education outlined in Equation (1) is further examined. An alternative investment scenario is run that tests how increasing female secondary enrollment will impact levels of malnutrition in children under five. The scenario, named SCH_High, raises the percent of females

[11] A malnourished child is a child whose weight-for-age is more than two standard deviations below the weight-for-age standard set by the U.S. National Center for Health Statistics/World Health Organization.

enrolled in secondary education an additional 50 percent over the baseline by 2050. Figure 1.3 presents the total female enrollment in secondary education as a percentage of the female age-group corresponding to national regulations for secondary education (the SCH variable from Equation (1) summed over the investment period (2000 to 2050). The SCH variable presented in this way illustrates the baseline percentage of females that are enrolled in secondary school over the period in comparison to other countries. Further, it demonstrates the impacts that increasing investments in female secondary education has on total enrollment over the period. In general, the SCH_High scenario is somewhat conservative in terms of boosting total enrollment: SCH numbers increase only slightly in countries with high initial female secondary enrollment rates, such as the Philippines, and by 5 to 15 percent over the period in countries with relatively lower baseline enrollment rates. Figure 1.3 presents these data so that the total number of females enrolled and the resulting percent increase in enrollment under the investment scenario compared to the baseline are explicit. Many countries in Sub-Saharan Africa increase the number of enrolled females by about one-third under the investment scenario, while countries with initial higher levels of female enrollment improve enrollment compared to the baseline between 3 and 9 percent.

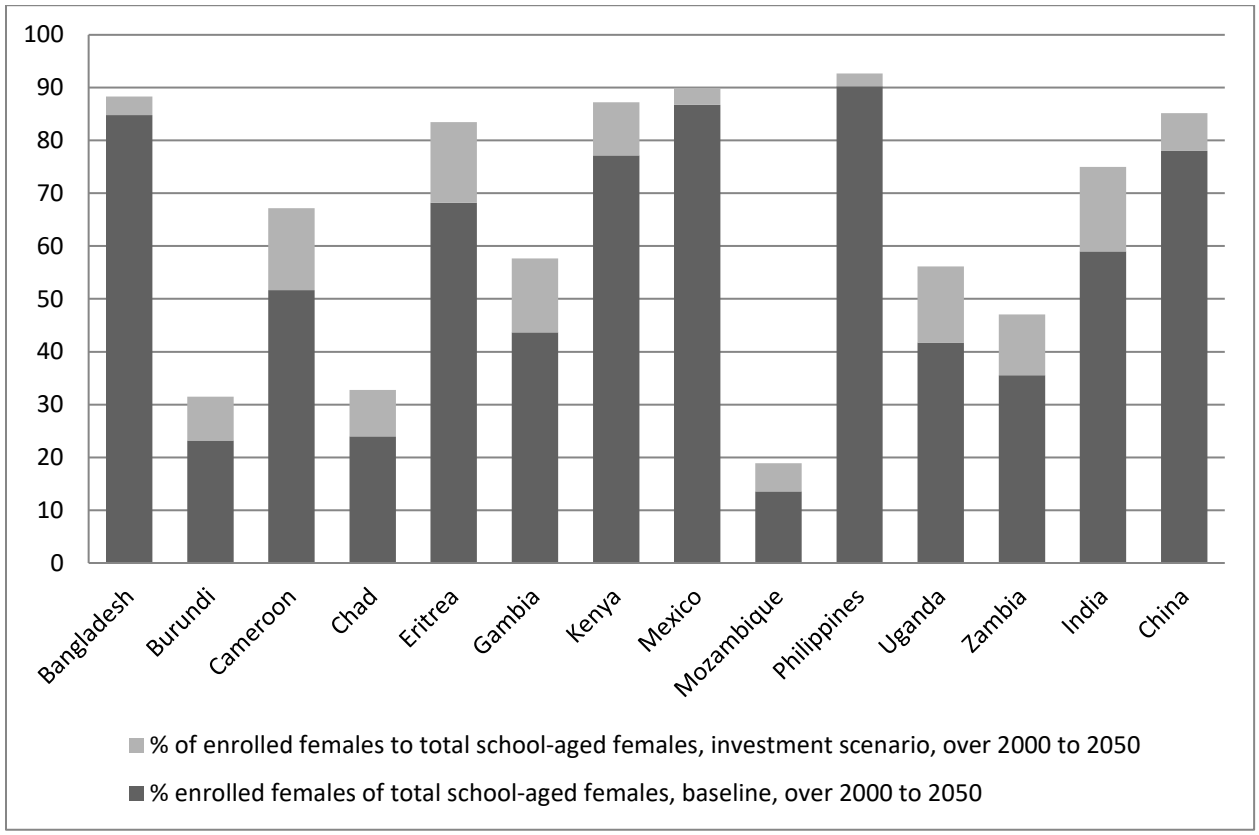

Figure 1.3. Total percentage of female secondary enrollment under the baseline and investment scenario summed over the period 2000 to 2050.

Source: Authors' calculations.

Table 1.1. Total female secondary enrollment (millions) under the baseline and the percent change under the investment scenario summed over the period 2000 to 2050.

	Total female enrollment, baseline *Millions*	Percent change over baseline under investment scenario
	2000-2050	2000-2050
Bangladesh	379.3	4.1
Burundi	14.7	35.3
Cameroon	32.8	29.8
Chad	11.7	36.2
China	1,701.1	9.3
Eritrea	13.5	22.1
Gambia	2.7	31.7
India	1,689.2	27.0
Kenya	117.5	12.9
Malaysia	59.3	3.1
Mexico	205.0	3.8
Mozambique	10.9	39.3
Philippines	226.8	2.8
Swaziland	2.4	21.1
Uganda	65.4	33.9
Zambia	16.7	32.2

Source: Authors' calculations.

We are interested in determining the implications for future malnutrition levels with improvements in access to education for females over the 50 year time horizon. Holding all other variables in Equation (1) constant, these alternative enrollment rates result in dramatic changes in malnutrition. Under the SCH_High scenario, malnutrition decreases for all developing countries considered (Table 1.2). By increasing female secondary school enrollment, 40 percent of malnutrition cases are eliminated in China by 2040, bringing the incidence of malnutrition to zero. On the other hand, malnutrition in Bangladesh is less impacted by education investments due to its relatively higher baseline levels of enrollment (Figure 1.3)

Table 1.2. Total child malnutrition (millions) under the baseline and percent change under increased female enrollment in secondary education summed over the period 2000 to 2050.

	Baseline Malnutrition (millions)	Reduction (%)
	2000-2050	2000-2050
Bangladesh	420.1	1.6
Burundi	49.4	6.1
Cameroon	18.2	20.6
Chad	32.3	8.6
China	189.4	30.6
Eritrea	7.5	19.7
Gambia	1.6	20.9
India	2,092.4	8.7
Kenya	48.6	14.8
Malaysia	18.7	4.0
Mexico	26.0	12.7
Mozambique	29.1	6.7
Philippines	64.6	3.6
Swaziland	1.0	16.6
Uganda	79.0	20.0
Zambia	16.5	16.1

Source: IMPACT model simulations.

As an indication of the financial feasibility of moving from the baseline to one where additional strides in female enrollment are gained, thereby lowering malnutrition, we calculate the investment costs. Public spending per secondary school student in percent of GDP per capita is taken from World Development Indicators (World Bank 2008), and presented in Figure 1.4 for selected countries. Patterns in public spending on secondary education are difficult to isolate across countries in similar income groups. For example, expenditures in Sub-Saharan Africa range from a low of 10 percent in The Gambia, to nearly 75 percent of GDP per capita in Burundi. Higher levels of spending on secondary education in low income countries might reflect high start-up costs and/or the expense of educating a relatively small percentage of the population. Across country income groups, however, spending per student in percent GDP per capita on secondary education is highest in low income countries, followed by high, and middle (Dickson and Hughes 2008).

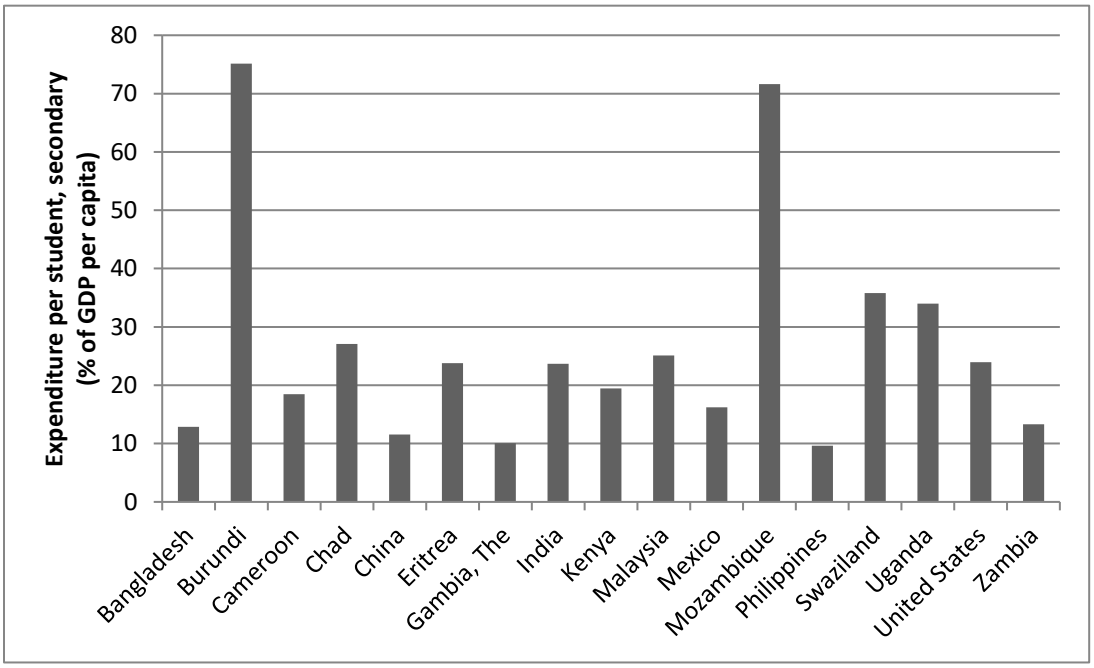

Figure 1.4. Public expenditures per student, secondary, as percent of GDP per capita, selected countries, averaged over the period 1998 to 2006.

Source: World Development Indicators (World Bank 2008)

The future costs of secondary education are estimated based on the relationship between GDP per capita and spending per student, upper secondary, in percent of GDP per capita (Dickson and Hughes 2008). Data on student spending and GDP were taken for the most recent year, mostly 2000-2005, and plotted to generate a best fit curve. The best fit curve is used to determine the rates at which changes in GDP will impact spending per student. These rates are then applied over the projection period, from 2000 to 2050, using IFPRI IMPACT model projections of GDP, and the United Nations 2006 revisions for population.

Expenditures per student will change marginally under the investment scenario, and in some case decreases, such as with Malaysia (Table 1.3). Decreases in expenditures likely reflect the changes in the amount of GDP per capita that is spent on education as GDP rises. When comparing these additional costs to the potential reductions in malnutrition, a small percent increase in spending produces a relatively large decrease in malnutrition. For example, by increasing spending per female student by 2.6 percent in China, all incidence of malnourishment in children under 5 years old can be eliminated by 2040. Overall, China would eliminate over 189 million cases of malnutrition over the 50 year period. Similarly, Gambia can reduce rates of malnutrition by nearly 21 percent over the period, reducing malnutrition by 1.6 million cases by increasing per pupil spending on education by 2.3 percent. These results support making female secondary education a high priority for policy objectives and targeting.

Table 1.3. Expenditures per female student, secondary, in constant 2000 dollars under the baseline and the percent change under the investment scenario, 2000 to 2050.

	Total cost per pupil, baseline, constant 2000 dollars	% change under the investment scenario
	2000-2050	2000-2050
Bangladesh	97.5	0.6
Burundi	172.0	2.0
Cameroon	200.0	2.6
Chad	165.9	2.3
China	282.7	2.6
Eritrea	71.3	2.0
Gambia	57.6	2.3
India	309.8	4.4
Kenya	118.5	1.4
Malaysia	1,932.2	-0.2
Mexico	735.0	0.1
Mozambique	323.6	1.8
Philippines	169.4	0.1
Swaziland	838.5	2.4
Uganda	217.5	2.3
Zambia	97.1	2.3

Source: Authors' calculations.

Alternative investment scenario: Improving clean water access

To understand the impacts that additional clean water access may have on women's livelihoods, two scenarios are envisioned. The baseline scenario assumes no improved water supply and no basic sanitation, neither of which are widely available or routinely controlled at the country level. The reduced exposure scenario raises access to an improved source of water, but not basic sanitation services. Each of these scenarios is associated with a relative risk of contracting diarrhea based on the Global Burden of Disease regional classification system used by the World Health Organization (Box 1.1).

Box 1.1. Global Burden of Disease regional classification system and five mortality strata

The 191 Member States of the World Health Organization (WHO) have been divided into five mortality strata on the basis of their levels of child mortality under five years of age and 15–59 year-old male mortality. The mortality strata are as follows:

A. Very low child, very low adult
B. Low child, low adult
C. Low child, high adult
D. High child, high adult
E. High child, very high adult

The five mortality strata are applied to each of the six epidemiological sub-regions of the WHO Member States, which produces a total of 14 epidemiological sub-regions:

African Region D and E
Eastern Mediterranean Region B and D
European Region B and C
Region of the Americas A, B and D
Western Pacific Region A and B
South-East Asian Region B and D

For this analysis, the five worse-off sub-regions in terms of population are chosen, following Hutton and Haller 2004. The epidemiological sub-regions and their Member States chosen for this analysis are as follows:

- Africa Region (AFR) D: Algeria, Angola, Benin, Burkina Faso, Cameroon, Cape Verde, Chad, Comoros, Equatorial Guinea, Gabon, Gambia, Ghana, Guinea, Guinea-Bissau, Liberia, Madagascar, Mali, Mauritania, Mauritius, Niger, Nigeria, Sao Tome And Principe, Senegal, Seychelles, Sierra Leone, Togo
- Africa Region (AFR) E: Botswana, Burundi, Central African Republic, Congo, Côte d'Ivoire, Democratic Republic Of The Congo, Eritrea, Ethiopia, Kenya, Lesotho, Malawi, Mozambique, Namibia, Rwanda, South Africa, Swaziland, Uganda, United Republic of Tanzania, Zambia, Zimbabwe
- South East Asia Region (SEAR) B: Indonesia, Sri Lanka, Thailand
- South East Asia Region (SEAR) D: Bangladesh, Bhutan, Democratic People's Republic Of Korea, India, Maldives, Myanmar, Nepal
- Western Pacific Region (WPR) B: Cambodia, China, Lao People's Democratic Republic, Malaysia, Mongolia, Philippines, Republic Of Korea, Viet Nam Cook Islands, Fiji, Kiribati, Marshall Islands, Micronesia (Federated States Of), Nauru, Niue, Palau, Papua New Guinea, Samoa, Solomon Islands, Tonga, Tuvalu, Vanuatu

Source: WHO (2002) and Hutton and Haller (2004).

Table 1.4. Summary of exposed population and relative risk of diarrhea under baseline and reduced exposure scenarios by epidemiological sub-regions and mortality strata.

	Baseline Exposure Scenario	Investment Scenario	Diarrhea cases per capita, baseline
Share of population in exposure scenarios (%)			
Africa Region D	35	5	1.3
Africa Region E	38	10	1.3
South East Asian Region B	19	3	0.6
South East Asian Region D	12	0	0.9
Western Pacific Region B	24	1	0.8
Relative risk of contracting diarrhea under exposure scenarios			
Lower Estimate	6.1	3.8	
Best Estimate	11	6.9	
Upper Estimate	16	10	

Notes: For epidemiological sub-regions and mortality strata explanations, see Box 1.1.

Source: Hutton and Haller, 2004; Author's Calculations.

The scenarios, relative risks, and baseline exposure levels are summarized in Table 1.4. It shows the regions of Africa that fall under the epidemiological regime 'D' and 'E' have over a third of their populations exposed to the risk of waterborne illness, under baseline conditions of clean water and sanitation coverage. As a result of higher investment and increased coverage, though, these exposures drop by 30 percent to much lower levels—although still somewhat elevated, as in the worst-affected regions. The exposure rate drops less dramatically, but still by significant levels in the South and Southeast Asia regions, as well as in the Western Pacific – to the point where exposure to waterborne illness disappears in the worst-off regions of South and Southeast Asia. The relative severity of incidence of diarrhea, on a per-capita basis, across the regions also mirrors the degree of exposure, with the sub-Saharan African regions having, on average, incidence levels where each person is likely to suffer from water-induced diarrheal illness more than once in a year, whereas in the less severely-affected parts of South and Southeast Asia, only two-thirds of the population will experience an incident. The relative risk numbers shown in Table 1.4 illustrate how the risk of contracting diarrheal illness changes with the different levels of exposure, relative to conditions which reflect the best possible access to clean water and sanitation. In other words, under baseline conditions, the best-estimate risk of contracting diarrheal illness is 11 times as likely as under the best situation of water and sanitation provision – whereas it falls to being just under 7 times as likely, when clean water access is improved through higher investments.

By using these numbers as parameters in our calculation, by region, we then calculate the number of people likely to contract diarrhea as

$$AvoidedDiarrhea = CW_{Popn} \cdot Exp_{invstmt} \cdot \left(RRisk_{invstmt} \Big/ RRisk_{baseline} \right)$$

Where 'CW_{Popn}' is the size of the population that has gained access to clean water through higher investment, and the lower level of exposure to risk of contraction is $Exp_{invstmt}$, and the relative levels of risk under the baseline and high-investment cases are given by $RRisk_{baseline/invstmt}$.

Under increased investments, the rate of access to clean water is increased by 50 percent relative to baseline level for each five year period from 2000 to 2050 (Figure 1.5). Both African WHO sub-

regions have a baseline access of 500 million in 2030, which improves by approximately 50 percent to 750 million by 2050. Under the investment scenario, access to clean water improves more rapidly around 2030 for the Africa Region D (63 million additional people), while Africa Region E reaches greater numbers toward the end of the investment period (74 million additional people). South East Asia Region B, which includes Indonesia, Sri Lanka, and Thailand, needs to make only modest improvements, since these countries begin with relatively higher levels—over 80 percent—of initial water access. A similar profile is found for the South East Asia Region D, which is dominated by India, which reaches universal clean water access in 2025, under the baseline. Finally, the West Pacific region improves clean water access by 111 million people in 2030, and an additional 47 million in 2050.

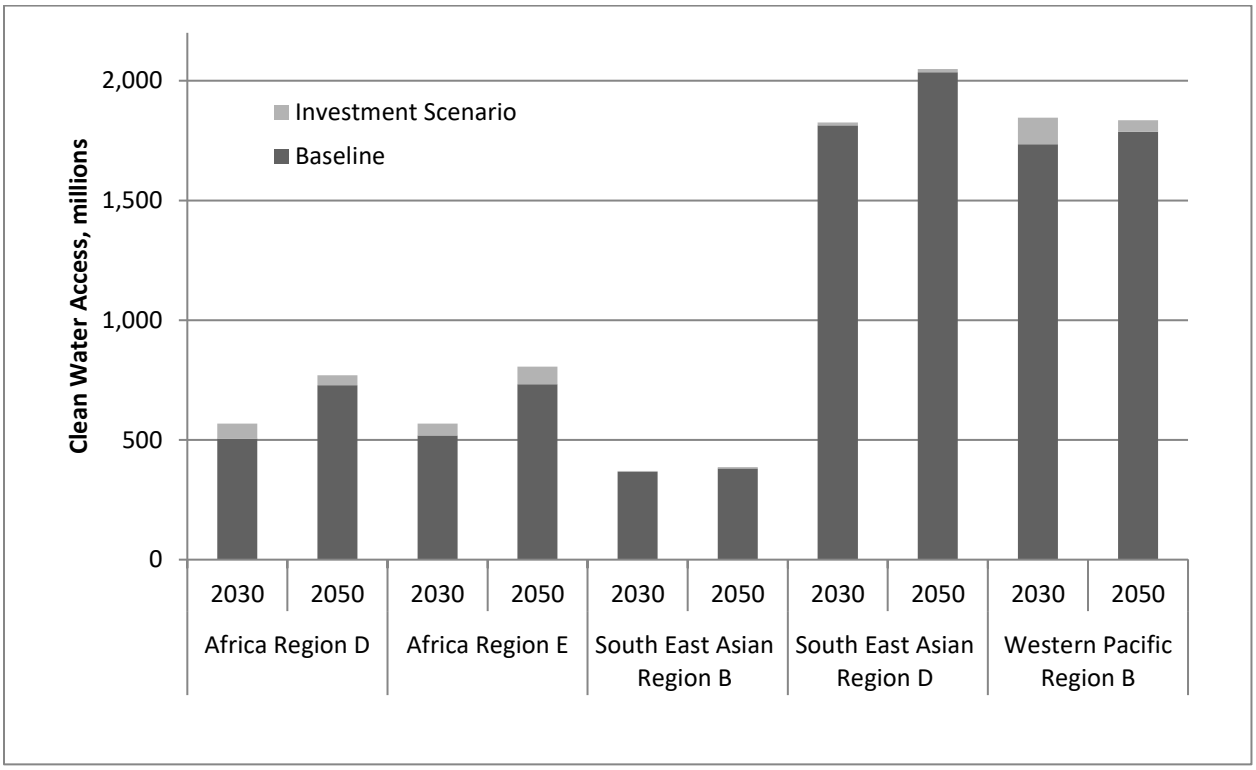

Figure 1.5. People with clean water access (millions) under baseline and investment scenario, 2030 and 2050.

Notes: For epidemiological sub-regions and mortality strata explanations, see Box 1.1.

Source: Author's Calculations.

The relationship between WATER outlined in Equation (1) is used to calculate the total reductions in malnutrition as a result of improved water access (Figure 1.6). For each region considered, malnutrition declines, with the greatest impacts taking place in both African Regions, and in the Western Pacific Region B. For example, in 2030 the Western Pacific Region reduces the incidence of malnutrition by 452 thousand, while the African Region D reduces malnutrition by 637 thousand. The reductions in malnutrition are not as pronounced in the South East Asian Regions due the relatively higher levels of baseline water access (see Figure 1.5).

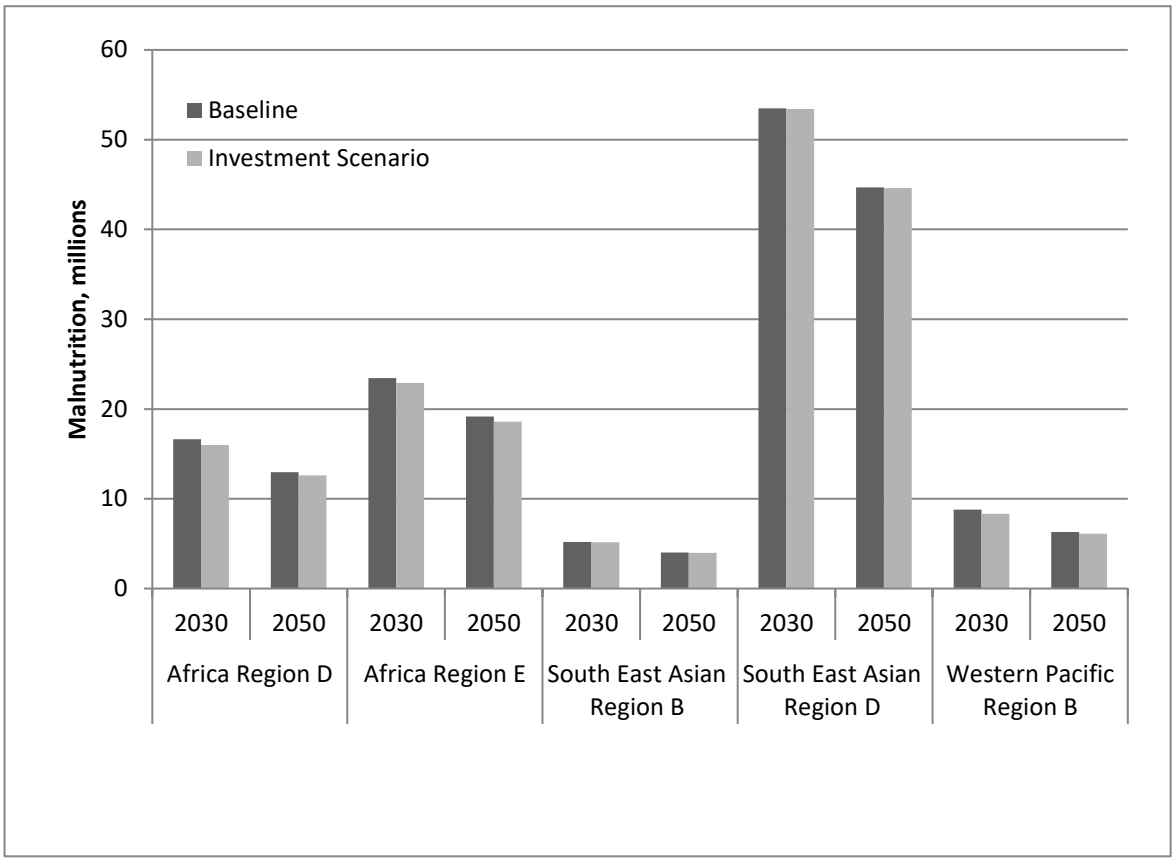

Figure 1.6. Total child malnutrition (millions) under the baseline case and that of improved water access, 2030 and 2050.

Notes: For epidemiological sub-regions and mortality strata explanations, see Box 1.1.
Source: Author's Calculations.

In Table 1.5, below, we see that even under the baseline case, there is steady improvement in the provision of clean water access across most developing regions. This is accelerated, though, under additional investments that can provide additional people with improved water access – which is significant in both the sub-Saharan African and Western Pacific regions. For example, in 2025, an additional 125.6 million people will have access to clean water, reducing the population exposed to diarrhea by 28.9 million and reducing the number of cases of diarrhea by 14.3 million.

Table 1.5. Summary projections of additional clean water access and reduction in exposure and diarrheal incidence, developing regions.

WHO region	Year	People w/clean water access, baseline millions	Additional people w/clean water access, investment scenario millions	Reduction in population exposed to diarrhea millions	Reduction in diarrhea cases millions
Africa Region D	2000	188.8	-	-	-
	2025	452.7	61.2	18.4	14.7
	2050	728.9	41.5	12.4	9.9
Africa Region E	2000	207.6	-	-	-
	2025	468.2	43.6	12.2	9.9
	2050	731.9	74.5	20.9	16.8
South East Asian Region B	2000	356.9	-	-	-
	2025	231.9	3.1	0.5	0.2
	2050	381.4	5.1	0.8	0.3
South East Asian Region D	2000	1,085.0	-	-	-
	2025	1,735.2	7.9	1.0	0.5
	2050	2,035.3	13.2	1.6	0.9
Western Pacific Region B	2000	1,201.5	-	-	-
	2025	1,692.6	125.6	28.9	14.3
	2050	1,786.7	47.7	11.0	5.4

Notes: For epidemiological sub-regions and mortality strata explanations, see Box 1.1.

Source: Author's Calculations.

The sizable reduction in the number of people who are exposed to risk of diarrhea and the incidence of diarrheal illness is also observed in the heavily-affected parts of sub-Saharan Africa, where the improvements continue to accelerate over time in the least favorable epidemiological regimes, reaching comparable levels to those seen in the mid-projection period of the Western Pacific region.

At this point, we have not carried out additional calculations to show the implications for reducing water-related illnesses on relieving the burden that would otherwise be placed on women at the household level, in terms of providing additional care and nurture for the ill. This would entail not only additional time spent in care, but also possible loss in wage-market earnings if such care has to come at the expense of time spent in wage-earning labor. This is an important dimension of women's labor market supply behavior, and can also be a factor in choosing between occupations, when considerations of flexibility and being able to respond to family emergencies become important. Given the highly-aggregate nature of this analysis, though, we have not been able to quantify these implications for this particular scenario, but recognize their importance for improving the design of health care policies and increasing the effectiveness of public service investments, so as to improve livelihoods and maximize the benefits to both men and women.

Conclusions

This paper has addressed the importance of understanding key micro-macro socio-economic linkages that underlie gendered social dynamics that should be addressed when designing gender-focused interventions

to improve welfare outcomes at the household level. Summarizing, synthesizing, and interpreting a wide array of quantitatively-based literature that looks at gender-relevant policy linkages at both the micro and macro-levels, we try to demonstrate how gender-targeted investments can create important improvements in livelihoods and welfare. Our conceptual framework captures some of the key socio-economic linkages that we believe to have the greatest gender relevance, so as to better illustrate the possible constraints that can impede the effectiveness of gender-aware interventions, and their ability to enhance household productivity and welfare. In order to illustrate the importance of increasing access to important public services such as education and clean water, we construct two simplified and somewhat stylized quantitative policy experiments so as to show the effect of increasing investments in these particular sectors on women, and overall human welfare. The policy experiment on education provision has demonstrated that sustained investments in female education have positive implications for malnutrition in every one of the 35 developing countries considered. In addition, the results show that these educational investments do not represent a large burden on GDP, and that governments may make low-cost investments in female education that can save hundreds of thousands of children from malnutrition and make strides towards meeting the Millennium Development Goals. The experiments on clean water provision are equally as compelling, and argue for stronger efforts in improving access to clean water and improved sanitation.

While there are aspects of micro-level agent interaction and intra-household bargaining dynamics that are not explicitly modeling in these experiments, we consider the reduced-form relationships between education, clean water provision and malnutrition as being useful in illustrating the relative importance of these sectors and the order of magnitude of potential benefits. Further work will need to be done to unpack the structural ways in which gender affects household behavior and decisionmaking in order to deepen the understanding of the important micro-macro linkages that are relevant to gender-differentiated welfare and policy.

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2. COUNTRY STUDIES

Gendered Patterns of Time Use in Tanzania: Public Investment in Infrastructure Can Help

By Marzia Fontana and Luisa Natali[12]

Abstract

This paper addresses the burden carried by women in fulfilling their unpaid but critical tasks within the household. It describes and measures the economies of "care" supported by women and often hidden from the typical Systems of National Accounts (SNA). By examining time use survey data from Tanzania, the authors describe the distribution of time use between men and women of various demographic and socio-economic classes, to identify those who are overly burdened by the weight of time needed to maintain the household. The collection of water and fuel and the preparation of food are the most prominent among these unpaid, household activities, and receive the most attention in this study. The data show that Tanzanian women spend three times longer than men in collecting water and caring for other household members, and that this time burden is comparatively heavier for those who are poor and live in rural areas. The data also show that children within poorer households tend to be more involved in unpaid work, and that the girls tend to take on the larger share of the load, especially within male-headed households. The authors advocate for using time use information to develop more gender-aware economic models that can illustrate the gendered dimensions of linkages between the macro-level drivers of economic change and the micro-level welfare effects. Using the analysis in an economic modeling framework can demonstrate the multiplier effects of alternate policy-driven interventions and investments, such as improving access to clean water, energy, and transport all of which would save time and free up women's labor and permit value to be generated in other sectors of the economy as well as improving household-level income, productivity, and welfare overall.

Introduction

This paper examines gender patterns of time use in Tanzania with a view to identify areas that are most in need of infrastructure investment. The data show that the burden of unpaid work in Tanzania is large and mostly borne by women. Public investment policy has an important role to play in redressing gender inequalities and reducing poverty by promoting initiatives that reduce time spent on water collection, home maintenance, and other unpaid activities. The role of these activities in maintaining households' standards of living, and in supporting the functioning of the market economy, is not sufficiently recognized. Infrastructure in the water sector, sanitation services, electrification, roads, and better transport systems, especially in the rural areas, are examples of policy interventions that can ease the burden of this work.

Some descriptive statistics are presented as a first step in analyzing activities for which the burden of work is most unequally distributed between different groups of women and men. Investment should focus on infrastructure that reduces the time intensity of such activities, to have a positive impact both on equality and on labor productivity. These interventions should be given priority in poverty reduction strategies. The analysis draws on the nationally representative 2006 Time Use Survey (TUS) for Tanzania, which is the first of its kind. The Tanzania TUS is very comprehensive and contains rich information that should be taken into account in policy formulation.

[12] We acknowledge with thanks the staff of the Tanzania National Bureau of Statistics who very kindly shared with us their data and promptly responded to our queries. We are most grateful to Siwa Msangi, for having involved us in the project, and for his support and great patience at every stage of the work. Many thanks also to Debbie Budlender, for her precious advice on the data, and for inspiration. Wezi Mwangulube provided valuable help with the formatting of the paper.

The objective of this initial data exploration was to take steps towards integrating time use data into an economy-wide macro-model of Tanzania. Such a modeling approach could be an effective way to examine and quantify the many linkages between unpaid work and the market economy, and to highlight the important role of gender relations in structuring such interconnections.[13]

A few first attempts at including unpaid work into Social Accounting Matrix (SAM)-based modeling do exist (see Fontana and Wood 2000; Fontana 2001 for Bangladesh; Fontana 2002 for Zambia; Siddiqui 2005 for Pakistan; and Fofana at al. 2005 for South Africa). The approach has limitations, however, since it involves lumping all unpaid household activities together into one homogenous sector—variously called "social reproduction" or "household production." Household tasks differ in terms of their production technologies and the objectives they fulfill (compare, for instance, the activity of washing dishes and cleaning the house, with the task of taking care of a terminally ill family member).

The unpaid time inputs necessary to achieve a basic minimum level of well-being for all family members in a household is sometimes called "household overhead time" in the literature (Harvey and Taylor 2000). It varies a great deal across household types, depending on the availability of public services and infrastructure, intermediate market inputs, income, and other assets. All these elements can be seen as important constitutive components of a "well-being production function." Differences in overhead time requirements are a significant source of inequality across households and need to be adequately reflected in economy-wide modeling, to help with the appropriate assessment of alternative investment strategies for gender equality.

The next section of the paper provides an introduction to the data, by an overview of how women and men in Tanzania spend their time, including their engagement in paid employment, unpaid work, care for others, their volunteering in communities, socializing, personal care, and sleep. Each of the sections that follow focuses on one specific aspect of work, which is singled out for its gender relevance. The analysis focuses in particular on water collection, fuel collection, and food preparation because these are the activities in which gender differences in time patterns appear most marked and which could mostly benefit from improvements in physical infrastructure. A brief analysis of gender patterns in travel is also provided.[14] The time burden associated with water collection, fetching of fuel, and food preparation vary by sex, location, income, age and other characteristics. The analysis is developed further by focusing on the socio-economic characteristics of those people who must spend above average time on each of such tasks, whom we call the "overburdened." The last section gives a preliminary quantification of how much time could be saved in a year if interventions to reduce some unpaid work were implemented.

Most of the analysis refers to the adult population defined as persons of 15 years of age or older (conforming to the standard definition of the labor force as commonly found in most statistics), but selected information on children's time (age between 5 and 14 years), further disaggregated by sex, is also provided.

About the Data

The TUS was undertaken by the Tanzania's National Bureau of Statistics (NBS) in 2006 as an add-on module of the Integrated Labour Force Survey (ILFS) and is the outcome of several years of advocacy and research led by the Tanzania Gender Networking Programme (TGNP). The survey provides valuable information on the range of paid and unpaid activities and tasks women and men undertake during a day.

[13] Although lack of time prevented us from taking the task forward, a full modeling project is planned for future research.
[14] We decided not to consider unpaid care for persons as this dimension has been thoroughly analyzed in an excellent recent study (Budlender 2008) and would require a more complex range of policy interventions than simply investment in physical infrastructure.

The broad categories making up the System of National Accounts (SNA)[15] work include paid activities, and they are:

1. Employment for establishments, which more or less correspond to formal sector work;
2. Primary production activities that is not for establishments, which includes subsistence production as well as collection of fuel and water; and,
3. Services for income and other production of goods that is not for establishments, which more or less corresponds to non-agricultural informal sector work.

The categories making up unpaid work (sometimes called non-SNA or extended-SNA work) are:

4. Household maintenance (including food preparation), management and shopping for one's own household;
5. Care for children, the sick, elderly and disabled for own household, and;
6. Community services and help to other households.

Non-work activities include: learning, social and cultural activities, mass-media use, personal care, and sleep.[16]

The Tanzania TUS is a very useful and innovative dataset, and undertaking more such surveys should be definitely encouraged. This survey allows measurement of work by women that goes usually undercounted. The design of the TUS as an add-on module of the Integrated Labor Force Survey (ILFS)[17] usefully provides the opportunity to draw links between gendered patterns of time use and other socio-economic characteristics contained in other parts of the labor survey.

How Women and Men in Tanzania Spend Their Time: An Overview

This section presents data on all the activities identified in the survey broken down by sex. Table 2.1 describes the average time spent per day by the entire female and male Tanzanian populations (aged 5 years and above) in the ten main activities, with the average calculated over the whole population, whether or not engaged in that activity.

Table 2.1 shows that patterns of time use between paid and unpaid work are highly gendered, confirming trends observed in many other countries. On average, women devote much more time to unpaid activities than men do. Female time in both household maintenance and care, for example, is three times as much as male time. Women and men spend a similar share of their day (about three hours) on primary agricultural work but men spend more time in other paid work then women. Men allocate more time to non-work activities such as social and cultural engagements and learning.

[15] The UN System of National Accounts (SNA) recognizes as productive work the following categories: employment for establishments; primary production activities not for establishments such as agriculture, animal husbandry, fishing, forestry, fetching of water and collection of fuel wood; services for income and other production of goods not for establishments such as food processing, trade, business and other services. Water and fuel collection have been included only since 1993 and are often still not included in measurement of GDP. Household maintenance, management and shopping for own household; care for children, the sick, the elderly and disabled; community services and help to other households are still considered "non-productive" activities and are not recorded. Some countries record these activities as separate "satellite accounts." It is these activities that most gender-aware literature calls non-SNA work or extended-SNA work.

[16] Additional information on the methodology, including a list of all activity codes, is provided in Annex F.

17 This is not typical of any TUS—time use surveys have been undertaken as stand-alone surveys in some cases and are not always drawing on nationally representative samples.

Table 2.1. Average time spent on activities in a day, by sex and main activity type.

	Broad activity type	Mean minutes per day			Percent of day		
		All	Female	Male	All	Female	Male
1	Employment for establishments	61.0	34.7	89.7	4.2	2.4	6.2
2	Primary production activities not for establishments	171.3	163.0	180.2	11.9	11.3	12.5
3	Services for income and other production of goods not for establishments	6.3	6.9	5.7	0.4	0.5	0.4
4	Household maintenance, management and shopping for own household	113.3	169.9	51.8	7.9	11.8	3.6
5	Care for children, the sick, elderly and disabled for own household	23.9	35.4	11.5	1.7	2.5	0.8
6	Community services and help to other households	8.0	7.2	8.9	0.6	0.5	0.6
7	Learning	80.8	75.1	86.9	5.6	5.2	6.0
8	Social and cultural activities	111.4	94.6	129.7	7.7	6.6	9.0
9	Mass media use	12.5	7.7	17.8	0.9	0.5	1.2
10	Personal care and self maintenance	851.5	845.7	857.8	59.1	58.7	59.6
	Total	1440.0	1440.0	1440.0	100.0	100.0	100.0

Source: Calculations from the 2006 Tanzania TUS.

Figure 2.1 illustrates shares of male and female time inputs into both SNA and non-SNA production.[18] Women in Tanzania contribute a larger share of total work time than men in a year (about 57 percent). The share of their contribution to non-SNA work time is especially significant (more than 76 percent of their total work time inputs).

[18] This is still for the whole population, aged 5 years or older.

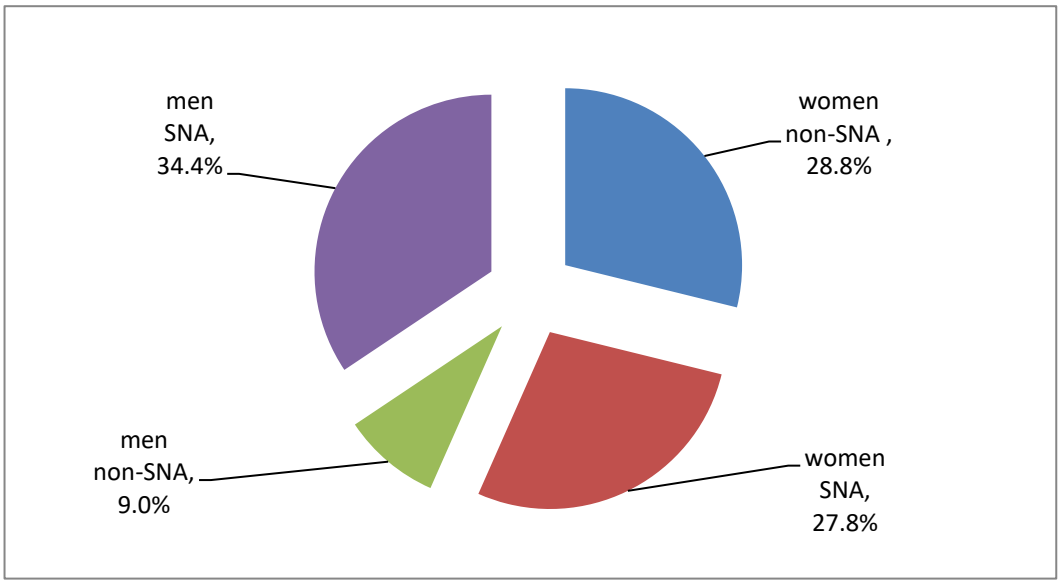

Figure 2.1. Female and male shares in total time inputs to SNA and non-SNA.

Source: Authors' calculations from the 2006 Tanzania TUS.

Figure 2.2 shows differences in time contributions to SNA and non-SNA work by location. As expected, people in rural areas contribute more than people in urban areas to non-SNA production (as well as to SNA production).

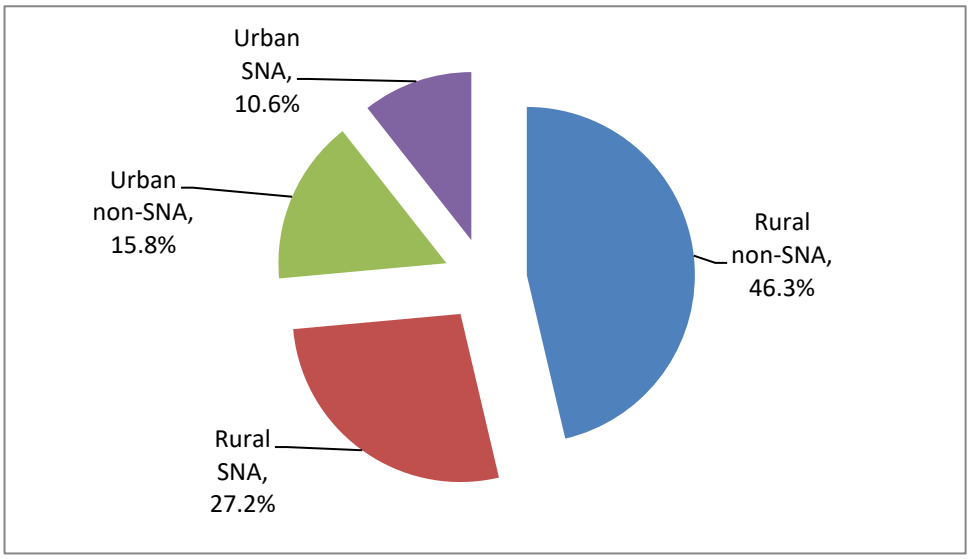

Figure 2.2. Rural and urban shares in total time inputs to SNA and non-SNA.

Source: Calculations from the 2006 Tanzania TUS.

Table 2.2 provides further breakdown of work activities (codes 1-6) to highlight the sub-categories that present most marked differences between women and men. Crop farming takes up the largest amount of time among productive activities (as conventionally classified by standard statistical systems), with no significant differences between women and men (about 72 minutes per day for women compared to 76 minutes for men). Men spend on average more time than women in most other paid

activities. It should be noted, however, that crop farming is not always a paid activity (in the sense that the person carrying out the work receives some monetary remuneration), as it includes agriculture for home consumption. Women, and girls, in particular, are likely to be involved in this work.

Travel time related to primary production seems to be quite high for both women and men (more than 45 minutes per day) while travel time related to other activities is significantly smaller, but usually greater for men than for women.

Table 2.2. Average time spent on disaggregated work activities in a day by sex.[19]

Activity	Mean minutes per day		
	All	Female	Male
(1) Employment for establishments			
Wage employment	23.6	10.5	37.9
Self-employment and home based work	17.9	12.9	23.4
Paid domestic and personal services produced by domestic work	9.7	5.8	14.0
Travel	9.1	5.2	13.4
Other	0.7	0.4	1.1
(2) Primary production activities not for establishments			
Crop farming	76.3	71.8	81.2
Tending animals and hunting	20.0	7.1	33.9
Collecting firewood or dung	6.2	7.7	4.6
Collecting and waiting to collect water	15.7	22.1	8.7
Travel	47.9	50.0	45.7
Other	5.2	4.3	6.1
(3) Services for income and other production of goods not for establishments	6.3	6.9	5.7
(4) Household maintenance, management and shopping for own household			
Activities related to food preparation	70.9	119.1	18.4
Cleaning house and care of clothes	19.9	28.3	10.8
Do it yourself	5.7	3.6	7.9
Chopping wood	2.8	3.7	1.8
Travel	8.9	9.7	8.1
Other	5.2	5.4	4.9
(5) Care for children, the sick, elderly and disabled for own household	23.9	35.4	11.5
(6) Community services and help to other households	8.0	7.2	8.9

Source: Calculations from the 2006 Tanzania TUS.

Women spend nearly three times as long as men (about 22 minutes per day) collecting water and caring for other family members (about 35 minutes per day).[20] Food preparation is by far the activity that shows most marked differences between women and men: while women and girls spend on average two hours per day cooking, men and boys devote only 18 minutes to this task.

[19] Refer to Annex F for a list of the aggregations carried out and corresponding activity codes.

[20] For a more detailed analysis of time spent on unpaid care in Tanzania please refer to the excellent report by Debbie Budlender ("The Political and Social Economy of Care: Tanzania Research Report 2." Geneva: The United Nations Research Institute for Social Development, 2008). Person care, especially child care, is frequently carried out at the same time as other tasks; hence the average figures in the Table 2.2, calculated using the 24 hours approach, might underestimate actual time and effort going into this activity.

The subsequent analysis will look in greater detail at the three activities of water collection, fuel collection and food preparation for adult men and women (population aged 15 years and above). A separate analysis looks at children (girls and boys between the age of 5 and 14 years). The analysis will zoom into some of the broad unpaid work categories and decompose the average time calculated over the entire population into: (a) participation rates (share of people actually undertaking the task in the total population) and (b) average duration among participants. The 24 hours approach has been used throughout the analysis (for further discussion of advantages and disadvantages of this approach please see Annex F).

Patterns of time use in water and fuel collection

Water collection

Water is essential for the well-being of women, men, and children. Water is important for people's health and is a key input into cooking, cleaning, nursing, and other domestic activities carried out mostly by women as part of their caring responsibilities. As shown in Table 2.3, women in Tanzania are more involved in water collection and spend more time on this task than men do: about 76 percent of all adult women collect water, compared with only 33 percent of men. The average time spent by women in this activity is about 30 minutes compared with 20 minutes for men.

Table 2.3. Participation rate, mean time among participants, and mean time among population by sex for adults.

	All	**Female**	**Male**
		Percentage (percent)	
Participation rate	55.4	75.6	32.9
		Absolute minutes per day	
Mean among participants	27.2	30.1	19.6
Mean among population	15.1	22.8	6.5

Source: Calculations from the 2006 Tanzania TUS.

Does location matter?

As shown in Table 2.4, women residing in rural areas are more likely to collect water (80 percent) than urban women (65 percent), but the share of urban women who fetch water is still significant. The average time spent by rural women is slightly longer (31 minutes) than the time spent by urban women (27 minutes) whereas men devote to the task the same time on average on a daily basis, regardless of where they live.

Table 2.4. Participation rate, mean time among participants, and mean time among population by sex and location.

	Adult females		**Adult males**	
	Rural	**Urban**	**Rural**	**Urban**
		Percentage (percent)		
Participation rate	79.6	65.4	34.1	29.7
		Absolute minutes per day		
Mean among participants	31.2	26.7	19.7	19.3
Mean among population	24.8	17.5	6.7	5.7

Source: Calculations from the 2006 Tanzania TUS.

This high level of participation in both rural and urban areas could be explained by the fact that water infrastructure in Tanzania is poor even in the urban areas. Data from the ILFS show that only 4.5 percent of all households have private tap water in their dwelling. About 30 percent of households use wells as their main source of water, while more than 24 percent of all households must collect water from springs, rivers, or lakes (authors' calculations from the 2006 ILFS). Urban households are usually located closer to the water sources than rural households.

Recent studies of urban areas in Tanzania draw attention to the presence of many squatters and unplanned settlements**,** a consequence of a rapid urban growth as a result of rural to urban migration. This growth is generally not accompanied by a parallel expansion of infrastructure and services (Muzzini and Lindeboom 2008). Rapid urbanization has increased pressure on the already overstrained and poorly maintained urban infrastructure and services, and it has been reported that people are on average spending more time fetching water than in the 1990s (Arvidson and Nordstrom 2006).

Does the income level matter?

Water collection takes more time and effort for adults in poorer households. Table 2.5 shows that 79 percent of women and 36 percent of men from households with a monthly cash income of less than TShs. 50,000 collect water, compared with only 63 percent of women and 27 percent of men in households with incomes greater than TShs. 100,000. When looking at households at the very top decile of the income distribution (more than TShs. 1,000,000), the proportion of women and men engaged in water collection drops further (60 percent for women; only 5 percent for men).

Table 2.5. Participation rate, mean time among participants, and mean time among population by sex and household income.

	Adult females			**Adult males**		
	Y <50,000	**50,000≤Y ≤99,000**	**Y 100,000**	**Y <50,000**	**50,000≤Y ≤99,000**	**Y >100,000**
	Percentage (percent)					
Participation rate	79.0	76.7	63.5	35.9	31.6	26.6
	Absolute minutes per day					
Mean among participants	30.6	30.1	28.2	21.0	17.9	17.8
Mean among population	24.2	23.1	17.9	7.5	5.7	4.7

Source: Calculations from the 2006 Tanzania TUS.

Does headship matter?

Table 2.6 shows an interesting pattern in water collection as related to the sex of the household head. The share of women who have to collect water in male-headed households (about 78 percent) is higher than the share of women who collect water in female-headed households (71 percent). The task takes longer in the former households (about 31 minutes for women in male-headed households compared with 28 minutes for women in female-headed households). Men are more likely to collect water in female-headed households (about 48 percent) than in male-headed households (about 31 percent). To understand better the reasons for these patterns, a more in-depth analysis of each of these two household categories' characteristics would be required.

Table 2.6. Participation rate, mean time among participants, and mean time among population by sex and headship.

	Adult females		Adult males	
	Female Head	**Male Head**	**Female Head**	**Male Head**
	Percentage (percent)			
Participation rate	71.1	77.7	47.9	30.9
	Absolute minutes per day			
Mean among participants	27.6	31.2	19.3	19.7
Mean among population	19.6	24.2	9.2	6.1

Source: Calculations from the 2006 Tanzania TUS.

Does the presence of young children matter?

Participation rates in water collection are usually higher for those women who live in households with small children (below 7 years old). But for men the opposite pattern is true: about 37 percent of adult men in households without young children collect water compared to only 30 percent of adult men living in households with young children (Table 2.7). We will see in subsequent sections that a similar pattern seems to emerge in most of the other unpaid activities later analyzed in this paper: men do less unpaid work if they belong to household with young children, a fact for which we have not found yet any plausible explanation. As always, we would probably need to look into other characteristics of these two household groups to understand better.[21]

Table 2.7. Participation rate, mean time among participants, and mean time among population by sex and presence of children in the household.[22]

	Adult females		Adult males	
	Presence of children	**No children**	**Presence of children**	**No children**
	Percentage (percent)			
Participation rate	77.6	72.0	30.5	36.7
	Absolute minutes per day			
Mean among participants	31.0	28.3	20.3	18.7
Mean among population	24.0	20.4	6.2	6.9

Source: Calculations from the 2006 Tanzania TUS.

The presence of young children in a household may increase the need for water required for cleaning and care. Both young as well as older children are not only users of water but also providers of water, as they often contribute to its collection. Children's participation in water collection is high: about 72 percent of girls and 60 percent of boys fetch water. This compares with 76 percent and 33 percent respectively for adult women and men. Gender differences among children are not as pronounced as they are among adults: boys participate more than men in this activity. The average time spent on this task is similar between girls and women and between boys and men. The data are reported in Table 2.8.

As noted for the adult population, children's participation in fetching water is also higher in rural areas, but the average time required is slightly higher in urban areas than in rural areas (Table 2.9).

[21] Households with young children constitute about 58 percent of all households in the sample whereas households without young children are about 42 percent.
[22] We considered children all those aged below 7 years old.

Table 2.8. Participation rate, mean time among participants, and mean time among population by sex for children.

	All	Girls	Boys
		Percentage (percent)	
Participation rate	66.0	72.0	59.7
		Absolute minutes per day	
Mean among participants	25.9	28.4	22.8
Mean among population	17.1	20.5	13.6

Source: Calculations from the 2006 Tanzania TUS.

Table 2.9. Participation rate, mean time among participants, and mean time among population by sex and location.

	Girls		Boys	
	Rural	Urban	Rural	Urban
		Percentage (percent)		
Participation rate	75.0	62.5	61.1	54.2
		Absolute minutes per day		
Mean among participants	28.0	29.9	22.2	25.7
Mean among population	21.0	18.7	13.6	13.9

Source: Calculations from the 2006 Tanzania TUS.

As shown in Table 2.10, children in poorer households are more likely to be engaged in water collection than children in other households (about 76 percent of girls and 63 percent for boys). Still many children must perform this task even in better-off households (60 percent of girls and 45 percent of boys in households with average monthly income above TShs. 100,000).

Table 2.10. Participation rate, mean time among participants, and mean time among population by sex and household income.

	Girls			Boys		
	Y<50,000	50,000≤ Y≤99,000	Y>100,000	Y<50,000	50,000≤ Y≤99,000	Y>100,000
			Percentage (percent)			
Participation rate	75.7	71.6	59.9	62.6	63.6	45.4
			Absolute minutes per day			
Mean among participants	29.4	27.6	25.9	23.4	21.3	23.3
Mean among population	22.2	19.8	15.5	14.7	13.5	10.6

Source: Calculations from the 2006 Tanzania TUS.

As described in Table 2.11, participation rates of boys are significantly higher in female-headed households (67 percent) than in male-headed households (about 58 percent). While participation rates of girls and boys are very similar in female-headed households (about 70 percent, very high, but suggesting a more equal sharing of tasks among children), the gap between them in male-headed households is significant (about 20 percentage points higher for girls).

Table 2.11. Participation rate, mean time among participants, and mean time among population by sex and headship.

Activity	Girls		Boys	
	Female head	Male head	Female head	Male head
	Percentage (percent)			
Participation rate	71.0	75.2	66.9	57.5
	Absolute minutes per day			
Mean among participants	28.0	29.6	22.5	23.0
Mean among population	19.9	22.2	15.0	13.2

Source: Calculations from the 2006 Tanzania TUS.

Who are the "overburdened"?

The tables presented in the previous sections helped to identify factors that may affect the distribution of the burden of collecting water between men and women, such as location and income levels. Only average figures have been presented thus far, either for the overall population or for the groups actually carrying out the activity. The dispersion around the average, however, should be noted. Figure 2.3 shows that the male distribution for water collection is more skewed than the female distribution. There is a much larger share of men who do not collect water at all relative to women, and a much smaller share of men who spend above average time collecting it. Some of the people who are involved in the collection of water spend much more than the average 27 minutes on the task. About 7 percent of the total female adult population spends more than 60 minutes collecting water while the corresponding share for men is only about 2 percent. Most of the people spending above two hours per day (more than 120 minutes) collecting water are women.

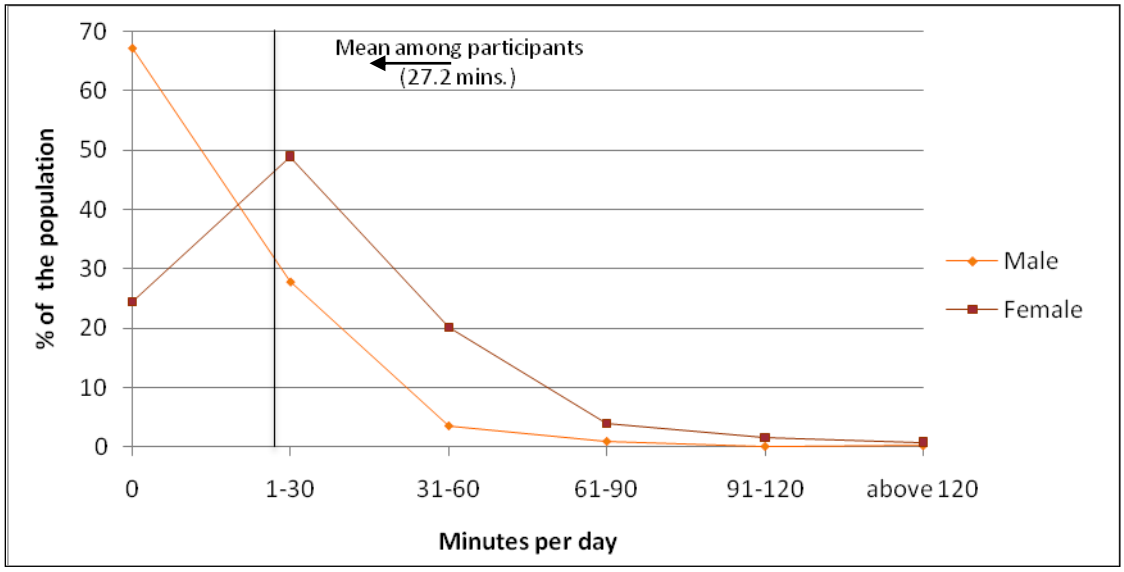

Figure 2.3. Distribution of female and male population collecting water by duration

Source: Calculations from the 2006 Tanzania TUS.

To understand more clearly the socio-economic characteristics of those people who are especially burdened by the task of water collection, a "time poverty line" was arbitrarily set for this analysis as being equal to the "average duration among participants," in order to provide a point of reference. Those groups

whose time use in a particular activity exceeds the average duration (thereby placing them above this time poverty line) are then classified as "the overburdened." "Being overburdened" is therefore defined with respect to one particular activity only, i.e., water collection. People's overall time burdens, or the correlation between their involvement in multiple activities were not considered here, but certainly present an avenue for further analysis.[23]

How many are the overburdened?

The overall mean time spent on water collection among participants is 27 minutes per day. About 36 percent of those collecting water are "time poor" or "overburdened." As illustrated in Table 2.12, about 85 percent of the overburdened are women and over three-quarters of them live in rural areas. As noted earlier, although many urban households need to collect water, they are usually located closer to the source than are rural households. Only 4 percent of the overburdened are urban men.

Table 2.12. Overburdened adult population by geographic location and sex.

Geographic location	Above average		
	Female Adults	Male Adults	Total
Urban area	17.0	4.1	21.1
Rural area	67.7	11.2	78.9
Total	84.7	15.3	100

Source: Calculations from the 2006 Tanzania TUS.

How many of the overburdened are poor?

More than 60 percent of the overburdened belong to households with a monthly average income below TShs. 50,000, and the vast majority of the people who are both income poor and time poor are women (about 85 percent) (Table 2.13).

Table 2.13. Overburdened adult population by income level and sex.

Household income	Above average		
	Female adults	Male Adults	Total
Y<50,000	51.2	8.9	60.0
50,000≤Y≤99,000	22.2	4.4	26.6
Y≥100,000	11.2	2.1	13.4
Total	84.6	15.4	100

Source: Calculations from the 2006 Tanzania TUS.

Men and women working in "subsistence farming" ("own *shamba* (field)") represent a significant share of the Tanzanian adult population (around 57 percent, of which around 31 percent are women and 26 percent are men). Of the sub-sample of the adult population who spend above average time in water collection, about 47 percent of them are female subsistence farmers, making this group overrepresented among the overburdened. Women who live in locations with no access to markets or shops (a good proxy for generally poor infrastructure) are also overrepresented among the overburdened relative to their percentage in the total population.

[23] This analysis is for the adult population only but a further examination of the data suggests that a significant proportion of children are overburdened (according to our definition).

In sum, the analysis of the burden of water collection in Tanzania suggests that this is indeed a very strenuous and time-consuming activity, especially for women and children living in low-income households. This is largely the reflection of an extremely poor water infrastructure system. In light of these facts, the recent Government's proposal to reduce the budget for water by a significant amount (to 3 percent of the total 2008-2009 budget) is rather worrisome.[24]

Fuel collection

Fuelwood is one of the main sources of energy in many Tanzanian households, in particular in rural areas. It is used mostly to cook meals, but also to provide warmth and lighting when needed. Almost three-quarters of Tanzanian households (70 percent) use firewood as their main source of energy for cooking. Charcoal is the second most used source of energy. Firewood is mostly used in rural areas, whereas charcoal is more frequently used in urban areas. Less than one percent of all households use electricity for cooking and these are almost entirely in cities (ILFS 2006). The great majority of households does not use any heating source, but among those that do, 13 percent of those household use firewood. Firewood is less used for lighting (by only about 2 percent of all households) while kerosene is the most widely employed source (more than 80 percent of all households use it). Those households which use electricity for lighting (about 14 percent of all households) mostly reside in urban areas.

As shown in Table 2.14, and as was also the case for water collection, women in Tanzania are more involved in fetching fuelwood than men. Participation rates of both men and women, however, are lower than those for water collection. Only 39 of all adult women (compared with 76 percent for water collection) and 17 percent of men (compared with 33 percent for water collection) collect fuel. The average time spent by women in this activity is about 22 minutes compared with 29 minutes for men in contrast to water collection, where women spend on average ten minutes more than men.

Table 2.14. Participation rate, mean time among participants, and mean time among population by sex for adults.

	All	Female	Male
		Percentage (percent)	
Participation rate	28.6	38.9	17.1
		Absolute minutes per day	
Mean among participants	24.3	22.5	28.8
Mean among population	6.9	8.8	4.9

Source: Calculations from the 2006 Tanzania TUS.

Does location matter?

Table 2.15 confirms the pattern outlined earlier in the section: that the need for fuelwood is much higher in rural areas, where about 50 percent of women and 21 percent of men spend on average more than 20 minutes every day collecting it. Participation rates are only 9 percent and 8 percent respectively in the urban areas. This is a more marked difference between rural and urban areas than the one observed for water collection.

[24] The Tanzania 2008-2009 Budget Speech is available at: http://www.parliament.go.tz/bunge/docs/budget08_Eng.pdf. Details on the criticisms it has generated, especially from the Tanzania Gender Networking Programme (TGNP) can be found at http://www.tgnp.org/downloads/2008-2009percent20Budgetpercent20Review.pdf

Table 2.15. Participation rate, mean time among participants, and mean time among population by sex and location.

	Adult females		Adult males	
	Rural	**Urban**	**Rural**	**Urban**
	Percentage (percent)			
Participation rate	50.4	9.5	20.6	8.3
	Absolute minutes per day			
Mean among participants	22.4	23.3	29.1	26.8
Mean among population	11.3	2.2	6.0	2.2

Source: Calculations from the 2006 Tanzania TUS.

Does the income level matter?

Similar to the findings on water collection, fuel collection is more commonly undertaken by both women and men from poorer households. Table 2.16 shows 47 percent of women and 22 percent of men from households with monthly cash income of less than TShs. 50,000 collect fuel, compared with only 22 percent of women and 9 percent of men in households with income greater than TShs. 100,000. At the top decile of the income distribution (greater than TShs. 1,000,000) the proportion of women (4 percent) and men (0 percent) engaged in fuel collection drops much further. These patterns confirm that the time burden of unpaid work is heavier for the income poor and support other studies that find a correlation between time poverty and income poverty.

Table 2.16. Participation rate, mean time among participants, and mean time among population by sex and household income.

	Adult females			Adult males		
	Y<50,000	**50,000≤Y≤ 99,000**	**Y>100,000**	**Y<50,000**	**50,000≤Y≤ 99,000**	**Y>100,000**
	Percentage (percent)					
Participation rate	47.0	33.6	21.6	22.4	13.2	8.9
	Absolute minutes per day					
Mean among participants	23.0	22.4	19.2	27.8	31.2	29.8
Mean among population	10.8	7.5	4.2	6.2	4.1	2.6

Source: Calculations from the 2006 Tanzania TUS.

Does headship matter?

Table 2.17 shows that even with regards to fuel collection, female participation rates in male-headed households (40 percent) are higher than female rates in female-headed households (36 percent). For male participation rates the opposite holds (21 percent of men collects fuel in female-headed households compared with 17 percent in male-headed households). The differences between the two household types are small.

Table 2.17. Participation rate, mean time among participants, and mean time among population by sex and headship.

	Adult females		Adult males	
	Female Head	**Male Head**	**Female Head**	**Male Head**
	Percentage (percent)			
Participation rate	36.4	40.1	20.9	16.6
	Absolute minutes per day			
Mean among participants	22.4	22.5	27.2	29.1
Mean among population	8.2	9.0	5.7	4.8

Source: Calculations from the 2006 Tanzania TUS.

Does the presence of young children matter?

The presence of children younger than 7 years seems to increase the average time spent by men (32 minutes a day compared to 24 minutes in households without young children), but not their participation rates. As for women, both their participation rates and the duration of their task are slightly higher when young children are present, as shown in Table 2.18.

Table 2.18. Participation rate, mean time among participants, and mean time among population by sex and presence of children in the household.

	Adult females		Adult males	
	Presence of children	**No children**	**Presence of children**	**No children**
	Percentage (percent)			
Participation rate	40.4	36.2	16.1	18.7
	Absolute minutes per day			
Mean among participants	23.4	20.7	32.1	24.2
Mean among population	9.4	7.5	5.2	4.5

Source: Calculations from the 2006 Tanzania TUS.

Children's contribution to fuel collection

Our findings show that about 25 percent of girls and 18 percent of boys collect fuel. This compares with 39 percent and 17 percent respectively for adult women and men. There seems to be no difference in participation rates between adult and young men. Children's participation in water collection was 72 percent and 60 percent, for girls and boys respectively. Evidently, more children are involved in collecting water than in collecting firewood. Their average daily time spent fetching wood is about 20 minutes.

From the data, we also see that participation rates among children are much higher in rural areas than in urban areas. Thirty-one percent of girls collect fuel in rural areas, compared with only 6 percent in the cities. The percentages are 21 percent and 6 percent respectively for boys. Female children spend more time collecting firewood in rural areas whereas male children spend more time collecting firewood in urban areas, contrasting with the observations among the adult population.

The Tanzania time use data also show that children in poorer households are more likely to be engaged in fuel collection than children in households with average monthly incomes above TShs.

100,000. From these data we also see that a higher number of both girls and boys participate in fuel collection if they live in male-headed households. They spend more time on this activity, however, if they belong to female-headed households. The difference in participation between the two household types is more marked for girls while the difference in duration is more marked for boys. These patterns differ from the patterns we observed for water collection, where girls' participation rates were higher in male-headed households but boys' rates were higher in female-headed households.

How many are the overburdened?

Figure 2.4 shows a contrasting pattern than that observed for water collection. Because the share in the population of both women and men who collect fuel is smaller than the share that does not, the distributions for both male and female firewood collection decline smoothly from left to right. Similarly to the patterns for water collection (Figure 2.3), the female distribution lies above the male distribution, representing their higher participation and duration. About 34 percent of those collecting fuel spend every day longer than the average time. Most of them are women. Very few in the population (1.6 percent of the male population and 1.8 percent of the female population) spend more than an hour per day on the task.

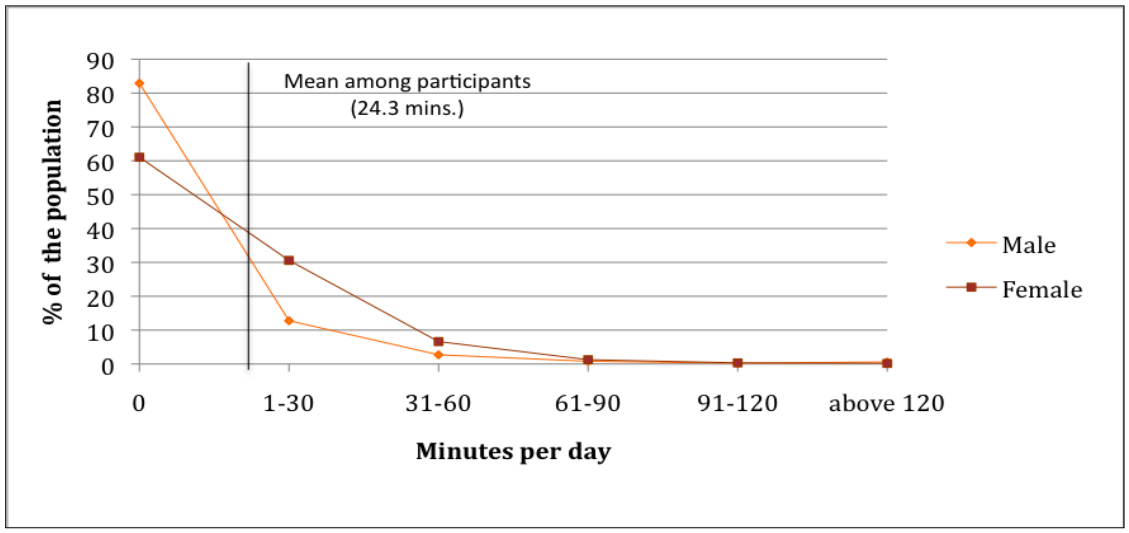

Figure 2.4. Distribution of female and male population collecting fuel by duration.

Source: Calculations from the 2006 Tanzania TUS.

Who are the "overburdened"?

The vast majority of the overburdened (90 percent) live in rural areas and more than 66 percent of them are rural women. Almost 70 percent of the overburdened belong to households with monthly incomes below TShs. 50,000, highlighting again that the burden of unpaid work falls especially on the most vulnerable and disadvantaged women.

Home maintenance

Food preparation

The activities of food preparation include grinding, cutting, heating water, cooking, setting tables, serving, and cleaning up after a meal. Healthy and carefully prepared meals are an essential part of good nutrition of children and adults, and contribute to their broader sense of well-being. Food preparation is the activity in which differences between women and men appear most marked. Table 2.19 shows that nearly all adult women (95 percent) devote a share of their average day to preparing food while only 35

percent of men do. The gap between women and men in duration is also striking: adult women prepare food an average 153 minutes per day while adult men spend 47 minutes on this task.

Table 2.19. Participation rate, mean time among participants, and mean time among population by sex for adults.

	All	Female	Male
		Percentage (percent)	
Participation rate	66.7	94.9	35.1
		Absolute minutes per day	
Mean among participants	126.4	152.6	47.4
Mean among population	84.3	144.8	16.6

Source: Calculations from the 2006 Tanzania TUS.

Does location matter?

As shown in Table 2.20, rates of participation in food preparation are higher in rural areas than in urban areas for both women and men, but the average duration of this task appears higher in urban areas. Both urban women and urban men spend at least 10 minutes longer than rural women and men preparing food and cooking. Further analysis could break down the activity of food preparation into its many components to identify which of the tasks take more time between rural and urban areas.

Table 2.20. Participation rate, mean time among participants, and mean time among population by sex and location.

	Adult females		Adult males	
	Rural	Urban	Rural	Urban
		Percentage (percent)		
Participation rate	95.9	92.2	36.8	31.0
		Absolute minutes per day		
Mean among participants	148.6	163.4	44.6	55.8
Mean among population	142.5	150.6	16.4	17.3

Source: Calculations from the 2006 Tanzania TUS.

Does the income level matter?

As illustrated in Table 2.21, the level of income does not seem to be an important determinant of time devoted to food preparation. It is worth noting, however, that in households with monthly income below TShs. 50,000 female participation rates are higher (96 percent compared with 92 percent in richer households) but the average duration time is slightly lower (150 minutes per day compared with 155 minutes) than in other households. As for men, both their participation rates and the average duration of their involvement are higher in poorer households, but still much lower than for the female members with similar levels of household income. When analyzing households at the very top decile of the income distribution, the proportion of women and men doing some cooking drops (80 percent for women and 5 percent for men). This household group however is only a small fraction of all households.

Table 2.21. Participation rate, mean time among participants and mean time among population by sex and household income.

	Adult females			Adult males		
	Y<50,000	50,000≤ Y≤99,000	Y>100,000	Y<50,000	50,000≤ Y≤99,000	Y>100,000
	Percentage (percent)					
Participation rate	95.6	95.2	92.3	37.9	32.5	31.6
	Absolute minutes per day					
Mean among participants	150.3	155.8	155.2	49.5	47.8	40.0
Mean among population	143.6	148.3	143.2	18.8	15.6	12.6

Source: Calculations from the 2006 Tanzania TUS.

Does headship matter?

Women in male-headed households spend about 30 minutes longer every day on food preparation than women in female-headed households (Table 2.22). There is only a slight difference between male-headed households and female-headed households in the time devoted by adult males to cooking, but male participation rates are higher in female-headed households than in male-headed ones (44 percent compared with 34 percent).

Table 2.22. Participation rate, mean time among participants, and mean time among population by sex and headship.

	Adult females		Adult males	
	Female Head	Male Head	Female Head	Male Head
	Percentage (percent)			
Participation rate	93.4	95.6	43.6	34.0
	Absolute minutes per day			
Mean among participants	134.4	160.9	50.0	47.0
Mean among population	125.6	153.8	21.8	16.0

Source: Calculations from the 2006 Tanzania TUS.

Does the presence of young children matter?

Consistent with the patterns observed for water and fuel collection, the presence of young children in the households seems to make female participation rate (slightly) higher and male participation rates (significantly) lower. This is shown in Table 2.23.

Table 2.23. Participation rate, mean time among participants, and mean time among population by sex and presence of children in the household.

	Adult females		Adult males	
	Presence of children	No children	Presence of children	No children
	Percentage (percent)			
Participation rate	95.0	94.7	30.7	42.3
	Absolute minutes per day			
Mean among participants	155.0	148.2	38.8	57.6
Mean among population	147.2	140.3	11.9	24.3

Source: Calculations from the 2006 Tanzania TUS.

Children's participation to food preparation

The data show that about 81 percent of girls and 57 percent of boys do help in food preparation. Girls' participation rates are lower than women's rates but boy's participation rates are higher than men's. Children spend on average on this task 40 minutes, which is significantly lower than for adults (84 minutes), shown in Table 2.24.

Table 2.24. Participation rate, mean time among participants, and mean time among population by sex and location.

	Girls		Boys	
	Rural	**Urban**	**Rural**	**Urban**
		Percentage (percent)		
Participation rate	80.9	79.3	57.3	57.9
		Absolute minutes per day		
Mean among participants	70.1	75.3	37.2	43.5
Mean among population	56.7	59.7	21.3	25.2

Source: Calculations from the 2006 Tanzania TUS.

Differences in participation patterns across income levels are more pronounced among girls than among adult women. The data show that, indeed, both girls and boys in low income households are more involved in food preparation and spend longer on this task than children in better off households (82 percent compared with 77 percent for girls, and 60 percent compared with 48 percent for boys). The data also show that girls in male-headed households have higher participation rates and spend more time on food preparation than girls in female-headed households. The opposite holds for boys who have higher participation rates and spend more time on food preparation in female-headed households.

How many are the overburdened?

In Figure 2.5, the shape of the female and male distributions are different from the previous ones in that the large majority of women and only a tiny proportion of men engages in cooking. Among women the distribution across duration levels is more even than in the previous distributions. The average time spent by participants is just above two hours per day (or 126 minutes). About 46 percent of the participants devote higher than average amounts of time to food preparation.

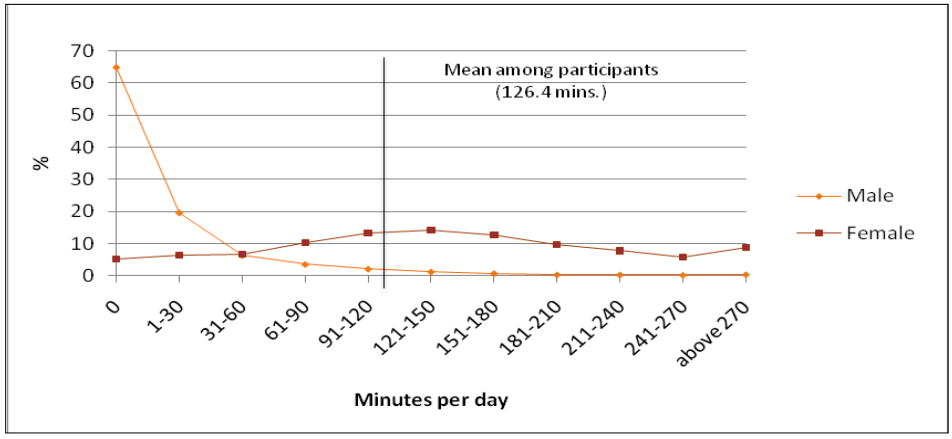

Figure 2.5. Distribution of female and male population preparing food by duration.

Source: Calculations from the 2006 Tanzania TUS.

Who are the "overburdened"?

Almost all the overburdened (95 percent) are women and about 70 percent of them live in rural areas. However, it is urban females who are the most overrepresented among the overburdened. They constitute about 20 percent of the population engaged in food preparation but more than 27 percent of the overburdened.

About 53 percent of the overburdened are women belonging to households with monthly income lower than TShs. 50,000. Women at this income level represent about 42 percent of the total population engaged in food preparation. Women in households with average monthly income between TShs. 50,000 and TShs. 99,000 constitute about 26 percent of the overburdened and 20 percent of the total population preparing food, while women in richer households constitute about 17 percent of the overburdened and 13 percent of the population preparing food.

Other household maintenance

Women tend to be more involved than men in other aspects of household maintenance as well, as shown in Table 2.25. About 86 percent of all adult women clean the house compared with only 42 percent of men. Women average of 37 minutes per day compared with 21 minutes for men. Women's involvement in chopping wood is also greater than men's, in terms of both participation and duration. "Do-it-yourself" (DIY) is the only activity to have a higher male participation. Nearly one-quarter of all men engage in DIY work for an average of 51 minutes per day; only 12 percent of all women report DIY activities, and they average 39 minutes per day.

Table 2.25. Participation rate, mean time among participants, and mean time among population by sex for adults.

	All	Female	Male
		Percentage (percent)	
Participation rates			
Cleaning house and care of clothes	65.3	86	42.2
Do it yourself	16.4	12	21.3
Chopping wood	17.6	25.5	9
Other	37.1	40.8	32.9
		Absolute minutes per day	
Mean among participants			
Cleaning house and care of clothes	32.7	37.3	22.2
Do it yourself	46.3	38.9	50.9
Chopping wood	17.4	17.4	17.4
Other	16.8	16.9	18
Mean among population			
Cleaning house and care of clothes	21.3	32.0	9.4
Do it yourself	7.6	4.6	10.9
Chopping wood	3.1	4.4	1.6
Other	6.2	6.5	5.9

Source: Calculations from the 2006 Tanzania TUS.

Table 2.26 shows that the proportion of adult men devoting time to cleaning is considerably higher in urban areas while there are not significant differences between women's patterns due to location. DIY activities are more frequent in rural areas, both for men and for women.

Table 2.26. Participation rate, mean time among participants, and mean time among population by sex and location.

	Adult females		Adult males	
	Rural	**Urban**	**Rural**	**Urban**
Participation rate		*Percentage (percent)*		
Cleaning house and care of clothes	85.1	88.2	38.9	50.5
Do it yourself	12.8	9.6	25.3	11.4
Chopping wood	28.1	18.6	10.4	5.1
Other	34.5	57.1	33.7	30.8
Mean among participants		*Absolute minutes per day*		
Cleaning house and care of clothes	33.1	47.6	19.5	27.3
Do it yourself	40.1	34.8	52.3	42.9
Chopping wood	17	18.9	18.3	12.5
Other	15	17.4	18.5	16.2
Mean among population		*Absolute minutes per day*		
Cleaning house and care of clothes	28.1	42.0	7.6	13.8
Do it yourself	5.1	3.3	13.2	4.9
Chopping wood	4.8	3.5	1.9	1.0
Other	5.2	10.0	6.2	5.0

Source: Calculations from the 2006 Tanzania TUS.

Table 2.27 suggests that the income level might not be an important explanatory factor for variations in time spent cleaning or repairing the house, although men living in high income households devote less time to DIY than men living in other households.

Table 2.27. Participation rate, mean time among participants and mean time among population by sex and household income.

	Adult females			Adult males		
	Y<50,000	**50,000 ≤Y≤99,000**	**Y>100,000**	**Y<50,000**	**50,000 ≤Y≤99,000**	**Y>100,000**
Participation rate			*Percentage (percent)*			
Cleaning house and care of clothes	85.4	88.0	84.9	40.7	45.0	42.0
Do it yourself	12.3	11.9	10.9	23.3	20.5	17.3
Chopping wood	28.3	22.6	20.7	11.3	7.6	4.6
Other	35.4	49.4	45.2	33.0	33.4	31.9
Mean among participants			*Absolute minutes per day*			
Cleaning house and care of clothes	32.6	42.7	43.5	21.0	22.0	25.6
Do it yourself	42.6	38.8	25.7	56.3	45.1	42.2
Chopping wood	16.1	18.5	20.7	18.4	12.6	22.5
Other	15.7	15.4	17.3	16.4	18.7	20.8
Mean among population			*Absolute minutes per day*			
Cleaning house and care of clothes	27.9	37.5	37.0	8.5	10.0	10.7
Do it yourself	5.2	4.6	2.8	13.1	9.2	7.3
Chopping wood	4.6	4.2	4.3	2.1	1.0	1.0
Other	5.6	7.6	7.8	5.4	6.2	6.6

Source: Calculations from the 2006 Tanzania TUS.

One of the most interesting patterns to be highlighted in Table 2.28 is that while women's participation rates in cleaning and the average duration of their task, are higher in male-headed households, men's participation in cleaning indicates a significantly higher participation in female-headed households (59 percent compared with 40 percent).

Table 2.28. Participation rate, mean time among participants and mean time among population by sex and headship.

	Adult females		Adult males	
	Female Head	Male Head	Female Head	Male Head
Participation rate	*Percentage (percent)*			
Cleaning house and care of clothes	83.6	87.1	59.1	40.0
Do it yourself	12.0	11.9	17.0	21.9
Chopping wood	22.3	26.9	10.3	8.8
Other	42.6	40.0	33.0	32.9
Mean among participants	*Absolute minutes per day*			
Cleaning house and care of clothes	34.0	38.7	23.5	21.9
Do it yourself	40.7	38.0	47.8	51.2
Chopping wood	17.6	17.3	13.5	17.9
Other	16.6	15.6	15.8	18.2
Mean among population	*Absolute minutes per day*			
Cleaning house and care of clothes	28.4	33.7	13.9	8.8
Do it yourself	4.9	4.5	8.1	11.2
Chopping wood	3.9	4.6	1.4	1.6
Other	7.1	6.2	5.2	6.0

Source: Calculations from the 2006 Tanzania TUS.

Patterns of travel

The study also examined women's and men's duration and patterns of travel. The analysis took into account three categories of travel related to work (both SNA and non-SNA) only::[25]

- Travel to formal sector work and non-agricultural informal sector work
- Travel to primary production activities
- Travel related to household management, care activities and community services.

Our main findings are that the vast majority of the population travels every day and that both women and men spend a lot of time going to work—an average of 85 minutes and 89 minutes per day for women and men respectively, as described in Table 2.29. However their reasons for travelling are different.

[25] See Annex F 3 for the aggregation of travel categories and corresponding activity codes.

Table 2.29. Travel related to SNA and non-SNA activities (aggregated).

	Participation rates *Percentage (percent)*		
	All	**Female**	**Male**
Formal and non-agricultural informal sector work	34.0	27.1	41.7
Primary production activities (not for establishments)	85.5	89.5	81.0
Household management, care activities and community services	92.2	97.9	85.8

Source: Calculations from the 2006 Tanzania TUS.

As the comparison between the two tables below suggests, most (but not all) people who participate in either non-agricultural work or primary production must travel, while people engaged in home management and care are less involved in activities associated with travel. Men travel on average 15 minutes longer than women when it is connected to non-agricultural work; women travel slightly longer than men for agricultural work. Travel related to agricultural work takes the longest (an average of 70 minutes per day for women and 67 minutes per day for men). Travel related to home management and care takes about 25 minutes per day for both men and women.

Table 2.30. Participation rate, mean time among participants, and mean time among population by sex for adults.

Travel related to	Participation rates			Mean among participants			Mean among population		
	Percentage (percent)			Absolute minutes per day			Absolute minutes per day		
	All	**Female**	**Male**	**All**	**Female**	**Male**	**All**	**Female**	**Male**
Formal and non-agricultural informal sector work	25.4	17.1	34.7	54.3	45.0	59.4	13.8	7.7	20.6
Primary production activities (not for establishments)	78.8	82.1	75.1	68.3	69.6	66.6	53.8	57.1	50.1
Household management, care activities and community services	53.5	57.8	48.7	24.7	24.1	25.5	13.2	14.0	12.4

Source: Calculations from the 2006 Tanzania TUS.

Both women and men spend more time travelling to non-agricultural work if they live in urban areas and more time travelling to agricultural work if they live in rural areas. Women appear to spend more time travelling for household and care activities in urban areas than in rural areas (an average of 29 minutes per day in urban areas compared with 21 minutes in rural areas).

Income levels seem to affect significantly the pattern of travel to paid work. Travel to non-agricultural work takes more time for both women and men living in households with monthly income above TShs. 100,000. For men, this time is close to 70 minutes and for women is about 50 minutes. Conversely, it is women and men living in the poorest households who spend more time travelling to primary production work, about 73 minutes per day, for both women and men. This is not at all surprising and simply reflects households' different activity profiles. It is also important to note that mode of travel (by public or private transport, or by foot) may vary greatly across locations as well as by sex. Women in rural areas with low incomes are more likely to walk than men.

For both men and women, time spent travelling for non-agricultural work is higher if they do not have young children but time spent travelling for agricultural work and for home management and care is slightly lower for families without young children.

There does not appear to be a strong correlation between the absence of public transports, and of market and hospital facilities, and the average time of travel, either for men or women. However there are differences among types of travel: e.g., the absence of public transport and other facilities seems to increase the average travel duration for primary production but not the travel duration for non-agricultural work and for home related activities. These patterns are rather unclear, and might be related to the mode of travel and deserve further analysis.

As a way of summarizing this brief and preliminary account of gender patterns in travel, Table 2.31 highlights the differences between men and women in the share of total travel time required by various activities according to the data. Men spend a much larger share of time in travel related to non-agricultural work, in total, although the majority of time is still spent in travel related to agricultural activities.

Table 2.31. Patterns of travel for men and women across various activities.

	Share of total travel time spent			
	Percentage (percent)			
	Female			Male
	All	Urban	Rural	All
Formal and non-agricultural informal sector work	8.5	25.7	3.8	20.4
Primary production activities (not for establishments)	74.3	42.8	82.8	65.0
Household management, care activities and community services	17.2	31.4	13.4	14.5

Source: Calculations from the 2006 Tanzania TUS.

When we look more closely at differences in travel patterns of women and consider whether they live in rural or urban areas, we see some interesting contrast and points of comparison. The most striking differences between urban and rural women is in the amount of time that is spent traveling for non-agricultural work – where urban women spend more than a quarter of their total travel time. For both urban and rural women, the amount of travel for activities related to agriculture is still sizable – although it may differ in dimensions that are not immediately apparent from these data summaries. Urban women also spend a larger share of travel time for activities related to domestic reproduction, household maintenance and community service.

Saving time

Earlier sections have vividly illustrated how large, and unequally distributed, the burden of unpaid work is in Tanzania. Differences and similarities in patterns across types of activity have also been shown. This paper concludes by undertaking a few basic calculations to estimate the gains that could be achieved by investing in infrastructure that reduces unpaid work, and targeting in particular those who spend above average time on it. These calculations are based on strong assumptions of how 'freed' time can be substituted by other (paid market) activities, and do not come from a formalized model of the household and how it interacts with the wider economy. Therefore, the reader should consider these results as being indicative of what the economic gains to reducing the time burdens on women could be, and should take away the qualitative aspects of what is being presented.

The time per year that would be saved, by women and men separately, was estimated assuming that there were improvements in infrastructure so that all those involved in water collection, fuel collection and food preparation would spend no longer per day on those tasks than the calculated current average, i.e., 27 minutes for water collection, 24 minutes for fuel collection, and 126 minutes food preparation. In other words, the overburdened would no longer exist!

The results are shown in Table 2.33. Millions of hours would be saved which could be spent in more productive work or could be simply devoted to more rest and recreation.

The exercise was extended by calculating the number of jobs that could be generated if all the freed up hours were converted into paid employment. This calculation assumes a working day of 7 hours for 250 days a year, and that job opportunities would be truly available to people seeking them. The results are shown in the second column of Table 2.32: more than half a million jobs could be generated for women from reducing water collection time; about 225,000 from reducing fuel collection; and above 4 million jobs from reducing food preparation time. In all cases, of course, the number of jobs created for women would be much higher than the number of jobs for men.

The third column of Table 2.32 shows the earnings that could be produced, assuming both women and men taking up these jobs would earn an hourly wage equal to the median hourly wage in the Tanzanian population for 2006: TShs. 346 for women and TShs. 385 for men (ILFS 2006). The resulting earnings from reducing food preparation time (and/or converting it into paid work) would thus be about 24 percent of the total cash earnings for 2006. The earnings from reducing water collection and fuel collection time would be about 4 percent and 2 percent of the total 2006 cash earnings respectively. Because most of these wages would accrue to women, the increase could significantly contribute not only to reducing poverty but also to redressing the gender gap in earnings and to increase women's visibility and decision making power, with positive consequences for all.

Table 2.32. Gains from unpaid-work-reducing infrastructure, by activity and sex.

	Hours saved in a year (million)	Potential Full-time jobs	Resulting earnings (TShs. million)
Water Collection			
Adult Women	1,128	644,655	390,338
Adult Men	212	120,897	81,454
Fuel Collection			
Adult Women	394	225,358	136,454
Adult Men	231	132,163	89,045
Adult Men	365	208,698	140,610
Food preparation			
Adult Women	8,034	4,590,742	2,779,694

Source: Calculations from the 2006 Tanzania TUS and ILFS.

Conclusions

The analysis carried out in this paper has shown a marked gender bias in most unpaid work undertaken in Tanzania. Women, and particularly women from low income groups and living in areas with limited facilities, spend long hours on water and fuel collection, food preparation and other domestic and care activities to compensate for poor infrastructure. Children, too, are heavily involved in unpaid work, girls more than boys, largely reproducing patterns found in the adult population. Patterns of time distribution vary across types of activity also depending on other household characteristics, such as the level of monthly income or the sex of the household head. Results showed for example that both adult men and boys tend to participate more in households managed by women, indicating a more even distribution of unpaid work among household members.

A wide range of activities were reviewed, but the focus was on water collection, fuel collection, and food preparation, which tend to take the "lion's share" of the unpaid work burden at the household

level. The problem of fuel collection affects mostly the countryside while high time burdens due to food preparation and water collection are found in both rural and urban areas. This lends weight to the arguments that some have made about the need for providing the rural poor with access to cleaner (and less time-consuming) sources of energy than traditional biomass sources, including possibilities such as biofuels in the form of gels or locally-produced liquids (like jatropha oil) to substitute for more expensive fossil alternatives like kerosene (Ewing and Msangi 2009). Using alternative cooking technologies that reduce the need for firewood collection (or the cost of its purchase) could also help reduce time burden, as has been documented in the case of South Africa (Wentzel and Pouris, 2007), among other examples. But such technologies are well-designed and adapted to the local food requirements, practical constraints of space and living patterns and are cost effective (Shäffler, 2006). There is also widespread recognition of access to clean water as a pre-requisite for human development at both the urban and rural levels (UNDP 2006), which underscores the urgency in relieving the time burdens that women bear in obtaining access to water, by expanding the coverage of clean water and sanitation facilities. Access to clean water and sanitation has strong linkages to malnutrition, which is also an important component of human development that policy has to consider along with the loss of productivity to the economy when workers are made ill by waterborne diseases that could be avoided through improved water and sanitation facilities. Given that women also bear the burden for caring for those household members who are ill the lack of water access presents a "double-whammy" effect on women's time, both in terms of compensating for its absence and dealing with its human consequences at the household level.

Our findings are the result of a preliminary exploration of the available time use data to make the hidden, unpaid work of many Tanzanian women more visible to those who would not otherwise appreciate its magnitude from looking at data within the system of national accounts (SNA). While the recognition of women's unpaid work is the first step towards understanding its significance within the market and household economy, policy-driven efforts to reduce and redistribute the burden of such work should follow. Further analysis to assess more precisely the circumstances of people who carry heavy burdens of unpaid work and to identify their needs (and those of the communities where they live) must be undertaken, and requires the widespread deployment of well-designed survey instruments at the household-level to obtain nationally-representative data that describes time use across a variety of activities and socio-economic strata. Such analysis is urgently required to identify priority areas for infrastructure investment so that adequate prioritization can be given to the provision of water, energy and access to roads, among a number of other rural and urban social services.

Time use analysis can strengthen the quantitative and qualitative analysis that is needed to design better pro-poor and pro-women policies and investments in key sectors such as agriculture modernization and commercialization, infrastructure, and employment. It can provide the analyst with a solid basis on which to evaluate the tradeoffs and gains that households are likely to encounter when they are faced with a shift in their socio-economic environment. While it was beyond the scope of this study on Tanzania, a gender-aware model that incorporates time use data could be constructed along the lines of Fontana and Wood (2000), to quantify the effects of policy driven interventions and investments, so as to evaluate the relative net benefits embodied within alternative policy scenarios. The advantage of using an economywide modeling framework, which is enhanced with greater sex-disaggregation, is that one can also see the multiplier effects that come from freeing up time in one activity, and allowing it to be applied productively to other activities and sectors. The resulting activities have the potential of increasing household income and expenditure, as well as having the productivity-enhancing effect of releasing additional labor to other sectors. Such a tool, in the hands of an analyst who is well-trained in the interpretation of models with macro-to-micro linkages, can provide guidance in prioritizing sectoral allocation of public expenditures to ensure gender-equitable outcomes and improved levels of human welfare and development.

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Understanding How Gender Relations Shape Outcomes of Conditional Cash Transfer (CCT) Programs: Findings from Bangladesh and Turkey on Gender-Focused Investments and Policy Reforms in Education

By Michelle Adato and Shelley Feldman with Zhenya Karelina

Abstract

Despite the existence of government funded incentives to increase female school enrollment, gender gaps in education still persist. To understand the constraints towards increasing female education, this study analyzes the reception and outcomes of one of the main policy instruments that governments use to increase female school enrollment: conditional cash transfer (CCT) programs. The data used for this study are from two impact evaluations of CCT programs in Bangladesh and Turkey. Qualitative data collected from interviews and focus groups reveal that CCT programs can provide a direct economic benefit if the willingness to send girls to school exists *a priori*; but achieving that willingness is itself a complex process that considers both economic and other factors. Schooling demand is an outgrowth of straightforward economic conditions such as poverty, levels of school expenses, and cash availability, but is also affected by social concerns about autonomy, sexuality, reputation, honor, and authority, sometimes independently. Supply-side constraints posed by the school system include the poor quality of teachers, the distance of schools, particularly secondary schools, from girls' rural communities, the fear of distance travel to school because of parental concerns for girls' reputation and honor, and the limited number of female teachers to serve as role models for girls and their family. In response to these constraints, policy makers have complemented CCT programs by improving the number and location of schools, solving transportation problems, and making school environments safer. In addition, implementing CCTs can successfully alleviate financial constraints for sending girls to school. Socially motivated concerns about girls schooling, however, require changing perceptions of the value of educating women. This study finds that efforts by the Turkish Government and NGOs to promote girls' education through public outreach campaigns were positive, feasible approaches, though not part of the CCT program. CCT programs that do organize women in these ways, provide training, and promote a discourse around women's importance and rights had important impacts. They should be prioritized in program designs, taking into account cultural contexts.

Introduction

Gender differences in primary and secondary school enrollment are common in many developing countries and there is evidence to suggest that such differences hinder the human capital development of girls and households, labor market participation and returns to labor, transmission of poverty across generations, and economic growth. The recognition of these differences has led to government and donor investment in policies and programs that promote girls' education, particularly in countries that have high rates of poverty and illiteracy for women.

Conditional cash transfer programs (CCTs) are one of the main policy instruments that governments are using to increase girls' education. CCTs are now found in over 25 countries—in almost every country in Latin America and seven countries in Asia. CCTs provide a cash transfer to poor households, conditioned on their willingness to invest in the human capital of their children. Though program designs vary, they typically include a small cash grant sometimes with a nutritional supplement and package of school supplies. Receipt is usually conditioned on 1) children's school enrollment and attendance in primary and/or secondary school; 2) attendance of pregnant and lactating women, infants, and children up to five years, and sometimes older children and adults, at preventative health care services; and sometimes 3) beneficiaries' attendance at regular health and nutrition training sessions. The cash is intended to assist poor households with food expenses and to reduce the need for children to work. Depending on the size of the grant and poverty level of receiving households, the funds are also used for

school expenses, clothing, and other household needs. The programs are expected to encourage investment in education, health, and nutrition, and enhance synergies between them, to increase households' chances to escape poverty traps. The program design builds on evidence that early childhood nutrition and health contribute to school readiness, attendance, and achievement, and ultimately, to greater adult earnings.[26]

Many CCT programs have undergone large-scale impact assessments, showing significant effects on school enrollment and attendance, including impacts on girls' education in several countries, despite continuing gaps in others (Schultz 2001, 2004; Behrman, Sengupta, and Todd 2000; Maluccio and Flores 2005; Ahmed et al. 2007; de Janvry, Finan, and Sadoulet 2006; Attanasio and Gomez 2004). Questions remain, however, about how and why CCTs work and their transferability from Latin America, where they have been most extensively developed, to new contexts in Asia. CCTs have relevance for Africa, too, where pilots are slowly emerging, and where the contextual factors influencing girls' enrollment are likely to display different forms.

This paper analyzes the conditions and constraints imposed by gender relations on program reception and outcomes in two countries, Bangladesh and Turkey. It seeks to explain the level of impact of CCT programs on girls' schooling indicators, whether there are specific constraints to increasing girls' school attendance and retention, and how those constraints can be overcome. These two country cases illuminate the context in which girls and their families consider their choices about girls' schooling, the changing expectations of girls and young women associated with increased education, the shifting national priorities and investments in girls' education, and what these factors suggest about opportunities for increasing girls' education. The paper explores the findings implications for improving program designs to achieve greater impact on girls' education.

Attention is focused on three interrelated themes: 1) the patterns of gender differences in both primary and secondary school attendance to identify intra-country and cross-country variation, 2) the role of social norms in shaping the willingness of parents to send girls to school, and 3) the shifts in national policy landscapes, including campaigns and policies to increase girls' attendance and labor market transitions that influence opportunities for girls. Data from Turkey and Bangladesh illustrate interactions among these three themes, the combination of which may result in different national or regional outcomes for their CCT programs. The focus is on asset-poor households and poor women. The research investigates how the members of these households negotiate for or against girls' education, how gender relations in households and communities shape program reception and success, and how aspects of program design and implementation facilitate asset building in the form of increasing girls' school enrollment and retention. The research also looks at what programs miss. This focus recognizes that enrollment rates are based not only on "supply constraints," i.e., the availability of education infrastructure, staff, and inputs, but also on "demand constraints" posed by the socio-cultural context, including perceptions of the value of education. This approach provides a more nuanced look at gender issues in CCT programs than is normally implied by the attention that CCTs (deservedly) receive as a mechanism to promote women's and girls' status. The analysis draws on historical and ethnographic materials, including exploration of discursive practices[27] and other non-financial dimensions of the CCT programs. While appreciating the increase in girls' school attendance since the early 1990s and the visible and significant impacts from CCTs, the paper concludes that the level of impact is influenced by the specific character of changing gender relations within each country, the availability of employment and

[26] See J. Behrman 2000; Grantham-McGregor et al. 2007; R. Martorell 1995; Pollitt et al. 1995; J. Hoddinott et al. 2008. See also M. Adato and Bassett 2008 for a review of the literature on these relationships.

[27] The term "discursive practice" emerged in the work of Michel Foucault in the early 1970s. It refers to the ways that cultural meanings are created and maintained through language and discourse. The approach of discursive practice asserts that social reality is shaped by our use of language, and that this is bound by specific contexts. The discourse itself is not simply the words, but the social action that creates and uses language, where the meaning is itself negotiated by social actors and not assumed to be contained solely within the language.

income generating opportunities to girls (particularly in rural communities) who have a primary or secondary education, and by the desire for education among school attendees and their families.

Typically, the literature on CCT programs and education focuses on quantitative studies of changes in enrollment, attendance, dropout rates, and child labor. Interpretation normally assumes that these impacts result from the financial incentive to send children to school. The cash transfers are assumed to reduce the opportunity costs of schooling, and increase the money available for school expenses. While these factors undoubtedly play a significant role, these studies do not explain the pathways of changes nor other non-economic factors that may be at work. "Gender bias" is often assumed where enrollment rates remain lower for girls than boys, but the process by which it operates is not explained. We need to know more about how gender bias works across regions and nations. As CCT programs move from Latin America to Asia and Africa, it will be crucial to understand the links between gender relations and other aspects of social and economic life to appropriately shape program implementation and impact. The limited research to date on gender issues in CCT programs comes from Latin America (see Adato and Roopnaraine forthcoming; Adato et al. 2000; Espinosa 2006; Maldonado, Nájera, and Segovia 2006; Rivera, Hernández, and Castro 2006). Research in Mexico and Nicaragua (Adato and Roopnaraine, forthcoming) find notable, if modest, impacts on "women's empowerment," based on their control of the cash transfer, and participation in collective activities and training. Women's status is also influenced by discourses, i.e., dominant cultural statements or institutionalized ways of thinking, that highlight the importance of women and girls and their centrality to the program. This discourse is shared not only among women and girls but also the men and boys in the community. The strongest gender discourse surrounds girls' education (see Adato and Roopnaraine, forthcoming). Colombia has among the more advanced CCT programs with formal collective structures and activities to engage women and increase their capacities (Combariza 2006). In El Salvador, an elaborate system of training on women's rights, domestic violence, women's and couple's health, and other areas, coupled with innovative teaching methods, have made a significant contribution to women's confidence and self-image (Adato et al. 2009). In Latin America, gender biases in education exist—especially at secondary school—however, in many countries the national enrollment rates are similar, and in some cases higher for girls, although the picture looks different when one disaggregates by class and ethnicity. Some Latin American CCTs, such as Mexico's PROGRESA/Oportunidades, benefit girls more than boys, with an increasing benefit to girls as they get older and would otherwise be more likely to drop out. In Mexico the CCT was found to have the largest impact at the crucial year when girls make the transition from primary to secondary school (Schultz 2001, 2004).

Bangladesh CCTs, in contrast to those in Latin America, do not offer health components and instead target girls' schooling exclusively. The Female Secondary School Stipend Program (FSSP) begun in the early 1990s provides stipends for girls with the proviso that they maintain a minimum 75 percent attendance rate, score at least 45 percent in annual school exams, and either stay unmarried until they either sit for the Secondary School Certificate (SSC) or turn 18 years old. In 1993, the Government of Bangladesh also launched an innovative (for its time) Food for Education (FFE) program that provided a monthly ration of rice or wheat to poor families whose children attended primary school. The goals of this program include increasing primary school enrollment, promoting attendance, reducing dropout rates, and enhancing the quality of education.

Turkey's CCT program, formerly part of the Social Risk Mitigation Program (SRMP) includes some basic health components. While the program clearly aims to increase boys' schooling, government officials also refer to girls' schooling as a high priority, consistent with their broader policy objectives. Both countries have had increasing girls' schooling high on the policy agenda long before they introduced CCTs, and so it is expected that CCTs would primarily serve to promote this objective. This paper will show, however, that in certain regions in Turkey, while the CCT did realize some of its intended objectives, including impacts on girls' education, the conditions of program reception were different

between regions: national outcomes differ from those in rural communities in the more remote, poor, and socially conservative provinces.

Despite similarities, the Bangladesh responses to the CCT tell a different story, linked to its different socio-cultural, political, and economic contexts. Each country is assumed to represent a conservative, gender-biased context, characterized by a particular understanding of gender difference and presumptions of women's appropriate place and behavior. Despite similar cultural and even religious heritages, Islam plays out differently, with different outcomes, in these two countries. The comparison of Turkey and Bangladesh reveals the complexity and differentiation within cultural settings that has important implications for interpretation of the potential of and constraints on CCTs as they cross the globe.

Methods and Data

To explore these issues and highlight areas for future research, we draw on primary and secondary data from the International Food Policy Research Institute (IFPRI) as well as other sources, particularly on government and non-governmental investments in girls' education. Many of these are qualitative studies using a mix of sociological and anthropological methods. We add a historical component to identify the changing government commitments to education, and how specific cash transfer programs feature in these commitments. We also look at the reorganization of the labor market to assess its significance for understanding people's assessments of the opportunities to be garnered from increasing education (Feldman 1998). These findings are contrasted with those from Latin America, to understand the institutional contexts and cultural mores that hinder or enable program success in Bangladesh and Turkey.

The analysis is based primarily on two studies of CCT programs, in Bangladesh and Turkey (for the full study results see Ahmed et al. 2004; Sharmeen n.d.; and Adato et al. 2007). Both studies involved large-scale quantitative surveys as well as qualitative research. This paper draws on the data collected using the two sets of methods, but with a stronger emphasis on the qualitative research that was better at exploring the gender issues at focus in this study.

The Bangladesh study was of the Primary Education Stipend Program (PESP) and the Female Secondary School Assistance Project (FSSAP). The PESP, introduced by the government of Bangladesh in 2002, operated in all of the 4,463 unions in rural Bangladesh, and was available to students in rural Bangladesh, enrolled in government, non-government, community, satellite, NGO-run schools, and *ebtedayee madrasahs*. The children of the following five groups were eligible: 1) landless or near-landless households that own half an acre of land or less; 2) day laborers; 3) female-headed households; 4) households that earn their living from low-income professions; or 5) sharecroppers.

Families received a monthly stipend of Taka (Tk) 100 ($1.72 in 2003) for a single child and Tk 125 ($2.16) for more than one child enrolled in primary school. Children had to attend 85 percent of their classes and attain at least a 50 percent mark on annual examinations. Schools had to qualify for continued participation with 60 percent attendance, and 10 percent of students sitting for the primary scholarship exam. Parents or legal guardians (with an explicit preference for mothers) collected stipends with PESP bank-issued identification cards.

The FSSAP targeted girls in secondary schools, grades 6-10, and implemented in 119 *upazilas* of rural Bangladesh. A stipend was provided to each beneficiary[28] and the relevant stipends were deposited directly into the savings account of beneficiary girls. The program further subsidized tuition costs with. Students must attain 75 percent attendance, receive 45 percent on annual exams, and remain unmarried.

Qualitative and quantitative methods were both used in 2003 to gather information on various topics, including: family, community, and teachers' perceptions and understandings of the programs; the value and effects of the programs for girls and boys; parental and community attitudes towards girls'

[28] Tk 300 ($5.17) for grade 6, Tk 360 ($6.21) for grade 7, Tk 420 ($7.24) for grade 8, and Tk 720 ($12.41) for grades 9 and 10.

education; parental and community views of the quality/relevance of schooling for boys and girls; and the view of the school managing committee on the programs. A total of 5,850 households were surveyed in a village census, 500 households in a household survey, and 85 schools (48 primary and 37 secondary schools) in a school survey. The qualitative methods used focus group discussions, semi-structured interviews, key informant interviews, informal discussions with community members, and case studies of beneficiaries. Forty focus groups were held, and students, parents, teachers, and key informants (head teachers, *upazila* education officers, and upazila project officers) were asked parallel questions. The qualitative research was conducted in 8 of the 20 districts randomly selected for quantitative research: Gazipur, Mymensingh, Barisal, Chittagong, Habiganj, Pabna, Kurigram and Meherpur.

The study in Turkey was on the CCT program that was part of the government's Social Risk Mitigation Project (SRP). The program aims to improve education, through increasing enrollment and attendance and decreasing dropout rates, and health, through increasing immunization coverage and usage of health facilities. It is a national program targeted at the poorest 6 percent of the population, with benefits for families with children 0-6, school-age children 6-17, and women of childbearing age. The education support program required 80 percent school attendance and no more than one repetition of a grade level. To receive health support, children must attend regular check-ups based on age, and pregnant women must attend prenatal checkups, give birth in a hospital, and attend post-natal checkups. The amount of the stipend for education support differed for boys and for girls and by level of schooling.[29]

The program evaluation was conducted from 2005-2006. The quantitative research, conducted in 52 districts in 26 provinces, included a cross-sectional household survey of 2,905 households, and a two-round panel survey of 750 households. The qualitative research took place in 6 districts (rural and urban) in 3 provinces: Van and Diyarbakir provinces in the eastern and southeastern regions, and Samsun in the Black Sea region in the north.[30] Topics included: program communications; targeting; attitudes toward education and constraints on schooling; health and nutrition practices; the pregnancy benefit, use of the grants, women's status and gender relations. The main methods were household case studies, using ethnographic techniques, as well as key informant interviews and focus group discussions. In total, the research included data from 87 households and 33 key informants.

Conditional Cash Transfers (CCTs) and Development as a Social Project

Over the past decade CCTs have been hailed as a "magic bullet" for poverty reduction.[31] The popularity of transfer programs and the design of conditionality reflect five critical themes that characterize current debates about development. First is the recognition that growth alone is insufficient for poverty reduction, and that—rather than seeing a trade-off between equity and efficiency, or between expenditures on social protection or expenditures on other growth-promoting investments—safety nets and social protection programs can actually contribute to growth. This is because 1) these programs mitigate the effects of temporary shocks that may otherwise have long-term social and economic consequences; 2) investments in human capital increase productivity; and 3) uninsured risks and unaddressed inequalities have long-term costs (Morely and Coady 2003; de la Briere and Rawlings 2006).

The second theme is the shift away from safety nets as short-term responses to shocks to prevent destitution, asset depletion, and poverty traps, or those that provide ongoing cash or food support for the chronic poor, toward innovative program designs that serve not only these purposes but also contribute to a strategy of long-term development. New approaches to social protection programs attempt to build or

[29] In 2005 (with 2006 exchange rates) the stipends for boys were: 18.00 YTL ($13.80) for primary school and 28.00 YTL ($21.50) for secondary school; and for girls: 22.00 YTL ($16.90) for Girls' primary school and 39.00 YTL ($30) for secondary school.

[30] There was also an another qualitative component in 2005 using key informant interviews, rapid assessment techniques, and focus groups, in 15 provinces, and 87 localities. This paper draws on data from the later study, however, where there was a stronger focus on girls' education, and more in-depth methods used.

[31] "To help poor be pupils, not wage earners, Brazil pays parents," *New York Times*, January 3, 2004.

protect the assets of the poor through institutional designs that can strengthen skills, capacities, education, health, nutrition, and infrastructure (Adato, Ahmed, and Lund 2004).

Third is the trend toward targeted rather than universal benefits. Social transfer programs increasingly use a range of targeting methods, from proxy-means tests to self-targeting to community-based selection to identify the poor or "extreme poor" (Yaschine 1999; Coady, Grosh, and Hoddinott 2004).

The fourth issue concerns the recognition of the crucial role that women play in household change, in efforts to enhance children's nutrition and education, and in making use of credit and other resources to improve household members well-being. Women are now viewed as central actors in programs to strengthen household assets and reduce risk.

A unique feature of CCT programs has been a practice of program evaluation using large datasets, experimental and quasi-experimental designs, and econometric techniques to measure quantitative changes in health, nutrition, and education indicators and infer causality. A range of qualitative methods also has been used to investigate social processes and relationships that shape program reception and outcomes.[32] Qualitative research has contributed to explaining these different outcomes, as well as social impacts of the program on individuals, households, and communities, including those on women's status and gender relations. For example, IFPRI research in Turkey in 2006 reviewed in this paper focused on socio-cultural issues in its study of gender issues, but little similar work has been done on other CCTs.

Overall, there has been limited analysis of the socio-cultural contexts in which these impacts unfold, and program designers have paid little attention to the role of context. Furthermore, there appears to be no comparative analysis of the relevance of socio-cultural context across different countries, program designs, implementation practices, or outcomes. It is thus difficult to generalize about the relationship between social context and the conditions that may help or impede effective program outcomes, especially as they concern the interests and receptivity of women and other household and community members to program participation.

Information is also lacking about relationships among diverse expressions of normative behavior and the sanctions associated with nonconformity in different cultural contexts. We do not fully understand how these interactions shape program reception and sustainability. Attention to social context includes recognition of the salience of regional as well as rural and urban dynamics, opportunities, and expectations that influence program design, organization, reception, and outcome. An analysis of changing economies and labor markets, national policy reform, social movements and discourses also play a part in shifting social norms and thus help to explain why a particular social program may result in greater or lesser success over time.

In this paper, culture and women's and men's normative expressions and behavior are understood to include notions of comportment, beliefs about the sexuality of women and of men, gendered expectations of marriage and of labor market participation among young women and their families, and the values associated with women's formal, informal, and domestic work. While there may be stereotypic assumptions about country-specific norms for women, particularly those associated with Muslim cultures, there is insufficient information about how and to what extent these norms accurately reflect the diversity of interests and desires of women beneficiaries, their daughters, or of other, often male, household members. Stereotypes also tend to elide crucial differences within and across country ethnic and religious variation. Study of both the local socio-cultural context and its articulation with larger systems as well as households' negotiations of economic opportunity or constraint in culturally appropriate ways can inform

[32] For overviews of quantitative results of CCT program evaluations, see World Bank 2009; and quantitative and qualitative evaluations, see M. Adato and J. Hoddinott (forthcoming).

policymakers and program designers' efforts to respond to a more diverse set of circumstances when introducing programs such as CCTs in new regions of the world, and thus contribute more effectively to meeting short- and long-term goals of economic development.

CCTs, Gender Relations, and Educational Outcomes

Mexico's PROGRESA is the best known and often assumed to be the first conditional cash transfer program, but the earliest CCT program was actually in Bangladesh. In 1982 an NGO in Bangladesh started a stipend program for girls in one *thane* (sub-sub district). In the early 1990s, four different secondary school stipend programs began with donor support, and by 1994 there was a national program for girls from grades six to ten in 460 rural *thanas* (Khandker, Pitt, and Fuwa 1993). The monthly stipend in the Female Stipend Program ranged from Taka 25 in Class 6 to Taka 60 in Class 10 (between US$0.37 to $0.88 in July 2006). Girls received an additional payment for new books in Class 9, and for exam fees in Class 10 in exchange for meeting program requirements: remaining unmarried, attending school at a 75 percent attendance rate, and scoring at least 45 percent in annual school exams (Raynor and Wesson 2006). Bangladesh also offers cash or food transfers conditioned on participation in training and livelihoods programs that, like other CCTs, invest in the household's human capital to provide a basic safety net for very poor households through an asset-based approach to poverty reduction. The Government also supports a Food for Education (FFE) program that provides a free monthly ration of food grains to poor families if they agree to send their children to primary school. Boys and girls were equally eligible, and the increasing enrollment of both was the objective— although the impact on girls' enrollment was higher than that of boys (Ahmed and Ninnio 2002).[33]

In Latin America, CCTs started as small regional programs for education in Brazil and Mexico in the mid-1990s, followed by the now well-known, scaled up programs—PROGRESA in Mexico (now called Oportunidades) and the Bolsa programs in Brazil (now combined into Bolsa Familia) in the late 1990s.[34] This "current generation" of CCT programs has spread across Latin America. They have a broader focus on women's status and gender relations than the earlier Bangladesh girls' schooling program. Mexico's PROGRESA stated in an early policy document that the program "seeks to improve the condition of women and empower the decisive role they play in family and community development" (PROGRESA 1997). Most CCTs across Latin America attempt to achieve similar objectives.

Turkey's CCT program was modeled on Mexico's PROGRESA/Oportunidades program. Unlike PROGRESA, it does not emphasize women's empowerment either in its design or its rhetoric, although girls' schooling is a major objective. In the PROGRESA and similar CCT program design, women are the direct recipient of the cash transfers, and the program delivers the message that they should generally be the ones to control its spending. This design feature was informed by earlier literature on intra-household resource allocation that found that income controlled by women is more likely to translate into higher household food expenditures and calorie intake as well as expenditures on health, education, and household services than income controlled by men (e.g., Haddad and Hoddinott 1992; Thomas 1992).[35]

The second means of changing women's status—and the primary one for the long term—is through promoting girls' schooling. Since girls tend to leave school earlier than boys in many parts of the world, CCTs often offer higher transfers for girls' than for boys' school enrollment and attendance. And given the high tendency for girls to drop out in the transition to secondary school, benefits are normally set higher for secondary than for primary school, and again higher for girls than for boys.

[33] FFE did not specifically emphasize improving the status of women or girls, though it was acknowledged to have that potential.
[34] By 2006, 41 countries sent representatives to the 3rd International Conference on Conditional Cash Transfers (Ayala Consulting 2006). By 2009, about 25 countries have some form of CCT at either pilot or full-scale (World Bank 2009).
[35] See also Behrman (2007), for this evidence on the impact of intra-household research on PROGRESA's decision to target benefits to women, as well as provide a family-level benefit.

Third, programs often provide women with health and nutrition education since knowledge and attitudes toward health and nutrition may have a longer lifespan than a cash incentive, and adult education can make an important contribution to meeting overall development goals.

Fourth, to promote communications between the program and beneficiaries, many programs have elected beneficiary representatives—almost always women—who take on leadership responsibilities in their communities.

Fifth and finally, the programs sometimes promote collective activities for beneficiaries at the community level. These activities enhance program communications, and include group travel to collect benefits, shopping groups, healthy food preparation demonstrations, parent associations to promote school and health service management, and meetings for women to discuss common problems and solutions. The extent to which these different activities are part of program design or implemented in practice varies widely between countries and even communities.[36] Significantly, most of these five features were conceived in the Latin American context and have been only partially transferred to the Bangladesh and Turkey CCT programs. There is the focus on girls' education in both Bangladesh and in Turkey, and the Turkey program also targets women to be managers of the cash. The adult education, leadership, and community level activities are not present.

It is by now well-established that CCT programs have been successful in increasing children's school attendance and enrollment rates, including those of girls. Countries such as Mexico and Turkey, which start out with nearly-full enrollment rates in primary school, have small enrollment impacts at this level, but much larger impacts at secondary school level. PROGRESA increased secondary enrollment by 9.3 percentage points for girls (vs. 5.8 points for boys), and 14.8 percentage points for girls in grade 7, the transition year when girls most often drop out (Schultz 2001, 2004). The program also reduced dropout rates and grade repetition (Behrman, Sengupta, and Todd 2001), though it did not show lasting impacts on school attendance, achievement, or school re-entry (Behrman, Sengupta, and Todd 2000, 2001). Impacts in Nicaragua's *Red de Protección Social* (RPS) for primary school were high increasing enrollment by a net 12.8 percentage points, without any significant difference between boys and girls (the benefit level was the same for both). RPS also increased primary school attendance rates by 20 percentage points on average and 33 percentage points for the extreme poor (Maluccio and Flores 2005). Ecuador's *Bono de Desarrollo* (also primary school only) raised enrollment by 9.8 to 12.8 percentage points (Schady and Araujo 2006) and Colombia's *Familias en Acción* increased secondary school enrollment by 17.2 percentage points in rural areas and 13.9 percentage points in urban areas (Attanasio and Gomez 2004). The Cambodian Scholarships for Girls Programme increased secondary enrollment by 22 to 33 percentage points (Filmer and Schady 2006). The Female Secondary School Stipend program in Punjab in Pakistan increased secondary school enrollment by 9 percentage points (Schady and Fiszbein 2007). On the other end of the spectrum are programs where evaluations revealed little impact, either because the programs were primary-school focused and primary enrollment was already high at baseline (for Jamaica, see Levy and Ohls 2007), or because the control group also increased (for Honduras, see IFPRI 2003). In general, CCTs have done less well in demonstrating improvements in school achievement, and most are still limited by "supply side" problems—inadequate quality of facilities, teachers, supplies, etc. (see Adato and Hoddinott, forthcoming).[37]

[36] Adato and Roopnaraine (forthcoming) describe these different approaches and how they unfold in practice in several countries in Latin America. They find a wide variation in design features and outcomes with respect to how they foster participation, and contribute to women's knowledge, confidence, and other aspects of women's empowerment. They also show how the potential of CCTs to achieve this is constrained by certain central design features such as centralization, and a focus on the household rather than community, which limit collection action and agency.

[37] For work that reviews CCT impacts on education, see World Bank 2009; Behrman and Parker, forthcoming; Adato and Bassett 2008; 2009.

Increasing girls' schooling has been the sole human capital objective in Bangladesh, and arguably the most important one in Turkey. As in Latin America, CCTs in both countries have been successful in meeting this objective, at least as indicated by national level statistics.

Program structure is in certain situations more important in achieving positive results than the amount of money provided. The Bangladesh Reaching Out of School Children (ROSC) program, implemented in 2005, was designed to bring out-of-school children to school with a cash educational allowance for students in grades 1 through 5, and grants to their schools. Both educational allowances and grants to schools were provided in 60 percent of the project area; only grants to schools were provided in the other 40 percent. Although the grants to schools in the smaller part of the project area were almost double the level received by the grant-plus-allowance schools, they had less impact. In grant-only areas, there was no significant net change in primary school enrollment whereas in grant-plus-allowance areas, the net average increase in primary school enrollment was 8.9 percent for children ages 6-14 and 10.6 percent for those between 6-8, implying the importance of a demand-side stimulus, over supply-side alone (Ahmed 2006).[38] Bangladesh has three other CCT programs that also significantly raised girls' school enrollment.[39] As Mahmud (2003: 4) suggests in comparing stipend programs, there was a jump in the female share of secondary school students from 38 percent in 1994 to 42 percent in 1995, possibly reflecting the introduction of the stipend program, but no visible increase since 1997. Yet, a rise in the proportion of female students has continued in the sample Female Secondary School Assistance Project (FSSAP) schools, suggesting that participation in the stipend program varies according to the project. For FSSAP, where no control group was available, a model using school-level data indicates that, on average, an additional year of program duration increases the secondary school enrollment of an incoming cohort of girls by 29 percent but was found to decrease that of boys by 8 percent. Household-level data, considered a better measure, suggests that an additional year of program support yields an increase of 12 percent for girls age 11-18, but has no discernable effect on boy's enrollment (Khandker, Pitt, and Fuwa 2003: 24-25).

The CCT program in Turkey raised secondary school enrollment for girls by 10.7 percentage points nationally. In rural areas, the impact was even higher: 16.7 percentage points for all secondary school children, although most of this impact was for boys (22.8 percentage points) (Ahmed et al. 2006). These impacts, however, mask huge regional differences, particularly for girls. The evaluation of the CCT program in Turkey was representative nationally and not at the provincial level, so no program impact analysis was conducted at this level. But survey data indicates that despite the program, enrollment rates are low in at least three very poor provinces where the program focused heavily and aimed to improve impacts. Among program beneficiaries in Diyarbakir Province, data on secondary school enrollment showed 69 percent for boys and 65 percent for girls. In Samsun, it was 64 percent for boys and girls. In Van, it was 49 percent for boys and only 11 percent for girls. In Van, even primary school enrollment was low, particularly for girls, at 81 percent (Adato et al. 2007). Studies in both countries suggest that the programs have been partially successful, and evidence presented in this paper contributes to a better understanding of why they do or do not succeed.

[38] The actual increase in program areas was 21 percent, but the control areas also saw an increased enrollment of 12.1 percent during the project period, resulting in the 8.9 percent program-related impact (Ahmed 2006)

[39] The three programs are the Bangladesh Secondary School Project (FSSP), which operates in 270 upazilas (subdistricts), the Female Secondary Education Stipend Project (FSESP), which operates in 19 upazilas, and the Bangladesh Female Secondary School Assistance Project (FSSAP), which operates in 118 upazilas.

The status of girls' education in Bangladesh

Bangladesh is the ninth largest primary education system in the world to achieve gender parity in primary and lower secondary school enrollment. It doubled enrollment between 1985 and 2001, when the gross enrollment rate reached 97.5 percent (Schuler 2007:179). Yet Bangladesh still ranks among the bottom 20 countries on the International Literacy League rankings. Moreover, despite its achievements, disparities among classes, regions, and ethnic minorities continue, particularly in dropout and completion rates. For example, while the gap between the wealthiest 20 percent and those from the middle 40 percent of households narrowed, that between the middle and poorest 40 percent widened between 1993 and 2004 (Schuler 2007: 182). UNDP (2005) figures show that girls' net primary enrollment had risen to nearly 86 percent by 2002/3 compared to 48 percent in 1996 (BANBEIS 1999). It gives the secondary Gross Enrollment Rate as 45 percent for boys and 47 percent for girls. If the figures are correct, Bangladesh has succeeded in providing equal access to girls at primary and secondary level. Many writers in part attribute the increase in girls' enrollment in primary school to the Female Secondary Education Stipend Project (FSESP) (Ahmed and Ahmed 2002; Chowdhury, Choudhury, and Nath, 1999).

Studies also indicate, however, that girls, children living in rural areas and urban slums, children from socio-economically disadvantaged families, and ethnic minorities were particularly disadvantaged in access to education (Brock and Cammish 1991; Chowdhury et al. 1992; Nath et al. 1993; UNICEF 1992; Alam et al. 1997). The gender gap in favor of girls narrows as affluence increases and poverty decreases; this is particularly true in urban Bangladesh where boys surpassed girls from "surplus" households, i.e., those considered part of middle-income rural households. In rural agricultural households unable to secure their subsistence needs, by contrast, the gender gap in favor of girls is widest (Chowdhury, Nath, and Choudhury 2001).

Net enrollment rates for four of the country's small ethnic minorities who live in three hilly districts collectively known as the Chittagong Hill Tracts (CHT)[40] also reveal important trends. Enrollment rates are far behind the national estimate; significant disparities continue to exist between ethnic groups; and girls are behind boys irrespective of ethnicity (Minority Rights Group 1997; Chowdhury, Nath, and Choudhury 2001).

Adult literacy rates are also an important contextual factor, since adult literacy raises the aspirations of parents to educate their children. Between 1980 and 1998, the adult literacy rate rose marginally from 32 to 38 percent with the rate for females at only half that of males. Recent statistics provided by the government indicate that the literacy rate reached 65 percent in 2001 (Daily Star 2001), while other sources suggest lower rates[41]. The Literacy Assessment Survey 2008 (Bangladesh-UNESCO 2008)[42] revealed important variation in literacy rates by region, gender, and age. One finding is that the Adult Literacy Rate[43] (15 years and above aged population) is 48.8 percent countrywide with regional variations that reveal Chittagong Division (49.9 percent) to have the highest rates and Sylhet and Rajshahi Divisions (42.9 percent) to have the lowest. Given that the adult literacy rate was 38.8 percent in 2002 and reached 48.8 percent in 2008, a rate of growth of 5.55 percent per annum, it is possible to imagine that the adult literacy rate in 2015 could be as high as 71 percent. The major contribution to the high growth rate comes from the increasingly higher growth rates in female literacy, particularly in rural communities, which are assumed to be the most conservative. In contrast, the urban adult literacy rate has

[40] The CHT has about one percent of Bangladesh's 125 million people with ten percent of land area. There are eleven ethnic groups who inhabit CHT and this survey collected information from the four most populous ones (Nath 2001).
[41] For example, the ILO found that between 2000-2004, the literacy rate for men over 15 years of age was 50 percent and for women, 31 percent. UNICEF (2004) reported an estimated total adult literacy rate at 54 percent with a female-to-male ratio of 82 for the period 2000–2007.
[42] The data presented here is from their Literary Assessment Report 2008.
[43] This is for the population aged15 years and above.

been decreasing due mainly to a gradual decrease in male adult literacy. Fewer programs targeting adult illiterates in urban areas and the fewer and relatively new NGO urban programs that support adult and functional literacy may explain this finding.

Literacy rates vary by location, age, religion, education, and income. The Survey finds that urban-rural differences in literacy are widening, with a national literacy rate of 46.4 percent for rural areas and 56.9 percent for urban areas. The literacy rate is highest for 11-14 years age group (58.7 percent) but gradually decreases with age, although for those 65 and above, the rate is nearly 40 percent. The adult literacy rate of urban non-Muslims is significantly higher compared to urban Muslims, 65.8 percent as against 56.6 percent. In rural areas the difference is minimal. There is also a strong relationship between levels of formal education and adult literacy. The level increases from 3.8 percent for adults completing Grade 1 to 49.4 percent for adults completing Grade 4, reaching 100 percent for those completing Grade 9. Finally, as the study concludes, poverty continues to pose a large threat to increases in the literacy rate, and poor facilities and poor school environments may compromise future rates of growth.

Bangladesh, like other less-developed countries of Asia, devotes a smaller proportion of its GNP to education than their African counterparts. In public spending between 1993-94, Bangladesh spent 2.3 percent of its gross national product (GNP) on education, which is considerably lower than the average 3.5 percent investment in education for the South Asian region (Haq and Haq 1998). More importantly, 96 percent of the revenue expenditure on primary education is allocated to teachers' salaries, leaving very little funding for monitoring, supervision, training and other quality enhancing activities (Ahmad 1996).

Bangladesh requires longer hours of instruction (36.0 hours per week) in more crowded classrooms. It has the highest pupil/teacher ratios at the primary level in the region (Bray 2002: 22-23).[44] This may explain poor primary school retention in the early 1990s when only 52 percent of students entering Grade 1 reached Grade 5 (Loxley 1997: 24 in Bray 2002: 25) and high dropout rates in government schools (IRIN 2007; 2009).

The availability of different types of schools, government and private, religious and secular, is also changing. The government owns and manages most of the nation's primary schools serving about half of the total number of enrolled students. Secular private primary schools are fewer in number, and serve approximately a quarter of enrolled students.[45] Bangladesh maintains high enrollments in private schools, including NGO-, community-, and religious-run institutions, with increasing efforts to build community partnerships and share costs in provisioning education. The Bangladesh Rural Advancement Committee (BRAC) is a widely noted program offering basic education throughout the country (Alam and Hussain 1999). Islamic schools, the *ebteddayee madrassas*, comprise about one-third of the total number of private primary schools and serve the remaining quarter of students (World Bank 1996: 29 cited in Bray 2002: 35).

These enrollment patterns may partially be explained by the uneven external assistance for education in Bangladesh, which declined from 1992 to 1997 (from US$1820.7 million to US$1144.0 million) (Bray 2002: 49). The major investments to increase girls' education rely heavily on external aid from the World Bank (IDA) for the FSSAP, the Asian Development Bank for the SEDP and NORAD for FESP. This dependence poses risks in today's financial crisis. Recent figures continue to show fluctuating investments in public expenditure to education as a whole, including primary, secondary, and higher levels. The Annual Development Program shows that investments in education and religious affairs averaged only 6.97 percent of total GDP between 1995/96 and 2007/08 (Mahmoud, Wadood, and Ahmed 2008).[46]

[44] The pupil-teacher ratio in Bangladesh is 63, compared to India, the next highest, at 48.

[45] According to government statistics, there are 37,000 government primary schools and 23,000 private ones. Islamic schools number 7,000 are are included in the private school total.

[46] A recent World Bank study assesses the current system of social safety nets in Bangladesh showing that the ratio of expenditures on safety net programs as a percentage of GDP and public expenditures has been declining. Expenditures on safety

Government schools are characterized by inadequately maintained facilities including poorly maintained tube-wells and toilets, inadequate classrooms and resources, and poor quality teaching practices. While most government teachers are relatively well-paid men, they are generally unsupervised, have low status within the government, and a weak relationship with the community. This means that they are generally unaccountable to rural communities and families. By contrast, NGO schools are generally better maintained and employ primarily married women from the community as teachers. Although NGO teachers are less educated than their government employed counterparts and receive lower salaries, they typically enjoy a higher status and benefit from regular in-service training and, as such, are generally more accountable to both the NGO and their constituencies.

Bangladesh has a history of experimenting with education programs. Locally-organized programs were supplemented with donor support that, particularly following the Education for All Declaration in 1990, contributed to enhancing educational availability and access. The latter initiatives stress the value of girls' education as a symbol of modernity, altering how people value education over the long term. This suggests that people's aspirations towards education may change more rapidly than expected by actual enrollment figures even in rural communities dominated by patrilocal family farms oriented towards non-market production, especially when programs to target girls are initiated. Changing aspirations are a critical aspect of changing behavior.

Both the Government of Bangladesh and NGO-targeted programs have increased rural girls' access to schooling and have influenced how people think about women's appropriate behavior, girls' age at marriage, and the place of dowry and employment in family decisions. A number of policy measures and programs have contributed to these changes, including food for education (FFE) programs; secondary school stipends for girls; screening of curricula and textbooks for gender bias; and affirmative action measures, which nearly doubled the number of female teachers recruited to the sector (CAMPE 1999; Schuler 2007: 185-86). The FFE program, as noted earlier, began in 1993 with monthly provisions of wheat and rice that targeted poor households rather than girl children. The result, one year after its inception, was to successfully increase primary school enrollment, promote attendance, and reduce dropout rates. It also was successful in transferring income benefits to low-income households through wheat entitlements that operated with low levels of leakage (Ahmed and Billah 1994, Ahmed and Ninno 2002). The program was subsequently changed in favor of monetary stipends that were increased in size in 2002 and targeted to both boys and girls from poor families throughout rural Bangladesh. Stipends are provided to girls in grades 6–10 who remain unmarried, maintain a 75 percent minimum attendance rate, and achieve a score of at least 45 percent on yearly examinations (Ahmed, Ninno and Choudhury 2001; GroundWork Inc. 2002:13). Although annual stipends have since been reduced, Khandker, Pitt, and Fuwa (2003) conclude that the stipend program substantially increased girls' secondary education, with no discernable enrollment consequences for boys (see also Raynor and Wesson 2006).

Programs targeted to increase girls' education were actually begun in the early 1980s, often because school attendance was viewed as an important vehicle to reduce population through delayed marriage and motherhood. One such program, the Female Stipend Program to increase girls' secondary education, had precisely these goals, to delay marriage through efforts to raise the age at marriage to 18, increase the use of contraceptives, and reduce overall fertility rates (Raynor and Esson 2006). Given the dramatic reduction in fertility rates in the country, there is little doubt that moving toward gender parity in education has contributed to this result, even though there is little specific data to make a causal claim since there were simultaneously dramatic changes in the political economy of the country–an independence struggle, two famines, floods, and a broad restructuring of the agricultural sector which altered the demand for female household labor and signal a change to the value of education. Other

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nets are less than 1 percent of GDP and about 4.4 percent of public expenditure. Although reasonable growth rates have led to declines in percentage of the poor, the number of poor has not declined so that the number of people covered under the safety net programs represents only a fraction of those in need (World Bank 2006). Interventions to improve the nutrition of children and women are excluded from the list of safety nets since these programs do not fall directly under the rubric of transfer programs.

programs focused on raising girls' education levels include the Bangladesh Primary Education Stipend Programme (PESP), the Bangladesh Female Secondary School Assistance Project (FSSAP), and the Bangladesh Reaching Out of School Children Programme (ROSC). This paper utilizes empirical data from studies of the PESP and FSSAP.

The status of girls' education in Turkey

Although Turkey's modernization efforts since the 1920s included as an essential element increasing rights and opportunities for women (Toktas and Cindoglu 2006), many social structures and institutions continue to reinforce traditional gender roles that limit women's participation in the public sphere. In 2008, Turkey ranked 125 out of 157 countries on the gender-related developmental index measuring the impact of gender inequalities on human development achievement (Human Development Report *2*008). Patterns of gender inequality are perpetuated because programs and policies created by national and international bodies fail to tackle the power of the gender ideologies embedded in social institutions, such as family, education, Islam, and the employment market (Leach 2000). Economic disparities and urban migration in the past 50 years further complicate the landscape. Since 1997, when Turkey was declared eligible for membership into the European Union, the country has made significant efforts to improve social institutions, increase the economic power and promote equal treatment of all citizens in part by investing substantially in improving and expanding the educational system. In addition to raising enrollment and graduation rates, Turkey worked towards eliminating inequalities in education, improving the quality of the curriculum, and upgrading learning standards and outcomes for all students (World Bank 2005).

In promoting equal access to education, many reforms have targeted girls and women. In the past decade, government-funded educational programs successfully increased enrollment rates in primary and secondary school, but rates for secondary school still remain far below EU countries, particularly for girls. In the beginning of the decade, one in three high school age girls did not attend secondary school, compared with only one in ten boys (Mete 2004, World Bank 2005) While current enrollment rates in primary school for girls are about equal to boys, there is still a noticeable decline in girls' enrollment by secondary school. In the transition from primary to secondary school, the female-to-male ratio decreased from 98 percent to 89 percent (2008 Statistics from Turkish Statistical Institute).

Geographic location and economic status further increase gender differences and translate into fewer educational and employment opportunities for girls. Inequities in policy enforcement and distribution of resources have led to low enrollment and graduation rates in rural and poor communities, especially for girls. Educational statistics show that 10 percent of children of compulsory school age do not attend schools, and that nearly three fourths of these children are girls (United Nations 2008). In South-East Anatolia, the region of lowest primary enrollment in the country, the enrollment rate for girls is 21 percent, while boys' enrollment is more than double that rate in 2000-2001 (Hosgor 2004). One of the main factors for this disparity is a lack of transportation, which raises parents' concerns about girls' safety.

Illiteracy rates are also the highest among women. According to government statistics, up to 30.8 percent of women in rural areas and 16.6 percent in urban areas can neither read nor write. Corresponding figures for rural and urban men are a much lower 9 percent and 3 percent (UNICEF 2003). Girls with illiterate parents have a lower rate of school attendance. More than 70 percent of the children who are not enrolled in primary school are girls, and more than 55 percent have illiterate mothers (World Bank 2005). In Inequitable allocation of resources to rural and poor areas has led to a lower quality education in those areas. Inadequacies in educational facilities, lack of materials, and inexperienced teachers fail to provide students with the skills to be competitive in the labor market. Underdevelopment in Turkey's Eastern and Southeastern regions is linked with ethnicity. These areas are the sites of the highest Kurdish populations, an ethnic group that makes up 20 percent of the country's population, and where conservative traditional beliefs about the role of women, particularly in rural areas, are prevalent.

The negative effect of inequitable socio-cultural norms on girls' educational and occupational aspirations is arguably far more extensive than macro-structural variables and family background (Rankin and Aytac 2006). In poor countries where families often face extreme financial constraints, girls' education is frequently compromised. An analysis of the 1988 household survey in Turkey reveals that 54 percent of fathers nationally believe that women are best suited for domestic duties and should not accept paid work outside the home (Rankin and Aytac 2006). These biases are much stronger in the far Eastern and Southeastern regions of the country, and in rural compared to urban areas within those regions. The same survey revealed that girls are more likely to attend post-primary school if they lived in metropolitan areas, have less patriarchal families, and if other family members are available to assist with child care. In addition, birth order factored into school rates; the oldest daughter was 75 percent less likely to complete school than her younger sisters (Rankin and Aytac 2006). In addition to home life, the schooling environment plays an important role in promoting gendered beliefs. Many educational initiatives fail to examine the nature of the school experience for boys and girls and address its differentiated outcomes (Leach 2000). Not only do teachers perpetuate gender stereotypes, but the curriculum also expresses subtle but powerful messages about gender through academic expectations, achievement paths, rewards, and discipline (Leach 2000).

Turkey began an aggressive campaign to improve education standards and extend education to the entire populace. In 1997, Turkey passed the Basic Education Law which mandated eight rather than five years of compulsory education for all children between 6 and14 years of age. It invested public and private funds to significantly expand educational opportunities, constructing new schools to increase classroom supply by 30 percent (World Bank 2005). This investment dramatically increased enrollment rates. From 1997 to 2006, the total gross enrollment ratio for primary education rose from 89.51 percent to 96.34 percent. In the same time span, the rates of gross enrollment in secondary school increased from 52.79 percent to 86.62 percent.[47]

The reform caused a significant rise in girls' enrollment ratios in primary school, increasing from 82.43 percent to 93.37 percent. Enrollment rates for girls in secondary school also exhibited a significant jump. However, in the transition from primary to secondary education, the numbers overall for girls' enrollment steeply decline and continue to be a bottleneck in girls' education. In a 2006 survey, 96.24 of boys versus 76.6 percent of girls were enrolled in secondary school, revealing that gender differences become greater as girls continue their education.[48]

In 2000, Turkey published its 8th Five-year Development Plan and identified education as a central element in fulfilling its economic goals. As part of this plan, the Ministry of National Education, a key participant in implementing educational reform, specifically recognized the need to equalize female and male participation in all levels of education, decision-making processes and employment (UNICEF 2003). In the recently initiated 9th Development Plan for Strategy (2007-2013), schooling for girls was again a priority on the state agenda (UN 2008). To meet its goals the government spearheaded several programs to improve and expand educational facilities, increase supplies, and improve curricula and pedagogy around the country (UNICEF Online 2006; UN 2008). One government initiative revised educational materials to remove any examples of discrimination on the basis of sex or race, eliminating language and images that reproduced stereotypes of men and women (UNICEF 2003; Acar 2003; UN 2008). Boarding schools and transportation were also substantially expanded to increase enrollment, specifically targeting the low-enrollment Southeastern and Eastern Anatolia regions. The government also created projects that targeted girls' parents, attempting to instill a greater understanding about the importance of education and reduce dropout rates (UN 2008). To address monetary constraints, the government started the CCT program within the Social Risk Mitigation Program in 2006.

[47] See http://nkg.die.gov.tr
[48] See http://nkg.die.gov.tr

Examining the Relationship between Normative, Economic, and Institutional Contexts to Understand Education Outcomes

How are shifts in girls' school enrollment and educational attainment to be explained? The logic and design of CCT programs assumes that the main explanation lies in cash constraints or availability. The cash transfer enables the purchase of food to help the child concentrate in school, pay for school expenses, and compensate the family from income lost by sending each child to school rather than to work. Partially anticipated by the CCT program is another explanation: gender discrimination, causing some programs to provide higher transfers for girls' school attendance than for boys, with higher amounts offered as girls reach older grades, where the risk of their dropping out increases. However, the extent and forms of gender discrimination look very different in Latin America and Turkey or Bangladesh, suggesting that program design-responses to these obstacles do not necessarily transfer across contexts.

In Bangladesh, the study by Ahmed et al. (2004) of the FSSAP concludes that "[t]he single most important factor preventing girls from attending and achieving in school is gender discrimination." Since the contours of gender discrimination vary among groups and location, it is necessary to investigate the specific expressions and operations of discrimination to ensure that all avenues for overcoming the barriers that constrain or inhibit women's expectations and opportunities are identified. This paper offers more specific meaning to discrimination by focusing on its different expressions and its normative and prescriptive assumptions, and what they reveal about how patterns of gender discrimination shape educational availability, access, and attainment.

It is difficult to explain the direction of causality between shifting gender norms and increases in education indicators (Ahmed et al. 2004), and whether and how particular programs to enhance girls' education pave the way for changes in behavior (Ahmed, Quisumbing, and Hoddinott 2007).[49] The relationships between normative change, improvements in educational attainment, as well as economic context and opportunity, are complex and multiple. Changes in school attendance and retention both contribute to and respond to normative change, and to the wider economic and institutional environment. For example, parents' literacy, particularly mothers', supports not only their own daughters' school enrollment and retention, but can also serve as set an example in the community. Mothers' illiteracy can simultaneously shape both support of, and resistance to, their daughters' education. It also can help to explain why some daughters may demand the opportunity to be allowed to attend or remain in school both challenging and altering their parents' and in-laws appreciation of the value of girls' education. Finally, parental literacy (or lack of it) may also explain why the families of girls who have aspirations for further education may still decide that the girls should not continue in school. Other institutional and social issues mentioned earlier, such as birth order, teachers' attitudes, and family demographics are complicating factors affecting girls' educational attainment. These dynamics are investigated below in the context of two CCT programs in Bangladesh and Turkey.

The Changing Labor Market, Women's Employment, and its Relevance to Girls' Education

Labor markets and the value of girls' education in Bangladesh

Changing aspirations and behaviors relating to the value of education generally arise with changing opportunity structures over the long term. In Bangladesh, restructuring the agricultural sector led to declines in subsistence production and in the demand for household labor. No longer able to secure work in agriculture, primarily in agricultural processing, women have been forced to secure other sources of work and income. For very poor women this initially led to their participation in NGO- and government-

[49] Ahmed, Quisumbing, and Hoddinott (2007) discuss the difficulty of assessing causality and the criticality of using randomized samples. Most studies assume rather than engage problems with causality, and, given the paucity of evidentiary material make broad generalizations difficult. In this section our purpose is to open a space for discussing a different way to think about the relationship between stipends, schooling, and the conditions that make enhancements to women's education possible both at the level of program implementation, institutional arrangements, and social practices.

supported road maintenance work and roadside tree planting. Currently, the Rural Employment Opportunities for Public Assets (REOPA) program, a social safety net project, employs 24,440 poor rural women on road maintenance project sites nationwide (UNDP 2009). Shamima, a participant in this public works program, notes that she now hopes to secure her household needs without having to resort to social protection interventions, accessing instead a micro-credit program to continue to send her son to the local BRAC school. Shamima's strengthened position, confidence, and determination, encourages others in the community to find a voice and contribute to creating a more aware, vocal, secure and engaged population of poor rural working women in the country (UNDP 2009).

The declining availability of agricultural work and the rise of projects that targeted very poor women for social safety net programs coincided with a rise in women's employment. Initially, women worked in micro-level income generating activities made available through either government sponsored programs such as the national Integrated Rural Development Programme (IRDP) Women's Program in Population Planning and Rural Women's Cooperatives (Feldman, Ahkter, and Banu 1980). Increasingly, micro-credit programs became accessible through the large NGO sector, including but not limited to the Grameen Bank Project and BRAC. [50] These opportunities were followed by the country's New Industrialization Policy in 1982 that led to a growing demand for women's labor in export garment manufacturing (Feldman 1992; 1993; n.d.; Kabeer 1994; Kibria 1995). These changing work opportunities contributed to changing aspirations. They also were accompanied by a discursive shift exemplified in a new government policy narrative that promoted gender equity to secure donor support for both women's projects, including informal education and training, as well as initiatives supporting women's involvement in national and local political positions by setting quotas. As recently as 2008, the Election Commission approved legislation to ensure that women represent 33 percent of political parties by 2020. These efforts to promote gender equity were initiated after the start of the International Women's Decade in 1975, but have gained strength and legitimacy as the donor community and NGOs have linked gender issues with development interventions, enabling the military regime of Generals Zia and Ershad to convey globally that Bangladesh was becoming a modern nation.

Adult and functional literacy programs for women, often promoted by NGOs, helped to establish networks among women that were later enhanced by access to rural credit schemes and training programs (McCarthy 1977). Such networks opened opportunities for women that had been previously unavailable in rural Bangladesh: to share an experience of public engagement, discuss shared issues, ideas, and interests with others, and to engage with people outside their immediate family or proximate neighbors. The literacy programs are credited with creating new gender roles and relations, and creating opportunities for new social identities (Maddox 2005). As the first generation of rural women obtained positions as workers in government and NGO programs, they served as role models who demonstrated how to, creatively manage new forms of public engagement by negotiating norms of seclusion with their families and communities. Prior to the mid-1970s and 1980s, even when rural women were educated, there was no active labor market to employ them. With the growth of the labor market beginning a quarter-century ago, the value of education began to change from its primary function of preparing educated rural upper and middle class women to be "good mothers" to a way to garner benefits from education through increased opportunities for income earning. Together, such women came to represent an aspiration and role model for other women, making evident that women need not remain "in the shadow of their fathers, husbands and sons" (Feldman 1998; Parveen 2007:265). This shift also contributed to recognizing the centrality of education and human capital development in meeting the goals of poverty reduction and its contribution to the development project.

Images of rural women as active and credit-worthy community members was further elaborated, some years later, by the sight of young girls walking each morning to urban garment factories, a metaphor for progress that today is etched in the popular imagination (Blunch and Das 2007). The expansion of

[50] There is much to criticize about some of these projects, but crucial here is that they were available and women were receptive to taking advantage of credit access, even if they did not fully control its use.

garment manufacturing in urban areas, notably in Dhaka and Chittagong, helped to raise the female labor force participation rate by adding more than 1.2 million workers to the formal, if contingent, labor force. This growth showed that education could work for women. Securing work in export production enabled some women to send money home to support their families in the countryside, transforming the girls' and sometimes their parents imagined opportunities, valorizing their education, and offering another role model for others in their home village, helping to generate new expectations among school age girls (Feldman, n.d.). It also signaled that women could be associated with progress and modernity that was supported by government rhetoric and an increasingly urban sensibility that is defining what it means to be part of a "modern" Bangladesh.

Household level poverty has an enormous impact on girls' chances of schooling. In rural, particularly Muslim contexts, evidence suggests that poor households still allocate their limited resources to the education of sons who are presumed to bring larger benefits to the household in terms of future income. There is however growing evidence that girls' and their parents' aspiration for schooling and for employment are changing. In Bangladesh, as girls gain expanded access to the labor market, their families are likely to place greater value on their attendance and completion of secondary school. Today, even as the garment-manufacturing sector faces new challenges globally, there remains a continued hiring preference for girls in export production. As new opportunities in the public and private sector emerge for women and allow them to secure their economic independence, it is likely that their ability to take care of parents in old age will alter the value parents' place on the value f daughter's education. Ahmed et al. (2004:15) confirm that over the decade the share of the female population that never attended school declined at a faster rate (10.6 percent) than that of the male population (5.6 percent). Their assessment of the Primary Education Stipend Program (PESP)[51] reveals that over half of the rural population (53.1 percent) in Bangladesh in 2000 lived below the poverty line, with per capita expenditures of less than one-half a dollar per day in nearly half (46 percent) of the sampled households.[52] With this degree of poverty, it is not surprising that over half of households (51 percent) with secondary school age children do not send them to school. Rates of both gross and net school enrollment positively related to income: children did not attend secondary school in 59 percent of low income households compared to 36 percent of higher income households.[53] While enrollment figures indicate that girls overtake boys at both the primary and secondary level, the difference is larger at the secondary level and suggests the success of the female secondary education stipend programs in attracting girls to school.[54]

In a broader context, Pitt and Khandker (1998) suggest that women's participation in microcredit programs has a larger impact on children's school enrollment than male borrowing. Other evidence reveals that the value of work for young women is increasingly important in undermining both dowry and marriages where women are assumed to necessarily be less educated than their husbands. Women's desire for education and for work suggests the relative failure of the old patriarchal bargain where women relinquished control of their physical mobility, assets, and independence in exchange for provision and protection (Kandiyoti 1988; Feldman 2001).

Changing labor markets and the value of education in Turkey

Modernization, urbanization, and industrialization have opened up employment opportunities for women in Turkey as well, playing a large role in increasing girls' school enrollment over the decades. However, women's presence in the labor force does not reflect government efforts to increase girls' education, or

[51] This section draws heavily on two critical sources studying the PESP and FSSA CCT programs by Ahmed with Sharmeen and DATA (2004) and Sharmeen (n.d.).
[52] See Ahmed with Sharmeen and DATA. 2004, Table 5.1.
[53] See Ahmed with Sharmeen and DATA 2004, Table 5.2.
[54] The PESP administrative targeting method uses official targeting criteria to select the PESP beneficiary students from poor households whereas the Female Secondary School Stipend programs do not explicitly target poor households (Ahmed et al. 2004).

vice-versa. The Middle East and North Africa region including Turkey faces an imbalance between investments in education and a labor market that is not expanding at the same rate. Despite consistent economic growth, these countries have experienced a growing unemployment rate, especially for recent graduates, and low job creation. Consequently, this area has the highest unemployment rate in the world (Bilgin and Kilicarslan 2008). In Turkey, from 1980 to 2004, the working age population grew by 23 million; yet only 6 million jobs were created (World Bank 2006). The unemployment rate for educated youth remains extremely high. In a study from 2007 to 2009, unemployment in the 15-24 year-old labor force age group reached the highest rate in a decade, rising from 20 percent to 28.8 percent, almost double the national unemployment rate (Turkish Statistical Institute). No has vocational training produced the results that policymakers predicted, despite considerable investments. In fact, vocational graduates are less prepared for pursuing higher education or entering the workforce, because their education is far more specialized, and thus limited, than that of secondary school (World Bank 2005).

In this environment, women face even greater obstacles in entering the workforce. In 2006, labor force participation was 71.8 percent male versus 24.9 percent female.[55] These numbers are the part of an overall decrease in labor force participation over the last decade, in spite of the government's aggressive education reform. Slow employment growth, high rates of urban migration and of informal unpaid work combined with patriarchal attitudes are behind the low rate of female participation in the workforce. Women's particular skill set and education decrease their competitiveness in the urban labor market, and deeply-ingrained gender biases about what work is appropriate for women also limit their occupational pursuits (White 2005). Social and familial pressures also limit women's ability to pursue paid employment outside of the home (UN 2008). For many husbands, women's employment, even if essential for family livelihood, is not recommended, because it represents both a threat to family honor and male authority (Erman et al 2002).

In Turkey, poverty is also correlated with lower levels of education. Education program beneficiaries, who are among the poorest 6 percent of the population, have the lowest enrollment rates in both primary (86 percent) and secondary(33 percent) schools in the poorest region, Maramara, and higher enrollment levels (96 and 70 percent for primary and secondary school, respectively) in the wealthier Black Sea region.

The Government of Turkey introduced CCTs as a means of increasing girls' education to address these disparities. One can begin to see a disconnect between this problem and its solution. If parents and girls do not see the prospect of improved economic opportunity through girls' school attendance, it is likely to reduce their incentive to participate in the program. And if they do participate for the cash incentive, the program may not have the desired poverty reduction impact hoped for in the long term.

An empirical analysis of CCTs, gender relations, and girls' schooling in Bangladesh and Turkey

The CCT and financial constraints on schooling access

CCTs are designed precisely to respond to the linkage between poverty and low school enrollment, providing what poor families are most presumed to need most in order to keep their children in school: cash to help with the cost of school expenses and as compensation for income that the children otherwise might earn by working. Review of CCT programs raises several questions, including: how strong a factor is a cash constraint in schooling decisions, is the amount of the grant is sufficient to compensate for these other costs, and what other factors are at play that displace the cash incentive?

In both Bangladesh and Turkey, household members repeatedly refer to money as a major reason that they do not send their children to school. As reported above, secondary school enrollment in Turkey is relatively low for both boys and girls and varies across regions. The figures for boys and girls are, respectively, 69 and 65 percent in Diyarbakir Province, 64 and 64 percent in Samsun Province, and 49

[55] See http://nkg.die.gov.tr

and 11 percent in Van Province (Adato et al. 2007). A non-beneficiary household in the village in Van in Turkey, for example, said his children had dropped out of secondary school although they had good grades and wanted to continue because: "we don't have the [economic] power to send them to school from now on..." Lack of money was said to be a factor in schooling decisions in the majority of households in the qualitative study across regions: in Diyarbakir Province in South Eastern Anatolia (93 percent), in Van Province in Eastern Anatolia (77 percent), and in Samsun (73 percent) (Adato et al. 2007). Poverty and ethnicity intersect in the qualitative study sites: the village of Samsun is in the least poor region and reported the lower level of financial constraint; villages in the other two regions were both poorer and predominantly Kurdish, and they reported a higher level of financial strain.

Parents in all regions of Turkey complained that school expenses were considerably higher than the CCT, particularly for secondary school students. The survey data from Turkey (Ahmed et al. 2007) found that the cost of the grant was sufficient to cover these expenses, except for boys' expenses at secondary level. The qualitative study, however, reflected people's perceptions of the adequacy of the grant to meet expenses, and as an incentive to comply with program requirements. People were insistent that "the money is too little" and key informants in all study areas confirmed that very poor families have trouble making ends meet even with the grant: "The household income is barely enough for the needs of the family. They can only buy food and fuel for heating with that money. The education aid is also insufficient and spent on food, coal/firewood and debts." Although school expenses varied by region, the grant funds did not. There also was an expectation of girls' appearance: "girls mean more cost… A secondary school student must be more proper, she must have all her clothes. Her clothes must be ironed, etc. She is a young girl now. 30-40 YTL is not enough for her." Nonetheless, the CCT program has made a difference for some. One mother in Diyarbakir said, "People can send their children to school thanks to the aid. For example I could not send one of my girls to school due to financial problems. If the state gave this money before, I could [have sent] her to school. And she would not be an ignorant person" (Adato et al. 2007).

In Bangladesh, most parents (82 percent) reported that the stipend was too little to cover their daughters' educational expenses and concluded that for these households, the PESP stipend was insufficient for them to be able to afford even the bare minimum clothing and school supplies needed to send their children to school. As one account posed it, "although Selina's father is very poor, he never asked Selina to use some of the stipend money for household expenses because he knew that the stipend money was too little to cover all her educational expenses." Selina opined, "It is impossible for a very poor student to continue her study depending solely on the stipend money." She suggests that the government should provide very poor students with books and school uniforms along with the stipend money (Ahmed et al. 2004). This sentiment reflects a desire for education and an effort by some parents to try to access it by allowing household resources, wherever they come from, to be redirected.

Importantly, too, it suggests despite a demand for public schooling, the need to purchase uniforms and books can preclude the attendance of children from poor households. This is confirmed by another respondent to the PESP survey who stated:

> It is the responsibility of the government to educate your daughter. But whose daughters? The amount of stipend money is too small to buy even a set of old textbooks. How could I buy a school uniform? Our family is so needy that I can't even get a taka for my educational expenses. Tell me how could I continue my study? (Ahmed et al. 2004).

Others, including those in the FSSAP program, confirmed that the main reason poor girls stay home is not due to parents' disapproval of their schooling, but rather due to poverty and lack of awareness. From the FSSAP household survey we learn that some extremely poor households have primary school-age children who do not attend school.[56]

[56] See Table 5.13 in Ahmed with Sharmeen and DATA (2004).

The perception that the state should pay for textbooks comes across strongly in the study in Turkey as well, where many parents complained repeatedly that while the state pays for primary school books, it does not at the secondary level. It is sometimes hard to disarticulate cash constraints (which a CCT could overcome) from broader expressions of poverty, which involve perceptions that education is not necessary or helpful for them. One mother said that she cannot afford the books for secondary school, but reasoned that "it will be sufficient for them to go to school up to 8th grade. To know how to read and write will be sufficient for them, if they are capable they can find job anyway." A refrain in this research is that "education is a luxury for people like us." CCTs respond poorly to this self-perception, by bombarding messages about the importance of education, for boys, and especially for girls. These information campaigns appear to have been delivered less effectively in Turkey than in Latin America, partly because of its underdeveloped communications systems. In Turkey, there were no monthly informational meetings with the mothers, or dedicated community-based liaisons, as in most Latin American programs. There were gender-based norms acting as constraints in Turkey, however, where most respondents, when asked about whether such a liaison could work to improve communications, said that it could not, because women could not gather together in groups without men present, and could not be convened by a women leader (Adato et al. 2007).

The effectiveness and limitations of the FSSAP is suggested by data on dropout rates. The Bangladesh School Survey (in Ahmed et al.: 44) reveals, for example, that in schools under the FSSAP, dropout rates for girls are lower than those for boys from both overall and in grades 6 to 9. However, in grade 10, the absolute dropout rate increases sharply for girls and is actually higher than that for boys. For this program in particular the shift is likely a consequence of the stipulation that a girl who fails the SSC examination would have to repeat grade 10 in order to retake it, and she foregoes her stipend and the SSC preparation allowance support. However, enrollment and completion rates in primary and secondary education are much lower for children from poor households than for those from wealthier households. Contributing to these lower rates is the fact that children from poor families have lower rates of proper-age enrollment than those from wealthier families, and evidence from the child nutrition literature reveals that preschool malnutrition is associated with delayed enrollment and also impaired cognitive development. (Ahmed 2004).

Some of this difference in dropout rates may be explained by the increased likelihood that parents at different stages in the education cycle provide private tutors to their children. In most cases, more boys than girls receive private tutoring in the lower grades, but in Class II and VI more tutoring is given to girls. From Class VII onward girls are more likely to receive private tutoring than boys. Overall, tutoring accounts for the single highest indirect cost item for secondary school students (Ahmed 2004: 24-26; see also Hove 2006 for a discussion of the need for and expectation of private tutoring).

The need for tutoring is especially important when students fail to meet the required minimum 45 percent marks, a condition of the FSSP, but it is also relevant to student perceptions of their performance. There is certainly a perception that extra tutoring is needed, general agreement that class instructional time is often too short to understand all of the course material. As one student noted, "If I could pay the private tuition fee and studies under a private teacher for one year, then I could get an "A" grade. It is very hard to study science without the help of a private teacher." (Ahmed et al. 2004). Private tutoring may be an essential complement to school attendance that enables students to succeed in meeting learning goals. In another study of the FSSP, four in eight students believe it is problematic to meet the 45 percent requirement; three in eight believe that the conditions are reachable *if* students can afford private tutoring and can study regularly; only one in eight believe that the conditions are not onerous (Hove 2007: 50-51).

In this FSSP study area, 80 percent of the girls receive private tutoring, mostly from their teachers with whom they meet between 12 and 24 days per month. Discussions with these students confirm that private tutoring helps them to learn in more detail, particularly important for passing mathematics, science, and English. It also compensates for other constraints imposed by school instruction where teacher-pupil ratios of participant vary across the four schools studied from an estimated 1:27 in the two

smaller schools to 1:48 in the two larger ones. From the teachers' point of view, all identify private tutoring as crucial to passing exams and to learning (Hove 2007: 45). But this finding reflects both a conflict of interest since it is teachers in these schools who provide tutoring to ostensibly compensate for low government salaries, and the unwillingness of teachers to fully meet their obligations as public sector teachers.

CCTs and perceptions of economic opportunity and the value of education

Whether education is worth the cost, and for whom, is tied to perceptions of its future economic value. In Bangladesh, as Sharmeen (n.d.) notes, "when a choice is to be made between sending a girl or a boy to school, the family will put its scarce resources into the education of the boy, believing that it is a better long-term investment." In Turkey, this assessment of value applies to decisions on boys' as well as girls' education. For boys in Turkey, education was generally seen as important not only for getting a job, but also for securing the type of better quality, more stable, and higher paying employment that is necessary for supporting their families. This perception varies by location and situation. In rural Van, the economy is heavily agricultural, and education is not perceived as adding much value. In one household with six sons and two daughters, the father found it sufficient to send just one of his sons to school. He did not consider sending his daughters to school despite the CCT, because of concerns about their reputation and family honor, and the fact that there is no school for them in the village, issues explored further below. The mother did consider girls' education important, and thinks that education would help parents and children to have a better life. But she is ill and needs her daughters to work. The father also makes the point expressed by others in his village: that working in the fields is respectable, that education does not guarantee a job or a living, and that ultimately what matters most important is food. Farming, not education, puts food on the table. He says: "I want them to have a better life but this is not going to happen through school but through money and property…They ask for food from the village when they are working outside the village" (Adato et al. 2007).

While high rates of unemployment might be expected to make people seek education as a means of increasing their chances of getting work, it can also make people cynical about the value of education. This came out in Van and Diyarbakir, where it is difficult to convince some households to send boys to secondary school when they do not believe that they will be able to find jobs that use their education. A teacher in Diyarbakir said:

> Most families think that education is useless. Actually they are right, many educated people are unemployed now. The state should first create job opportunities for university graduates and then ask people why they do not send their children to school. People won't send their children to school if they see so many unemployed educated young people...What good does education have, they ask (Adato et al. 2007).

If the economic value of boys' education to very poor families in parts of rural Southeastern and Eastern Anatolia is questionable, due to the agricultural economy and absence of jobs, the economic value of girls' education is nil. This does not mean education has no value, however, as its value is expressed as freedom from ignorance. Schooling enables them to read and write, and for Kurdish-speaking women, to learn to speak Turkish. Education helps them to "move around." Many illiterate women avoid going out of the home. A mother of two older girls in Diyarbakir said that she wanted her children to be educated because "life would be easier for them if they were educated...they could travel around more easily if they knew how to read and write, they could take the correct bus and would not get lost." Some said that educated girls are less reliant on their husbands for everything, and education and literacy is recognized as helping women to talk with others: their husbands, doctors and nurses, and government officials.

Primary education, however, is sufficient to provide these basic abilities to move around and communicate. Secondary education is associated with work opportunities. In the study communities in Van and Diyarbakir, working women are widely thought be less marriageable and an embarrassment to

the family. One father said about his daughter that "she is grown up now, people would laugh at her, [and] I will not let her to work." Her mother added that "if she works she would lose her status as a potential wife and thus will not be able to marry anymore" (Adato et al. 2007).

Despite this lack of support, girls in the study areas of Van and Diyarbakir are aware of the benefits of work, and some would like to find employment. Some parents supported these aspirations. One woman in the urban center of Diyarbakir said she was sad that she had not attended school and as a result had undergone many hardships. She felt that if she were literate, she could manage her tasks on her own. She noted that if she were educated, she would know when her CCT money was due to come, and understand why she received much money sometimes and just a little other times. She values education and wants her daughters to continue their schooling. She wants her children to go to university and feels that they will get better occupations through schooling. She is a CCT beneficiary, but said that she would send her children to school even if the program did not continue, even if they adjusted slowly. Nurses and teachers are often role models, and if the CCT increases girls and parents exposure to teachers and nurses, this may also increase the visibility of these role models (Adato et al. 2007).

In the urban areas, we found girls with aspirations to go to university and have careers. In one household a pair of sisters said they wanted to work but confirmed that it is impossible to work where they live. However, if a girl leaves town she can work elsewhere so long as people in her community will not see her and not know. Such work opportunities for women would thus be likely to produce greater incentives for their education. There are also regional variations. In the urban capital of Samson, people spoke regularly about girls getting jobs. But the relationship between education and employment is again not straightforward. General schooling at the secondary level may not lead to employment, so parents who support their daughters desire to work may prefer vocational school, which are harder to get into.

Extreme poverty may make it difficult for parents to support their daughters, leading to a girl's early marriage to a husband who takes on that responsibility. The relationship between education and marriage is complex, however. Some women say that educating girls opens doors for them to a better life in general, possibly helping them to find a better husband and better living conditions.

In Bangladesh the relationship between education and marriage is perhaps even more complicated, with the preponderance of evidence from the FSSAP study showing far more support for delaying marriage than in the study in Turkey. There are also similarities. There is evidence to suggest that many girls prefer to delay their marriage but are unable to protest a family decision that they marry. This generational difference between parents and daughters, while still common, is changing. Women participants in NGO and government-training programs often are more interested in the education of their children than women who have limited contact with other women and are not exposed to a changing rural landscape where women are more publically visible and may even work. Suggestions of changes to come are apparent in the stories of two girl students. Aklima, a brilliant student studying in class eight in Miapur Kaji Jashimuddin High School, started crying suddenly when we asked her about what we have heard from the other students that her marriage is settled, and it is going to happen within a month. She said:

> What should I do… it's in my fate…I can't do anything… it would not happen if my father was alive… my uncles settled this marriage and my mother is so helpless that she can't do anything about it… she told me that it's for my own benefit… I don't have any elder bother. So who would take my responsibility? I have heard that he [the would- be husband] is not well educated … I will miss my school and classmates very much… I want to study more (Sharmeen n.d.).

Another woman said:

> [The] Ideal age of marriage for a girl does not depend on her age, it depends on the physical growth… if a girl is fully-grown up and became tall at the age of 16… it is the proper time for

> her marriage. If a girl is physically developed at a young age people will tell her parents that your girl became adult (*sheyana*)… then you just can't keep your girl in home. Now a days there is no such thing as social security…so I have decided if someone teases my girl I will arrange her marriage immediately …I told my daughter that you must pass HSC exam before getting married… but if I could find a suitable boy I will settle marriage for my daughter and will ask the groom's parents to let my daughter pass SSC… if they don't agree I will accept their will… because girls are another's property (Sharmeen n.d.) .

The relationship between dowry and education, too, is changing and contradictory. In some cases, it is more costly to marry an educated daughter because the dowry is expected to be higher, while in other cases educated daughters carry their value with them in the form of market access and thus do not require a large dowry. A conversation with a father whose daughter participated in the PESP reflects the first position. He says, "I have stopped her to go to school and given her in marriage... [i]f my daughter becomes grown up and educated I have to pay more money as dowry, so it is better now to give her in marriage and pay less for dowry." Others, however, note that with increased education and both potential and actual employment, women gain greater control and responsibility and are able to bargain in establishing the value of their dowry. Another person stated, "Education will get jobs for them. If girls are educated and get good jobs before marriage, then they can save for their dowry and relieve their parents of this obligation" (Ahmed et al. 2004).

Studies of perceptions of the value of girls' education are beginning to reveal that there is a growing sense that educated and subsequently working girls' may take better care of their parents in old age than will sons. There is an increasing commitment within families to permit their younger daughters to stay in secondary school, past the age when their older sisters had been married off. Such a shift suggests the rapidity of the changing normative environment in Bangladesh, as new roles are imagined, and become more available (Shehabuddin 2008).

Gender and the logistics of school attendance

Transportation problems and overly distant school locations were identified as constraining factors to schooling by half of the households in Samsun and Van (Adato et al. 2007). Some of these concerns can be managed: e.g., building schools closer to girls' homes or finding more suitable transportation and trustworthy drivers. The Turkish government has made efforts in this regard, though more are needed. On the other hand, in Turkey one government official in Diyarbakir believed that parents use the transportation issue as an excuse to avoid sending their daughters to school.

In Bangladesh, distance to secondary schools and limitations in transportation were also cited as challenges to the continuation of girls' schooling. In one example, Selina, a stipend beneficiary from classes 6-10, had to travel 5 kilometers to reach her secondary school. She walked 1.7 km to the bus stop, then used her stipend money pay the bus fare. Although Selina found commuting "hard," still the conditions of the stipend pushed her to maintain 75 percent attendance (Ahmed 2004). Parents also reveal great concern about girls' safety, and thus distance to school is frequently a critical factor in parents allowing girls to study.

Gender and sexuality

Beliefs about the value of girls' education are also linked to beliefs about sexuality, honor, and reputation. Concerns about school and threats to family "honor" was raised by 46 percent of the study households in Turkey. In fact, if marriage and motherhood are added to this category, then 100 percent of the households in Van, 71 percent in Diyarbakir, and 36 percent in Samsun cited these issues as reasons for not sending girls to school. The differences in the rates are interesting, with households in the least poor of the three areas (Samsun) once again demonstrating more progressive positions. Parents' perceptions about reputation and risk influence their attitudes towards girls' school participation in school, especially

in secondary school. They express concern that girls will be attractive to men, putting them at risk. The belief is that girls who have reached maturity should not interact in the public sphere outside of the watch of their parents. If something happens, it will damage the family's honor, and, in discussing the CCT, many said that honor was more important than money (Adato et al. 2007).

The beliefs about women and, men, sexuality, and honor are more difficult to address than the logistical issues discussed earlier. In one of the urban study areas in Diyarbakir, a mother explained, "We do not send our daughters to high school. The schools were dirty. We are living for our honor, we can't. I am saying it for myself. The ones who want will send and the ones who don't, won't. Everybody lives for their own honor." Families continuously spoke about their fear of gossip. Girls' clothing and physical appearances are also a concern, as parents in the cities worry about girls wearing revealing clothing and looking more like women when they go to school. In the urban areas of Diyarbakir and Samsun, parents speak frequently about the risk of girls getting boyfriends in school. Such behavior would be cause to remove her from school, for fear of the family reputation, "because all places are full of relatives and acquaintances." In the rural and more conservative community in Van, boyfriends were not a concern. Their families objected to the idea of "boys and girls sitting together in the school side by side" (Adato et al. 2007).

In this respect Bangladesh is more similar to Turkey than it is different. Research found that reasons for high dropout rates for girls included concern for their modesty, and a desire to limit their interaction with boys. In one case, Majeda, a young student of Mogalbasha High School, would sometimes walk home from school with her classmates, including boys. She spoke of her family's response: "Talking with my male classmates was the main reason for my early marriage, as this became a spicy topic of gossip of my neighbors—both men and women. They convinced my father that he should stop me from going to school, and arrange for my marriage immediately" (Ahmed et al. 2004).

Nevertheless, if the CCTs succeed in getting more girls in school than otherwise would be the case, it is likely that norms will shift. One father in Van commented that local people must see "influential people" —people with authority in the tribal hierarchy—sending their daughters to school. And education itself can make a difference over time. A primary school teacher in Diyarbakir said that while uneducated boys "do not want their sisters to go to school because of their concerns about other boys," educated boys are more supportive. This suggests that if the CCT gets more boys in school, it will also have an eventual effect for girls (Adato et. al. 2007).

Supply-side problems: Quantity and quality of infrastructure and materials

Girls' enrollment and retention is influenced by both the facts and the perceptions of poor school quality, inadequate infrastructure, and safety problems that affect the attendance of children. In the Bangladesh FSSAP study, overcrowding, underqualified teachers, inadequate curriculum, and a lack of basic facilities were the main factors cited that prevented girls from receiving proper attention and skills in school. Many interviewees commented on the need for more female teachers to serve as role models and to make female students feel more secure in the classroom environment (Sharmeen, n.d.). The lack of proper sanitation facilities also significantly impeded girls' attendance. In a secondary school in Kurigram, one student reported:

> Nearly everyone in our class remains absent in classes whenever we had menstruation…. Where should we go? There is no sanitation facility for girls… our home is far away… and the latrine in school is so dirty that we prefer to go to the field rather than go the latrine (Adato et al. 2007).

Similar concerns over school quality and safety issues are also shape parents' and children's attitudes toward school in Turkey. Violence, drugs, poor hygiene, overcrowded classrooms, and high student-teacher ratios are all listed (Adato et al. 2007).

Perhaps unique to Bangladesh is that over one-fifth of children (22.1 percent) between the ages of six and ten are enrolled in grades below that expected by their age. More girls than boys are enrolled at the appropriate age than boys, although their gross enrollment rates are similar (Ahmed 2004).

CCTs' successes, despite the challenges

Despite these myriad factors constraining school enrollment, CCTs do succeed in getting more girls in school. In Bangladesh, the government's emphasis on education sends a message to parents that daughters' education is important, and the financial support of the stipend enabling them to make choices about their children's future. One teacher from a high school said, "When a girl sits idle at home, parents will force her to marry because she is considered a burden on the family. Now the government is giving incentives for girls to go to school so parents are changing their minds" (Sharmeen n.d.).

Similar accounts are given in Turkey. Although less successful in the rural study sites, national level evaluation data shows an overall gain of 10.7 percent in enrollment. The qualitative study reported many comments like this one from a woman in the urban locality in Van: "I am sending all my children to school now because government is helping us to send our children to school…A mother of course wants good things for her children and government knows the best. If they are giving money to people for school, then school is a good thing." She says that as long as the government continues to give her this money, she will send all her children to school. "But if they don't help, I could not send them, it is not my fault."

The CCT money also gives her support to stand up to her husband if he does not want to send the girls to school: "Fathers generally do not want to send their daughters to school but mothers want to send them. Now I can say to my husband that the government is paying me money for my daughters and I am sending them, it is none of your business now." This comment is interesting because it reveals three ways in which the CCT acts: first, to provide money so that school is affordable; second, it confers legitimacy on schooling, based on a respect for government authority; and third, it gives a woman an alternative form of authority (and an excuse) to enable her to stand up to her husband (Adato et al. 2007).

Conclusion

The studies of CCTs in Bangladesh and Turkey reveal that CCT programs have attained some success, but that achievements vary across and within countries. Both countries have made significant strides in increasing enrollment rates and reducing inequality between boys and girls—with Bangladesh achieving parity in primary school enrollment at the national level. However, when disaggregated by household poverty levels, rural-urban residence, ethnicity, and region, patterns of inequality emerge. Moreover, in both countries, large secondary school enrollment gaps remain for both boys and girls, though the gender gap is much larger in Turkey.

CCTs have been important in helping to overcome those constraints to girls' schooling that revolve around household income—schooling costs and the loss of income from child labor. But statistics show that many girls of secondary school age still do not attend school at all. The financial benefit provided by the CCT is apparently not sufficient, particularly in Turkey, to overcome parental resistance to girls' education that stems from a complex mix of competing economic and social pressures that vary in degree and importance across localities. Qualitative data collected from interviews and focus groups reveal that there is enormous complexity surrounding the decision-making about girls' school enrollment beyond the economic consequences to the family. Straightforward economic reasons of poverty, school expenses, and cash availability are critical constraints, but social concerns about autonomy, sexuality, reputation, honor, and authority also appear to be important considerations that are sometimes independent of financial constraints.

Key non-economic factors include gender and related socio-cultural norms that push girls out of school and into marriage and childbearing; beliefs about sexuality and honor; the inadequate availability

and quality of 'supply' (teachers, materials, infrastructure and transportation), the existence or lack of role models; education levels of mothers, fathers and siblings; and girls' and their families' perceptions of the value of education and resultant aspirations and actions. Each of these influences needs to be understood in their different expressions, and with the appropriate level of specificity across and within different countries and regions.

As in much of the developing world, increasing levels of education for girls has been a national objective in Bangladesh and Turkey, as part of each country's modernization project that spans much of the past century, with its social dimension of promoting rights and equality for women, and its economic objective of accelerating economic growth and integration into the world economy. Both countries have made significant strides in increasing enrollment rates and reducing inequality between boys and girls—with Bangladesh achieving parity in primary school enrollment at the national level. But large secondary school enrollment gaps remain for both boys and girls, though the gender gap is much larger in Turkey.

While work opportunities may increase the economic security of households and offer women a chance to secure employment previously unavailable to them, it is crucial to understand how these opportunities alter how parents interpret the value of education. With the relatively new manufacturing sector in Bangladesh and their preference for women workers, for instance, girls' education has garnered increased support from parents. Further, young women's ability to contribute to household income when employed also unsettles the surety that boys are the only source of care in old age. As more women from rural communities enjoy these increased opportunities they become role models for other families and reveal both a changing set of norms and recognition of these changes in rural communities. Thus, while there remains considerable concern about the need to control girls' sexuality and reputation, increased opportunities that are able to be framed with attention to these concerns–such as increasing the number of secondary schools proximate to where girls live so that they are not made vulnerable during travel to school – will likely assist in increasing girls' secondary school attendance.

In Bangladesh, in particular, the role of nongovernmental organizations and their contributions to primary and secondary education, has been especially salient in increasing female literacy to enhance the value mother's place on daughter's education, and providing schools and infrastructural capacity (teachers and teacher training) to rural communities. This contribution has the additional benefit of increasing the number of female teachers who provide a role model for others in the community. Furthermore, all of this takes place within a backdrop of changing economic and political priorities of governments, changing trends in international aid, and broad structural changes in economies, which may open and alter opportunities, and change perceptions of the value of women's labor and its relation to education.

Gender norms and associated discriminatory practices continue to be critical constraints on girls' education, even as some girls and their family members skillfully adapt to them in ways that enable them to avail themselves of new resources.[57] But, the broader economic and institutional environment also slowly alters such norms and practices. Anti-poverty policy cannot then rely too heavily on the recipe of CCTs, as it has been trending toward in many countries, focusing primarily on cash to reduce immediate poverty, and education and health to reduce long-term poverty. The availability of jobs in the economy, for which education is required or an advantage, may have a greater impact on girls' schooling than a CCT. The latter also may have a more sustainable impact if the CCT is vulnerable to cancelation if a new political party or government comes into office, or international donor funds are reduced. On the other hand, recent financial crises, as well as longer-term trends of economic instability and high

[57] Statistics from several Asian countries show that preferences for boys over girls continues, even as households get wealthier, with wealth and new technology offering new methods for discrimination (such as using ultrasound for sex selection) (Rosenburg 2009). This preferences for boys is still believed to be tied to perceptions that boys are better economic investments for the long term, however, thus lending further weight to an argument for increasing women's opportunities to be wage earners who can support their families.

unemployment suggests the continued importance of CCTs to maintain school enrollment in hard economic times, when children are most likely to be taken out of school, especially for girls.

Differences between Bangladesh and Turkey, and across three study regions within Turkey, provide some further insights. While many parts of Turkey have integrated women into the labor force, the vast regional economic differences, overlaid with ethnic and socio-cultural differences and normative religious expectations have led to vastly different pictures with respect to women's employment levels, education levels, and attitudes toward girls' education. The synergies among these considerations—the socio-cultural, economic, and institutional—explain CCTs greater and lesser levels of success in different parts of the country. Disappointing statistics on girls' education in parts of the Southeastern and Eastern provinces in Turkey, underpinned by ethnographic data explaining why so many girls still do not go to school, testifies to the ongoing power of socio-cultural norms. But the lack of employment opportunities, for boys as well as girls, has not aided the cause, and despite substantial government financial investment, new laws, and efforts at moral suasion, girls' enrollment remains low at primary and secondary levels.

The discourse of women's equality, which has been heard in the Turkish state for almost a century, is faint in the Southeastern and Eastern parts of Turkey. This is reflected in a CCT design that—unlike its counterparts around the world—does not have any elected women representatives, meetings for women, or training for women. This is explained in part by the government's anticipation that people would not respond well to these ideas, and indeed research found widespread local opposition to these ideas. Yet, efforts by the Turkish Government and NGOs to promote girls' education through public outreach campaigns was on the right track, and showed that these kinds of approaches are feasible—though they were not part of the CCT program. In CCT programs that do organize women in these ways, provide training, and promote a discourse around women's importance and rights, these have had important impacts. They thus should be prioritized in program designs, but taking into account cultural context and the forms that such activities would be wisest to take. Other complementary components or interventions that are relatively easier to accomplish involve improving the number and location of schools, solving transportation problems, and making school environments safer. These were significant issues in Turkey, and addressed but not sufficiently (though 2009 documents suggest an increased emphasis in this area), as supply side issues are often neglected in CCT programs.

Girls' school attendance and retention in Bangladesh, too, can best be understood by accounting for the normative environment that constrains the mobility and expectations family's hold about daughters. While CCTs respond to some of the financial constraints households face, it is often insufficient, as the poor quality of the school system requires that private tutors be hired if students are to pass appropriately through the grades. Other constraints posed by the school system include the poor quality of teachers, the distance of schools, particularly secondary school, from girls' rural communities, the fear of distance travel to school because of parental concerns for girls' reputation and honor, and the limited number of female teachers to serve as role models for girls and their family. The NGO contribution to the education sector has gone some way in mediating some of these constraints as they complement the relatively poor quality of government schools and provide an important model for how schools ought to be run and for the role that women teachers can play in increasing girls' school attendance. While CCTs undoubtedly increase girls' attendance in some cases, the success of reaching parity and increasing girls' attendance in secondary school would benefit from recognizing and including the effects of changes in the demand for women's labor in manufacturing and other arenas of modern sector employment that requires educational certificates, in new expectations about working girls' ability to contribute to household income, and in the new bargains in dowry decisions and marriage arrangements that family's are able to make when their daughters are educated. Interventions need to be responsive to and work to address social and economic issues simultaneously, either through their independent design or in conjunction with other programs designed for this purpose.

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Projecting the Effects of Women's Educational Attainment and Wanted Fertility in India: Application of a Multistate Population Projection Model

By Leiwen Jiang and Karen Hardee

Abstract

This analysis uses multistate population modeling and demographic projections of India to examine alternative scenarios of socio-economic policy interventions that are gender-focused within a comprehensive analytical framework. Six scenarios of the Indian population are constructed to analyze the comparative impact of alternative policy interventions on demographic outcomes. The pathways through which these interventions affect the future growth of the Indian population are summarized in the following two cases: (1) where investment in female education affects overall population growth and changes the quality of human capital (i.e., the size and educational attainment of the labor force); and (2) where increased access to family planning and reproductive health services is the primary intervention that impacts future population dynamics. Using baseline data from India's 2001 Population Census on fertility, mortality, and education transition rate, the analysis shows that population size projections vary depending on investments in education and family planning. In scenarios with a faster education transition rate for women, the national total fertility rate will decline, compared to a constant education transition rate. Therefore, investment in education, particularly girls' education, does contribute to slower population growth. The analysis also shows that impact of educational investments on population growth is relatively small in the short term, whereas investments in family planning and reproductive health generate a much immediate and more significant impact on population growth. It takes more than just investing in education to achieve population stabilization in a developing country like India. Promoting family planning and reproductive heatlh services is an important complement to expanding education.

Introduction

Education makes a key contribution to the empowerment of people in general, and women in particular. As the means of being guided into an informed state in which a person can exert independent judgment based on the combination of different skills and pieces of information, education is an important prerequisite for mastering the challenges for daily life, to improve wellbeing, and to benefit people and their families, through increased ability to take advantage of economic opportunities. Existing research shows that education affects a range of factors associated with the socioeconomic development of women, including fertility, health, and economic achievement (Lutz et al. 2008a, 2008b). At the same time, access to the means of controlling fertility also makes an important contribution to the empowerment of women (Presser and Sen 2000; Barnett and Stein 1998). How do these two contributing factors interact to improve women's lives and to affect societies? To better understand the dynamics of education, gender, fertility, and development, demographers and social scientists are recognizing the need to project populations based on age, sex, and level of educational attainment.

Several models project educational attainment (Barro and Lee 1993, 2000; Nehru et al. 1993; Dubey and King 1994). Previous studies on this topic, however, have neither provided the desired complete matrix of the composition of the population by age, sex, and different levels of educational attainment for different past points in time, nor have they managed to project these matrixes. The most advanced of these models is proposed by Ahuja and Filmer (1995) who use the Perpetual Inventory Method to sum up the total school enrolment over a long time series and then convert these estimates into educational attainment of the adult population. However, since such long time series data are rarely available, this method involves back projection based on a number of assumptions, which usually introduces a high level of uncertainty. The most problematic aspect of this method is its inability to consider the effects of mortality, as education and mortality tend to be strongly related.

Recently, another model has been used to study past and future population by age, sex, and educational attainment. The World Population Program at the International Institute for Applied Systems Analysis (IIASA), in collaboration with the Vienna Institute of Demography, has applied multistate population projection models to study this issue. The demographic multi-state method is a multi-dimensional expansion of the life table (increment-decrement table) and of the traditional cohort-component method of population projections. Developed at IIASA during the 1970s (Rogers 1975; Keyfitz 1985), it is based on a division of the population by age and sex into any number of "states." These states were originally geographic units, and the movements between them states were migration streams. A state can also reflect other clearly-defined subgroups of the population that change position. Groups with different educational attainment can be "states" with the movements investigated being educational transition rates and the populations in the different states having differential fertility, mortality, and migration rates. This model has been applied in a number of cases: (1) projections of human capital as part of a comprehensive IIASA PDE (Population-Development-Environment) case study on Mauritius (Lutz 1994); (2) projection of population by age and education for six North African countries; (3) the first global level projections by age, gender, and education attainment to 2030 (Lutz and Guojon 2001); and, (4) demographic backward projection considering mortality rates that differ by level of education for reconstructing a consistent set of educational attainment distributions by age and sex for the world over the period 1970-2000 (Lutz et al. 2007). Recently, UNESCO invited IIASA to adapt this method for the official UNESCO literacy projections in the world.

Methods, Model, and Data

This study[58] uses multistate demography methods to make projections of human capital in India, namely population by age, sex, and educational attainment category. The analysis was conducted using the model noted above developed by the World Population Program. The analysis uses data from the 2001 Census of India, from which the baseline population, the mortality rate, the fertility rate, and the education transition rate were derived.

Baseline population

The model requires baseline population by age (single year), sex, and educational attainment. The 2001 Census of India provided the data on the population by age (single year) and sex. Single year population by education is only available ages 7 to 19; for other ages the data are only available for five year age groups. Moreover, the direct report of population by age suffer from serious "age-heaping," i.e., a reporting of ages in multiples of certain numbers, generally 0, 5, 10, 15, and so on.

To derive the data needed, there are four steps to take:

- Use the Whipple Index method (Newell 1988) to remove age-heaping and obtain population by age and sex.
- Use information of population by education and calculate the proportion of the population by education in each age group.
- Derive the population by sex, education, and age by a single year interval for ages 7–19, five year intervals for ages 0–6, and from age 20–100+ using the proportion of the population by education derived in step (2) multiplied by the adjusted population from step (1).
- Use the average number of the five year age group for each single year age group for those age categories for which single year age group information is not available.

[58] For this study, Population Action International (PAI) was contracted by International Food Policy Research Institute (IFPRI) to carry out forward-looking population modeling and demographic projections of India to examine alternative scenarios of socio-economic policy interventions that are gender-focused within a comprehensive analytical framework. This report describes the methodology and data and provides the results of the analysis.

The derived baseline population is shown in Figure 3.1.

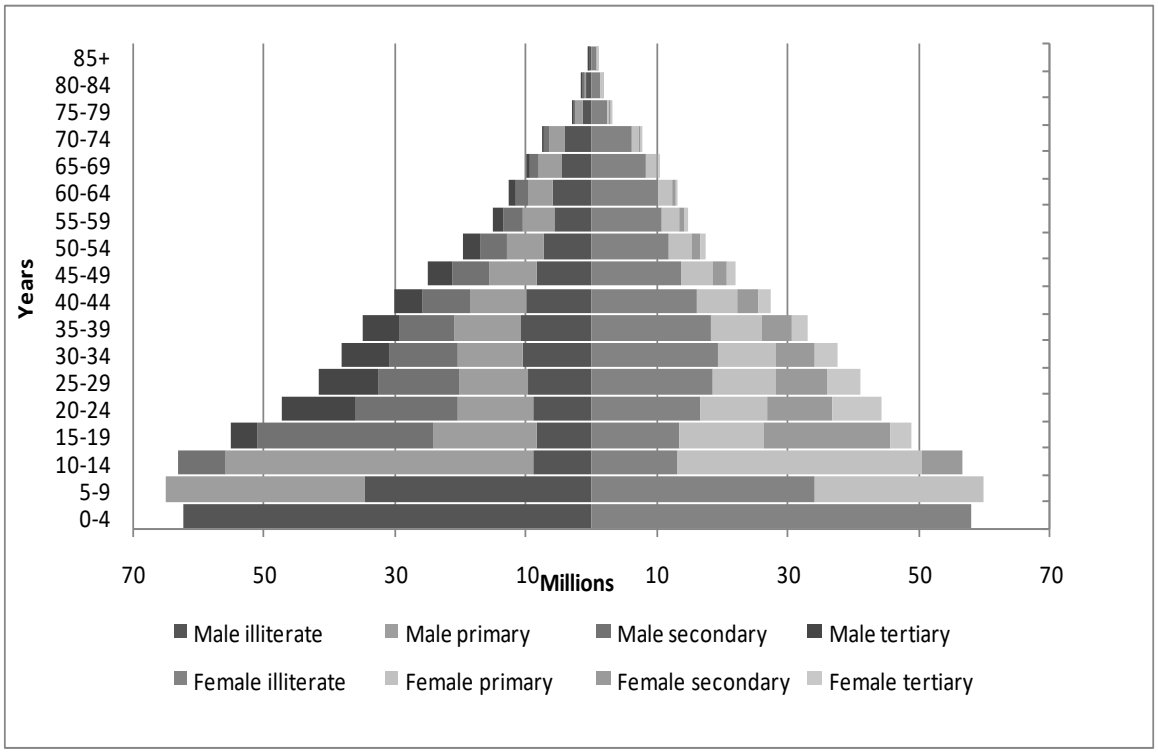


Figure 3.1. Indian population by age and education attainment, 2001.

Source: Author's calculations from 2001 Indian Census data.

Mortality

The 2001 India Census report also gives data on deaths by age and sex. Using life table techniques (Newell 1988), we obtain the mortality rate and life expectancy by age and sex. The life expectancy at birth is 64.2 for the female population, and 61.6 for the male population. Figure 3.2 shows the age pattern of the population survival rate. It indicates that about 6 percent of new births die before reaching age 1, while close to 80 percent of people can celebrate at least their 50th birthday. Moreover, Indian male population has higher probability of survival than the female before age 50, which differs from the situation in the industrialized countries and to a large extent, reflecting the lower social and family status of Indian women.

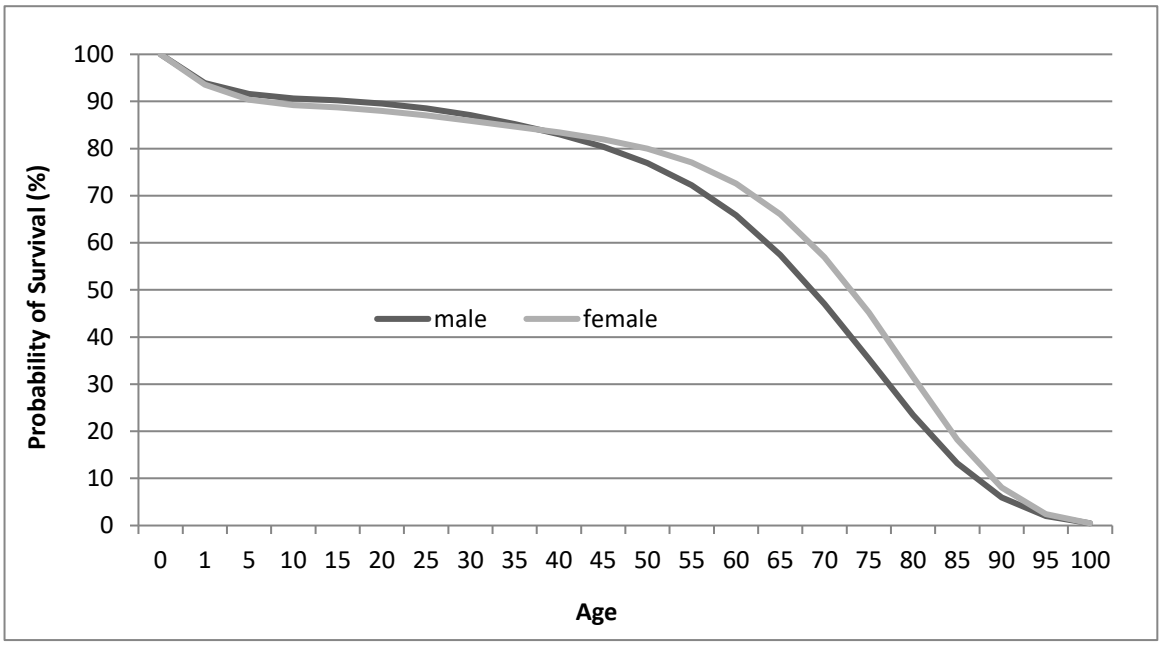


Figure 3.2. Indian population survival rate.

Source: Author's calculations from 2001 Indian Census data.
Note: Survival rate refers to the probability of population of a birth cohort to stay alive as age increases. For example, the survival rate is 1 at age 0. By age 1, the survival rate declines to 96 percent; by age 50, the survival rate declines to 80 percent for a woman and 77 percent for a man.

Data on deaths by education level do not exist for India. However, research on life expectancies of populations with different educational backgrounds in other developed countries reveal a common pattern where at age 15 life expectancy among population groups in the lower educational categories is always lower than among population groups with higher education. More specifically, the life expectancies at age 15 of those with no education is one year less than those with primary education; the differences between primary education and secondary, and between secondary and tertiary are all two years each, resulting in a five year difference between the highest and lowest categories (Lutz 2009).

Based on the research from other countries and sensitivity analyses using our projection model, life expectancies at birth for the Indian population by educational categories are derived for the baseline year so that the combined life expectancy of all those categories is consistent with the life expectancy of the total population.

Among the female population, life expectancy by educational category is 63.7 for the category of no education, 64.7 for primary education, 66.7 for secondary education, and 68.7 for tertiary education; for males, the life expectancies are 60.6, 61.6, 63.6, and 65.6, respectively.

To overcome data limitations for making assumptions on future changes in age-specific mortality rates for the population by education categories, the projection model uses the Brass Relational Model (Brass 1981) to adjust the survival ratios according to estimated differences in life expectancy in the baseline year and assumed changes in life expectancy for the future.

Fertility

The 2001 census data provides age-specific fertility rates for Indian women by education (Figure 3.3), from which we calculate the total fertility rate for each education group: 4.1 births for women with no

education, 2.7 births for women with primary education, 2.0 births for women with secondary education, and 1.8 births for women with tertiary education.

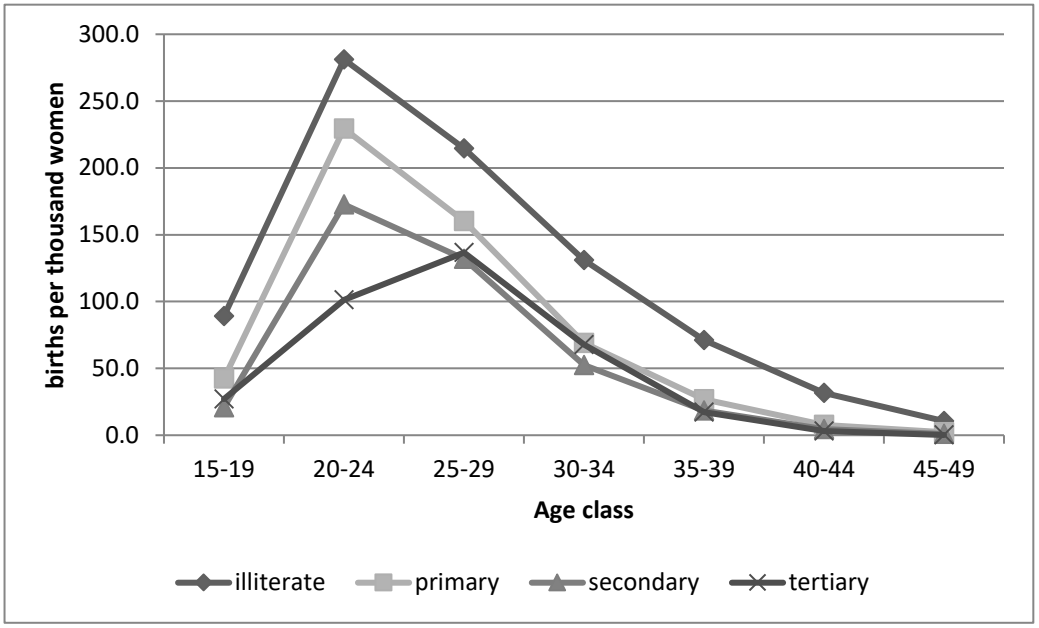


Figure 3.3. Age-specific fertility rate (births per thousand) of Indian women in each age class by education, 2001.

Source: Author's calculations from 2001 Indian Census data.
Note: In the graph, the age-specific fertility rate is expressed as the number of births given by every 1000 women of a certain age group.

Education transition rate

Ideally, we would use data from two points of time (e.g., 2001 and 2006) to calculate the education transition rate, but such data are not available. Instead, we use three steps to calculate the education transition rate from 2001 census data by:

1. Calculating the proportion of the population by education attainment for each sex and age group.
2. Assuming that the increase in the proportion of each education level represents the upward transition across ages, and calculate the increase of education attainment and the conditional transition probability to achieve this increase.
3. Using the age-specific educational transition rate, we calculate the overall education transition rate (propensity) in the baseline. The overall conditional education transition rates of the male population are 0.85 for transferring from no education to primary education, 0.63 for primary education to secondary education, and 0.26 for secondary education to tertiary education. The corresponding figures for the female population are 0.79, 0.54, and 0.24, respectively.

In contrast to these transition rates for the overall male and female populations, we can also derive age-specific education transition rates, as is shown in Figure 3.4 below.

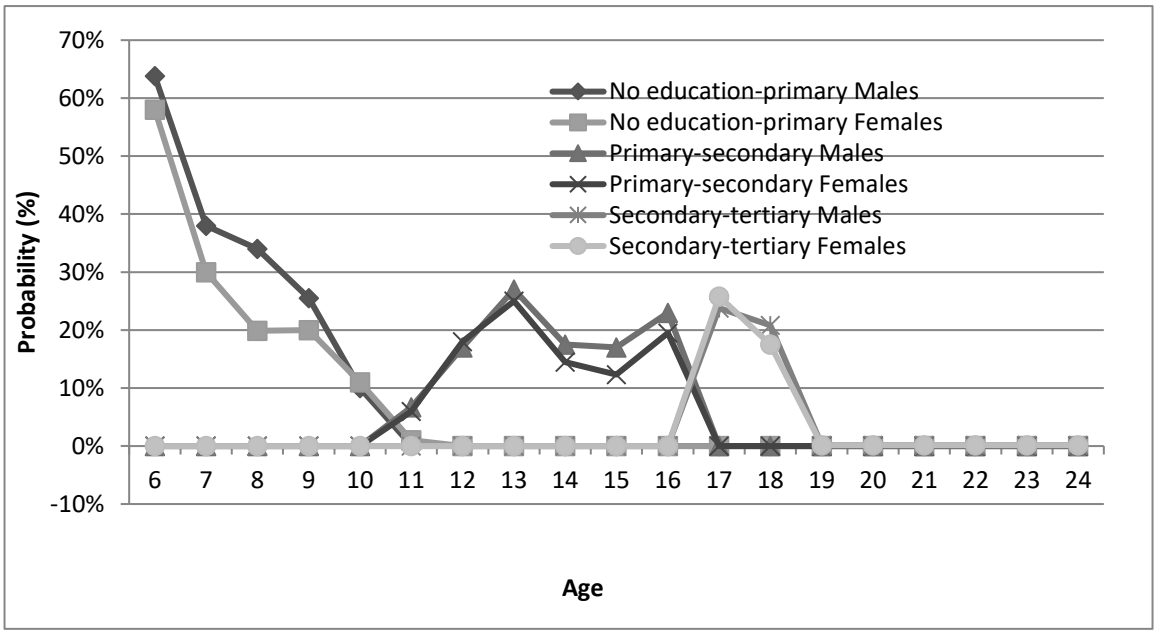


Figure 3.4. Education transition rate of the Indian population

Source: Author's calculations from 2001 Indian Census data.
Note: Education transition rate is the conditional probability by age that people move from a lower education level to a high level over time. For example, 63 percent of uneducated boys will move up to primary education at age 6; about 10 percent of girls aged 11 who have primary education will move up to secondary education.

Scenarios

Six scenarios of future changes of the Indian population are constructed to analyze: (1) the impacts of investment in education on overall population growth and changes in human capital (number of labor force population and its educational composition); and (2) the potential impacts of family planning and reproductive health services, relative to the impact of investment in education, on population growth and the labor force. The scenarios, described below include:

- Constant Scenario
- Global Education Trend Scenario
- Fast Track Educational Attainment Scenario
- Wanted Fertility Scenario
- Complete-Medium Scenario
- Complete – Fast Track Education Scenario

First, as the baseline **Constant Scenario**, we assume the fertility, mortality, and education transition rate in the baseline year (2001) will remain constant for the whole projection period.

Second, using the same values for fertility and mortality by educational category as in the Constant Scenario, we assume a moderate increase of the educational transition rate which is embedded in the **Global Education Trend Scenario** (GET) (Lutz et al. 2007). This assumes a country's educational expansion will follow an expansion trajectory based on the historical global trend. Under this assumption, for India, the overall conditional transition rates by year 2051 will increase to 0.99 for no education to primary education, 0.98 for primary education to secondary education, and 0.30 for secondary education

to tertiary education, for both men and women. The assumed transition rates in the year 2050 are similar to the present level of the United States.

Third, we assume a **Fast Track Education Scenario** (FTE) in which India will achieve overall transition rate 0.99 for no education to primary education by year 2015, 0.98 for primary education to secondary education by 2030, and 0.60 for secondary to tertiary education by 2050. Similar to the GET Scenario, the FTE Scenario only changes the education transition rates compared to the Constant Scenario.

In the fourth **Wanted Fertility Scenario**, compared to the Constant Scenario, we change only the total fertility rate. The total fertility rate (TFR) of a population can be decomposed into wanted and unwanted fertility based on household surveys that ask women the number of children they desire. Wanted/unwanted fertility has been one of the most important topics in the field of demography, reproductive health, and public policy for about four decades. Unwanted fertility is an important concept because, in principle, it can be reduced by ensuring access to family planning services that assist couples in achieving desired family size. Moreover, the estimates of unwanted fertility often serve as an input to population projections, by indicating the future trend in fertility and the scope for fertility to fall through population policies and effective reproductive health services (Casterline and El Zeini 2007; Bongaarts 1994, 1997).

In this analysis, the assumptions about the change of fertility is based on the proportion of wanted fertility rate relative to the observed total fertility rate derived from India's 1992–93 and 2005–06 Demographic and Health Surveys. As shown in Table 3.1, about 24 percent to 30 percent of the births to Indian women are unwanted. While the proportion of unwanted fertility for women with education did not change very much between the 1992–93 and 2005–06 surveys, the proportion for uneducated women increased significantly indicating the gaps between declining desired family size and efficient family planning services for this group of women. In this Wanted Fertility Scenario, we assume the TFRs of women by each education category will reach the levels of their wanted fertility reported in the 2005-06 DHS Survey report for year 2021, and remain constant afterwards. Model test shows that under this scenario India's TFR will decline from the baseline level of 3.0 to below replacement level before year 2021, similar to the medium scenario of the United Nations population projection 2008 Revision.

Table 3.1. Wanted fertility rate of Indian women of childbearing ages, from DHS surveys, 2005-06

	2005-06 Survey			1992-1993 Survey		
	Wanted TFR (1)	**TFR** (2)	**Ratio** (1)/(2)	**Wanted TFR** (1)	**TFR** (2)	**Ratio** (1)/(2)
No education	2.4	3.6	0.667	3.2	4.0	0.800
Primary	1.9	2.6	0.731	2.3	3.0	0.767
Secondary or Higher	1.7	2.1	0.810	1.9	2.4	0.792
Missing	1.1	1.1	1.000	3.1	4.1	0.756
Total	1.9	2.7	0.704	2.6	3.4	0.765

Source: Author's calculations from DHS surveys, 2005-06.

In the previous scenarios, mortality of the population by education is assumed to remain the same over the whole projection period in order to test the net impacts of education and fertility change (family planning services) on population growth and labor force (human capital) changes. In the fifth scenario, the **Complete-Medium Scenario** we consider a more complete picture of population dynamics for India's future by taking into account the impacts of changes in fertility, mortality, and educational transition. We adopt the assumption on life expectancy from the UN population projection 2008 Revision,

assuming the average male and female Indian life expectancy will increase from about 63 years in 2001 to 66.8 years by 2021, and 73.3 years by 2051. Table 3.2 shows the detailed assumptions on life expectancies by sex and educational categories. In this scenario, we assume that fertility changes will be the same as described in the Wanted Fertility Scenario, and that the education transition rate follows GET Scenario.

Table 3.2. Assumed life expectancy by sex and educational categories for India, various years.

	2001	2006	2021	2051
Female				
Illiterate	63.6	64.7	67.9	74.7
Primary	64.6	65.7	68.9	75.9
Secondary	66.6	67.7	71.1	78.2
Tertiary	68.6	69.7	73.2	80.6
Sum	64.2	65.3	68.5	75.4
Male				
Illiterate	61.0	61.9	64.5	70.7
Primary	61.6	62.5	65.1	71.4
Secondary	63.6	64.5	67.2	73.7
Tertiary	65.6	66.5	69.3	76.0
Sum	61.6	62.5	65.1	71.4

Source: UN population projection 2008 revision for India.

A sixth scenario **Complete-Fast Track Education Scenario** is included in which all parameters are the same as in the Complete-Medium Scenario, except that education transition rate follows the fast track education scenario. By comparing the results from the fifth and sixth scenario, it is possible to study the complete picture of the combined effects of education investment on births and deaths, and consequently on population size and composition changes.

Results

Population growth

While India's population will continue to grow under all scenarios, the population growth rate will be the highest under the Constant Scenario in which total population size will reach about 1.8 billion by the middle of the century (Figure 3.5). Under the Constant Scenario, even as the TFR of women of each education category stay the same, the national TFR will decline from 3.05 in 2001 to 2.68 by 2051. This decline in the national TFR will occur as women in the older generations with low levels of education who have higher TFRs increasingly leave the childbearing age group and younger generations who are relatively more educated and have lower TFRs increasingly enter childbearing age.

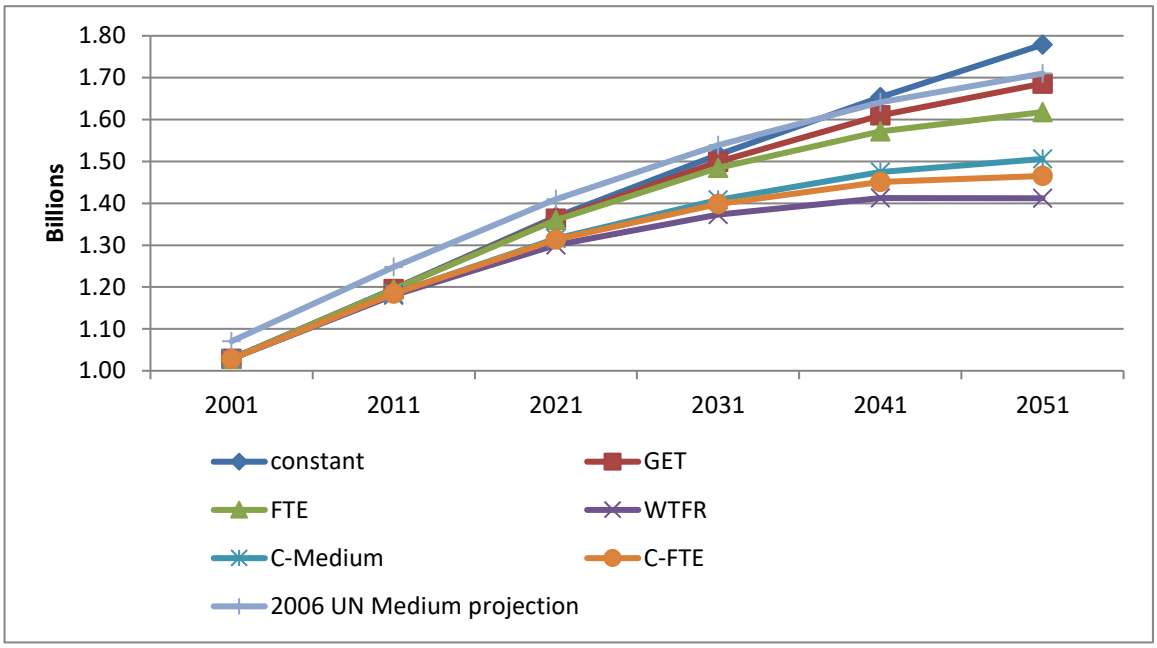


Figure 3.5. Indian population change, various years, 2001-2051.

Source: Author's calculations.
Key: Constant = Constant Scenario; GET = Global Education Trend Scenario; FTE = Fast Track Educational Attainment Scenario; WTFR = Wanted Fertility Scenario; C-medium = Complete-Medium Scenario; C-FTE = Complete- Fast Track Education Scenario.

Projection results show that when the education transition rate increases under the GET and FTE scenarios, India's population growth rate declines. More educated women in the population drive down the national total fertility rate: under GET and FTE scenarios, TFR will decline from 3.05 in 2001 to 2.22 and 1.99 by year 2051, respectively, which is 0.83 and 1.08 lower than that under the Constant Scenario, as is shown in Table 3.3 below.

Table 3.3. Projected Total Fertility Ratio (TFR) under each scenario, various years, 2001-2051.

	constant	*GET*	*FTE*	*WTFR*	*C-Medium*	*C-FTE*
2001	3.05	3.05	3.05	3.05	3.05	3.05
2011	2.85	2.84	2.84	2.47	2.47	2.46
2021	2.72	2.65	2.59	2.00	2.00	1.91
2031	2.68	2.50	2.33	1.97	1.97	1.76
2041	2.68	2.37	2.13	1.97	1.97	1.65
2051	2.68	2.22	1.99	1.97	1.97	1.57

Source: Author's calculations.

Although increases in education will also reduce mortality as people with higher levels of education have higher life expectancy, the reproductive effect of declining fertility over generations will result in a much more significant reduction in total population growth. The total population size will be about 100 million and 160 million smaller by year 2051 under the GET and FTE scenarios, respectively, than that under the Constant scenario. Therefore, investment in education, particularly girls' education, does contribute to slower population growth.

The investment in family planning and reproductive health services on future population growth in India is also tested. The Wanted Fertility Scenario (WTFR) provides a chance to analyze the effects on

population changes, if family planning and reproductive health services help women to actualize their wanted fertility (and eliminate their unwanted fertility). Other factors being equal, if Indian women in each education category gradually achieve their wanted fertility rate by year 2021, it will lead to the overall TFR declining from 3.05 in 2001 to under replacement level by year 2021, and further to 1.97 by year 2031, due to the departure of less educated women in the older generations from the child-bearing age groups. Consequently, the total population size will be 50 million less by year 2021 and 260 million less by year 2051, relative to that under the Constant Scenario. Comparing the effects on population growth under the GET, FTE, and WTFR sceanrios, the impact from these health investments will be much more immediate and significant than investments only in education. This is mainly because investment in education takes a number of years to have an effect on fertility reduction when more educated girls gradually reach childbearing age. Given the nature of reproductivity of fertility over generations, the impacts of postponing reduction in fertility by investment in education will be amplified overtime. Therefore, to achieve population stablization (or zero population growth) in a developing country like India, investment in education only will not be enough. Promoting family planning and reproductive heatlh serivces is also very important, and provides an important compliment to expanding education.

Another reason that population growth under the GET and FTE scenarios is higher than under the WTFR scenario is because increasing the education transition rate reduces the mortality rate and, as described above, life expectancy is higher among more educated people. Although no changes in life expectancy of the population by education are assumed for future years in all three scenarios, increasing the education transition rate increases the proportion of the population with higher education levels and drives the life expectancy of the overall population 0.3 and 0.5 years longer under GET and FTE scenarios, respectively, than under WTFR scenarios.

Moreover, the impact of an increasing education transition rate on life expectancy of the overall population is slightly underestimated. The GET and FTE scenarios only consider the disparities in life expectancy among people of various education levels, due to improving socioeconomic status, better knowledge about medicine and health, adaption of healthier life styles and sanitation habits, safer working environment, etc. Indirect impacts of higher levels of education on life expectancy, however, such as better knowledge to raise healthier children and higher motivation to improve community sanitation and health facilities, are not considered. There is limited research, however, that could provide the needed evidence on how much improving education reduces mortality rates, making it difficult to build into scenarios of changes in life expectancies.

The impact of the changes in education and fertility on population growth through deaths is complicated. While higher levels of education increase life expectancy of the overall population and reduce mortality as described above, declining fertility through achieving the wanted fertility rate or changing the composition of the population by education category will change the population age structure and result in population aging. A more mature or aged population will increase population death rates due to a larger proportion of elderly population, even though mortality rate remains the same or even increase. For instance, the population death rate by year 2051 is 1.44 percent under the WTFR scenario, significantly higher than under the Constant Scenario (1.25 percent), although the life expectancy is the same. The population death rates by year 2051 under GET and FTE are 1.27 percent and 1.29 percent, also higher than under the Constant Scenario, even though the life expectancies under FTE and GET scenarios are 0.3 and 0.5 years longer, respectively.

The impact of changes in life expectancy on total population growth is much smaller than that of changes in the fertility rate, due to the reproductive nature of fertility changes over generations. Changes in fertility levels are also reflected in the changes in population age compostion, which affect the proportion of the population in the labor force, which will be described in the next section.

Population growth under the Complete-Medium Scenario provides a more complete and somewhat "realistic" picture. It follows the UN population projection mortality scenario, a GET scenario, and achieves wanted fertility rate by the year 2021, which results in an overall TFR similar to UN medium variant population projection. Under the Complete-Medium scenario, the total Indian population size will increase to about 1.3 billion by year 2021, to about 1.4 billion by 2031 and 1.5 billion by 2051. In addition, we also include a Complete-Fast Track Education Scenario in which all parameters are the same as in the Complete-Medium scenario, but education transition rates follow those under the FTE Scenario. The projection result shows that while the FTE transition will help India to reduce its population growth rate slightly, the impact on population reduction will not be significant until after year 2031.

Labor force

As population increases, the total number and the proportion of the population in the labor force in India will also increase in the next decades under all scenarios (Figure 3.6). This increase in the labor force population provides India with the potential of a Demographic Windows of Opportunity (or Demographic Dividend), in which a large proportion of the population being in the age groups of labor force may contribute to a high economic growth rate and economic take off, as long as there is an enabling environment supporting economic growth (Bloom, Canning and Sevilla 2003; Lee and Mason 2006).

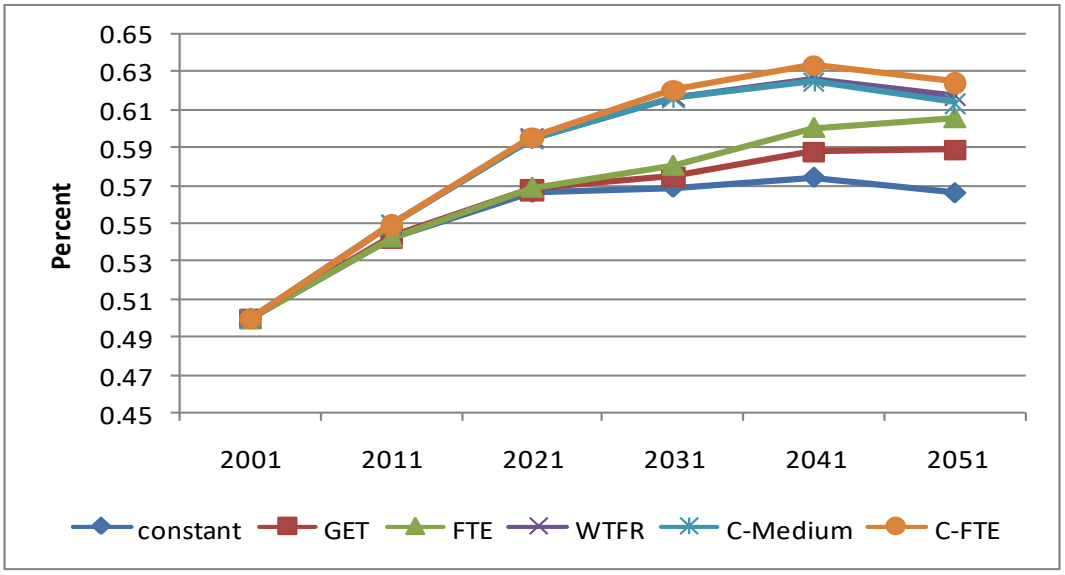


Figure 3.6. Percentage of the labor force population, various scenarios, various years, 2001-2051.

Source: Author's calculations.
Key: Constant = Constant Scenario; GET = Global Education Trend Scenario; FTE = Fast Track Educational Attainment Scenario; WTFR = Wanted Fertility Scenario; C-medium = Complete-Medium Scenario; C-FTE = Complete- Fast Track Education Scenario.

The proportion of the population of labor force age is quite different under the various scenarios. In general, a lower TFR is associated with a higher the proportion of the population being of labor force age. Under the Constant Scenario, the proportion of the population of labor force age will increase from 50 percent of the total population of India in 2001 to about 57 percent by year 2021, where it will stay until it slightly declines after 2041. Under the increasing education transition rate in the GET and FTE scenarios, the proportion of the population of labor force age will be virtually the same as under the Constant Scenario until 2021, and will increase to reach 59 percent and 61 percent, respectively, by year 2051.

The increase in the proportion of the population of labor force age is much more substantial under the scenarios of fertility decline. Through achieving the wanted fertility rate by the year 2021, the proportion of the population in the labor force under the WTFR scenario will quickly increase to above 59 percent by year 2021, and hits a peak of about 63 percent by year 2041. This proportion will be nearly the same under the Complete-Medium scenario, although it has a higher life expectancy and education transition rate. This again demonstrates the importance of fertility levels on not only total population size but also the population age composition. Compared to the Complete-Medium Scenario, further increase in education levels under the C-FTE Scenario will also significantly drive the proportion of the population in the labor force up in future years.

Education composition

The increasing proportion of the population of labor force age offers the potential for a demographic dividend, according to experiences in other regions of the world, e.g. East Asian countries. To actualize the potential, however, it will be more important to increase skilled labor by investing in education. According to the 2001 census, more than 41 percent of the Indian labor force population was illiterate (Table 3.3). Under the constant education transition rate, this figure will gradually decline to about 26 percent by 2021, and 18 percent by 2051, as many illiterate older generations leave the labor force. The proportion of the labor force with tertiary education will only slightly increase from 13.5 percent in 2001 to 14 percent by 2021, but will decrease to 12 percent by 2051. In particular, the education level of the female labor force is extremely low: in year 2001, about 54 percent of the female population of labor force age was illiterate and only 9 percent had tertiary education. Under the Constant Scenario, the situation will not improve very much. If India follows the Global Education Trend, the proportion of the population of labor force age with secondary or tertiary education, who account for majority of the skilled labor force, will increase from 34 percent in year 2001 to 69 percent by 2051 (Figure 3.7 and Table 3.3). Under the Fast Track Education Scenario, the percent of labor force age with secondary education (and above) will increase to about 74 percent by year 2051, due to the improvement of educational attainment among women of working age. Under the Complete Fast Track Education (C-FTE) scenario, the proportion of the female working force with secondary or tertiary education will increase from 23 percent in 2001 to more than 70 percent by 2051, and, as under the FTE scenario, both men and women will achieve universal secondary education, and the tertiary education transition rate rises to 60 percent.

Table 3.3. Baseline and projected percent of the Indian population of labor force age by education attainment under each scenario, various years, 2001-2051.

Percent Illiterate						
Year	**Constant**	**GET**	**FTE**	**WTFR**	**C-Medium**	**C-FTE**
2001	41.2	41.2	41.2	41.2	41.2	41.2
2011	32.1	32.1	32.1	32.1	32.1	32.1
2021	25.7	25.4	24.9	25.7	25.5	24.8
2031	21.3	19.9	17.1	21.4	20.1	17.2
2041	18.4	15.1	10.2	18.5	15.4	10.7
2051	17.5	11.7	5.8	17.5	12.2	6.4
Percent Tertiary						
Year	**Constant**	**GET**	**FTE**	**WTFR**	**C-Medium**	**C-FTE**
2001	13.5	13.5	13.5	13.5	13.5	13.5
2011	14.2	14.3	14.6	14.2	14.3	14.6
2021	14.0	14.8	16.5	14.0	14.8	16.5
2031	13.8	15.9	20.4	13.8	15.9	20.3
2041	13.0	17.2	25.9	13.0	16.9	25.2
2051	12.0	19.0	32.8	12.1	18.4	31.4
Percent Secondary and Above						
Year	**Constant**	**GET**	**FTE**	**WTFR**	**C-Medium**	**C-FTE**
2001	34.0	34.0	34.0	34.0	34.0	34.0
2011	41.4	41.6	41.6	41.4	41.6	41.6
2021	45.3	47.5	47.9	45.3	47.5	48.0
2031	48.0	54.2	56.4	48.0	54.0	56.3
2041	49.3	61.6	65.5	49.4	60.8	64.7
2051	48.8	68.8	73.7	48.8	67.2	72.1

Source: Author's calculations.

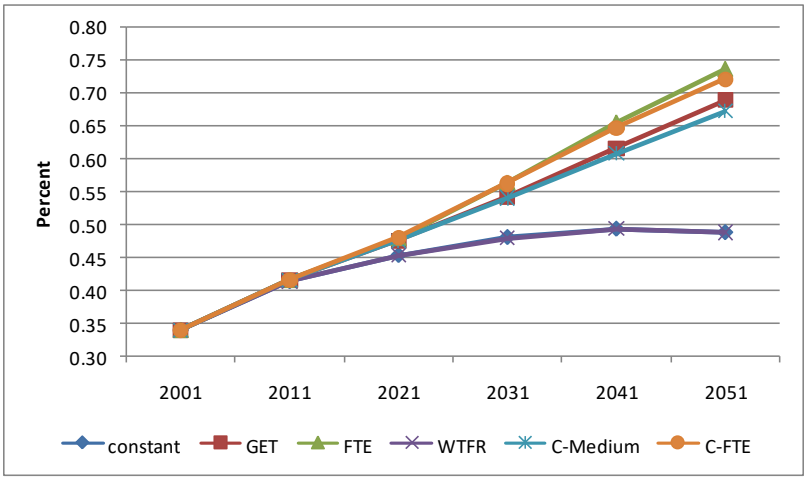


Figure 3.7. Percentage of Indian labor force population with secondary or higher education under various scenarios.

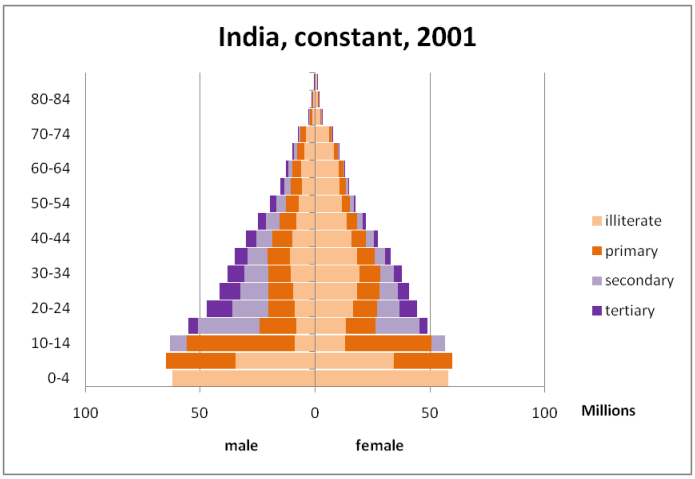
Source: Author's calculations.
Key: Constant = Constant Scenario; GET = Global Education Trend Scenario; FTE = Fast Track Educational Attainment Scenario; WTFR = Wanted Fertility Scenario; C-medium = Complete-Medium Scenario; C-FTE = Complete- Fast Track Education Scenario.

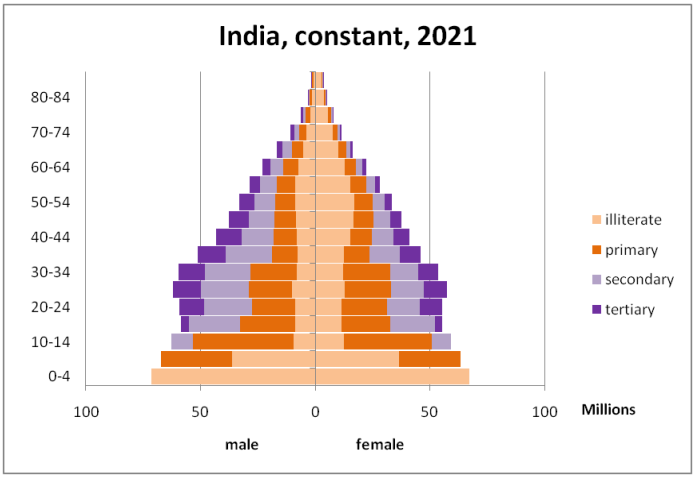
The projection results also show that, although the proportion of the population of labor force age increases very fast by achieving replacement fertility rate under WTFR scenario, without increasing investment in education, the percentage of labor force population with secondary or tertiary education levels remains lower than 50 percent in the future decades, which will affect India's ability to take advantage of the demographic dividend.

The projection result under the Complete-Medium scenario offers a possible future. Assuming the GET and medium mortality and fertility, the proportion of the population of labor force age with secondary and tertiary education will increase from 34 percent in 2001 to 45 percent in 2021 and 67 percent in 2051. These projections are slightly lower than those under the GET scenario because of the higher life expectancy in that scenario that retains more less-educated people in the population of labor force age from the older generation. The Complete Medium scenario and the FTE scenario again produce significantly higher proportions of the population of labor force age with secondary and tertiary education.

Population pyramids

Population pyramids provide a convenient way to display and summarize the changes in population size and composition. Population pyramids showing the changes in total population size, age, sex, and educational attainment under each of the six scenarios for the years 2001, 2021, and 2051 are presented in Figures 3.8–3.13. The figures show that while India's total population expands in the future under all scenarios there will be variation in the population age structures. The share of middle and old population is the largest under the Complete-Fast Track Education, which is much larger than under the Constant Scenario. From the population pyramids, one can also observe the changes in education composition of the Indian population over time. For example, it shows that the large number of illiterate people, (especially women ages 20–45) in year 2001, move up with age over time, and gradually leave the population more rapidly because of their lower life expectancy compared to those with higher education levels. Under the Constant Scenario, although the population size of labor force age in 2021 and 2051 will increase the most, the majority of the labor force has only primary or no education. In contrast, under the Complete-Fast Track Education Scenario the population size of labor force age will be comparatively small. However, a large share of the labor force has tertiary education, and there is almost no worker under 40 who will be illiterate by 2051 owing to the universal primary education. Moreover, the skewed distribution of population by education between male and female population will disappear in 2051 under this scenario.





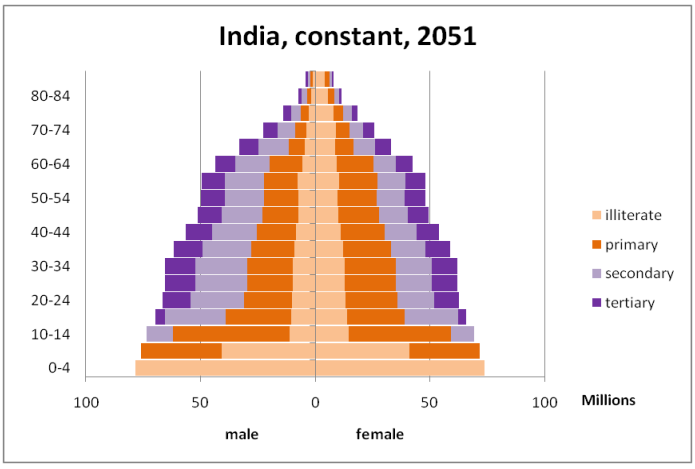


Figure 3.8. India Constant Scenario 2001, 2021, and 2051.

Source: Author's calculations

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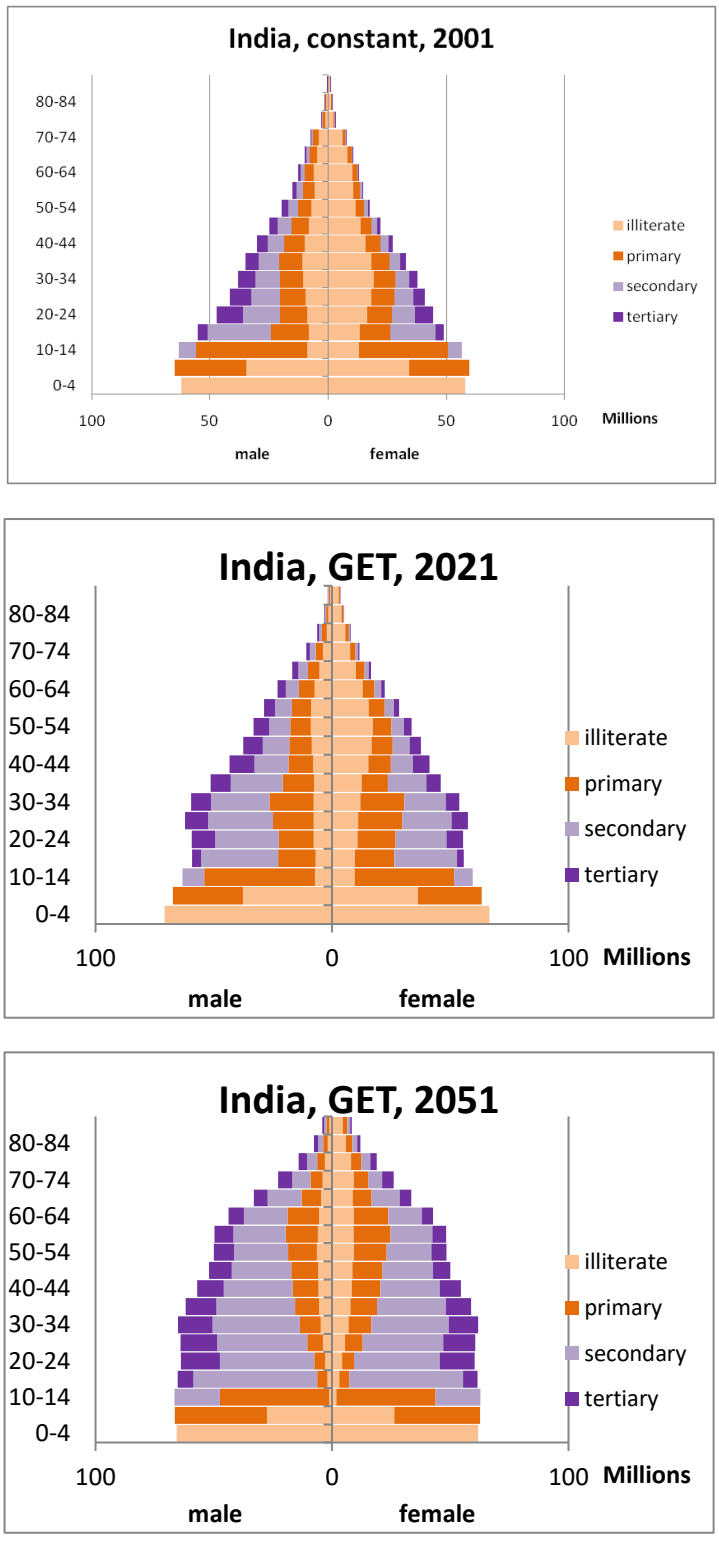


Figure 3.9. India Constant Scenario 2001 and Global Education Trend Scenario 2021 and 2051.

Source: Author's calculations.

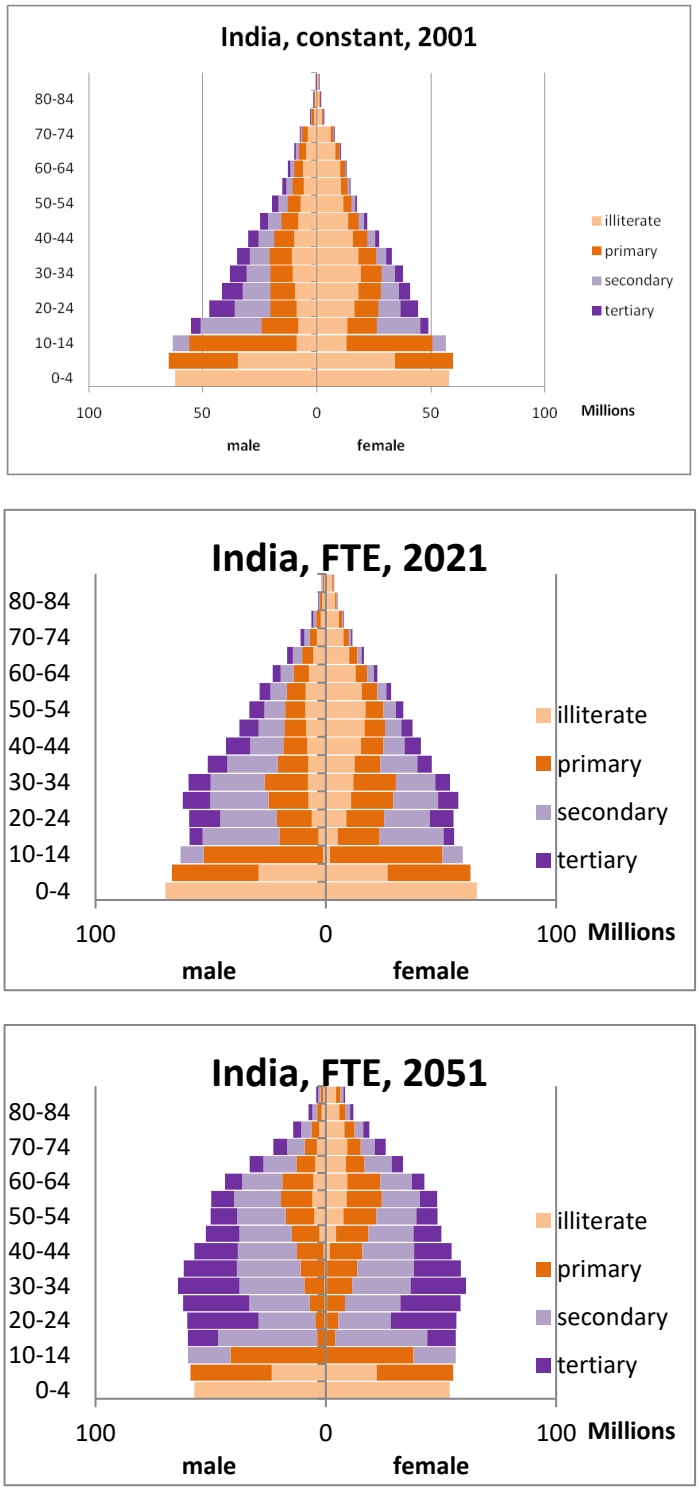
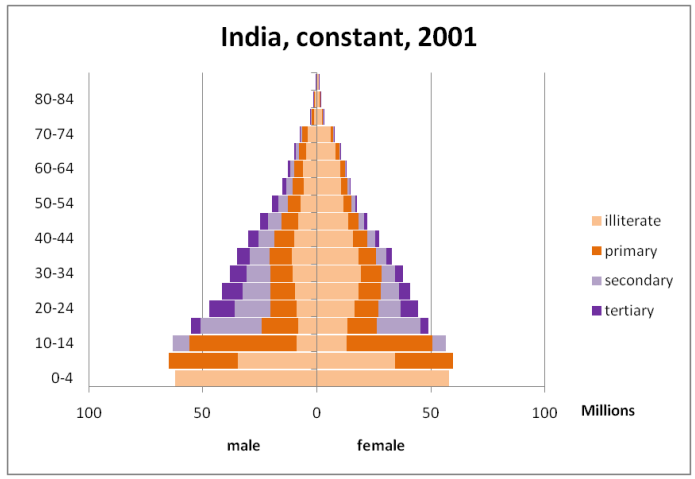
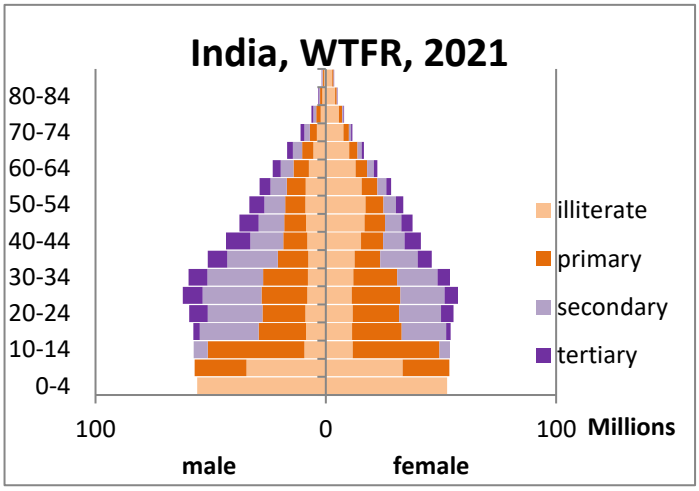


Figure 3.10. India Constant Scenario 2001 and Fast Track Education Scenario 2021 and 2051.

Source: Author's calculations.





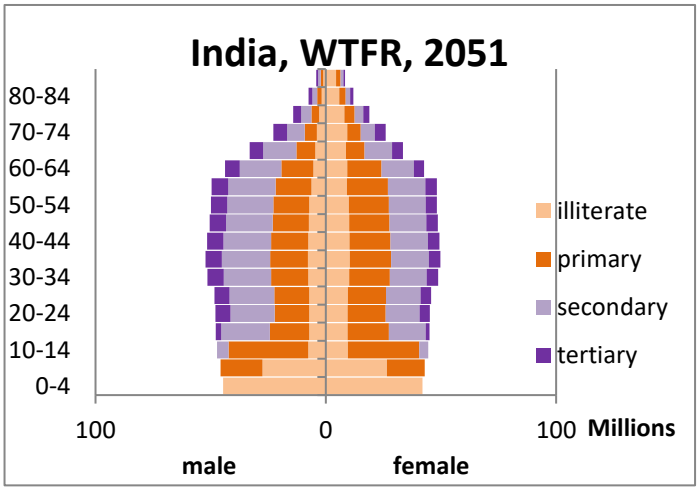


Figure 3.11. India Constant Scenario 2001 and Wanted Fertility Rate Scenario 2021 and 2051.

Source: Author's calculations.

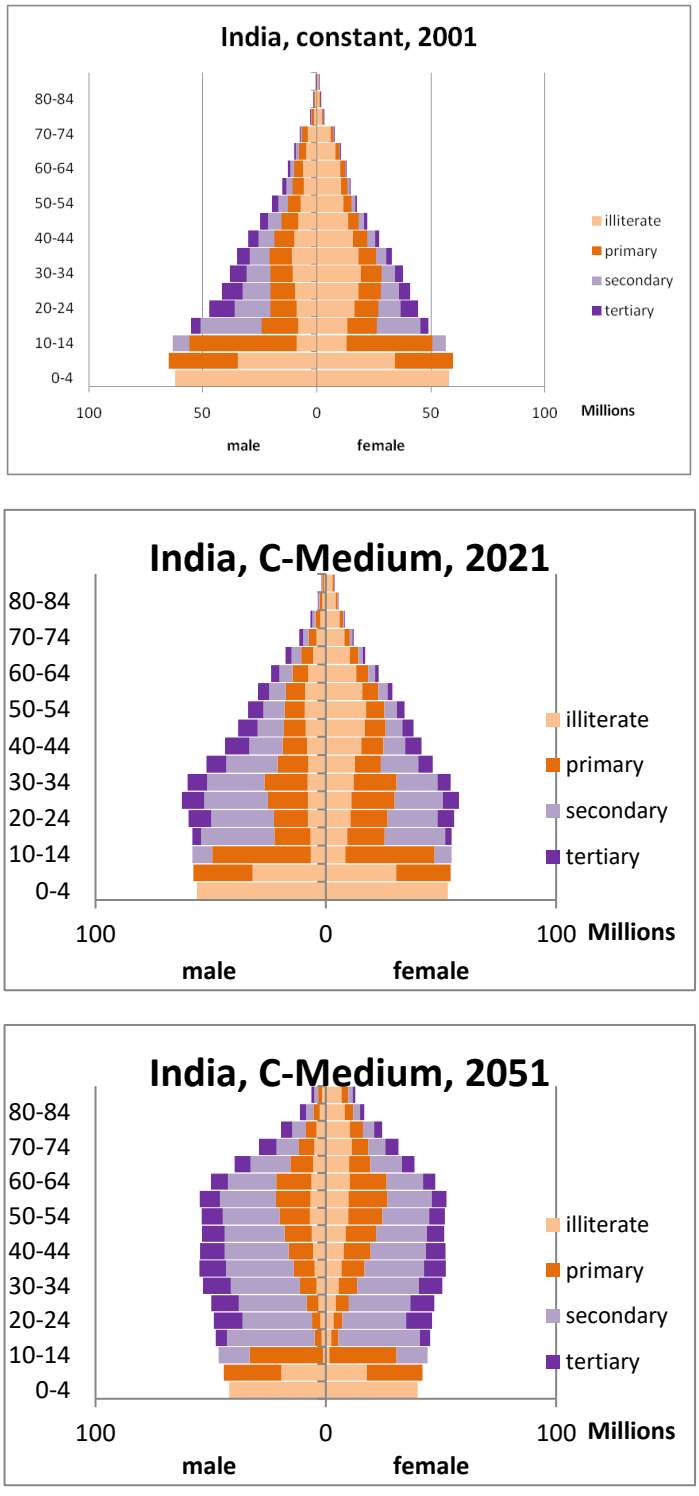
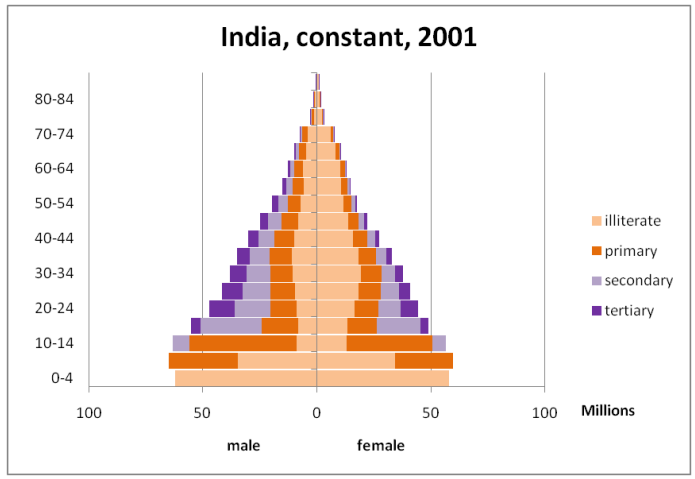
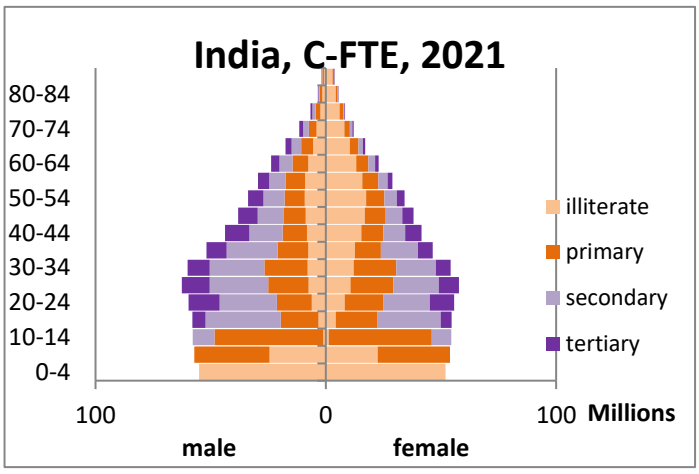


Figure 3.12. India Constant Scenario 2001 and Complete Medium Scenario 2021 and 2051.

Source: Author's calculations.





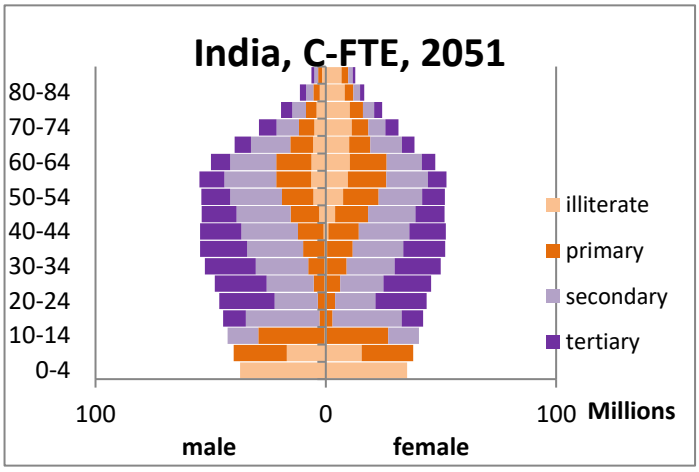


Figure 3.13. India Constant Scenario 2001 and Complete and Fast Track Education Scenario 2021 and 2051.

Source: Author's calculations.

Summary

This analysis has used multistate population modeling and demographic projections of India to examine alternative scenarios of socio-economic policy interventions that are gender-focused within a comprehensive analytical framework. Using baseline data from India's 2001 Population Census to construct six scenarios of fertility, mortality, and education transition rate, the analysis has shown that population size projections vary depending on investments in education and family planning to help achieve people's wanted fertility rates.

Investments in both education and family planning will have the largest impacts on India's population projections. Comparing results from the various scenarios, the impact from investment in the family planning program and reproductive health services will be much more immediate and significant than only investments in education. Holding other factors constant, expanding programs to help Indian women in each education category gradually achieve their wanted fertility rate by year 2021 will result in the overall total fertility rate declining from 3.05 to under replacement level (defined as 2.1 children per couple) by year 2021, and further to 1.97 by year 2031. Under this scenario, India's population will be 260 million less by year 2051 than it would be if current levels of educational attainment and fertility rates remain constant in India. Therefore, to achieve population stabilization in a developing country like India, investment in education only will not be enough. Promoting family planning and reproductive heatlh serivces is also very important, and provides an important compliment to expanding education.

Investment in family planning and eduction will also affect population composition. Fertility reduction due to family planning serivces and education investment will change population age structure, increasing the proportion of population of labor force age and resulting in a demographic windows opportunity in the next decades, which provides India with the potential for rapid economic growth and even economic take off. While both expanding family planning services and education investment will contribute to a larger share of the population of labor-force age, the more rapid and immediate fertility reduction due to family planning expansion will generate more significant impacts on the changes in population age structure and the effects of demographic dividend.

Moreover, a larger share of the population of labor force age alone does not necessarily guarantee an economic miracle. According to the findings of existing research, it is the larger and more skilled labor force providing increasing human capital that entails rapid economic growth. Our analysis reveals that an increasing education transition rate in India will not only help to achieve a population age structure that is favorable for economic growth, but also result in a larger share of skilled labor force that help to achieve higher economic growth rate. More importantly, investment in girls' education and achieving gender equality in education will be the most effective measure to increase India's population education level and improve its overall value of human capital.

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Trade Reform, Poverty, and Gender in a Diversified Rural Economy: Cafta and the Dominican Republic

By Mateusz Filipski and J. Edward Taylor

Abstract

This paper constructs a "gendered" disaggregated rural economywide model (DREM) for the Dominican Republic and uses it to simulate the impacts of the Dominican Republic-Central American Free Trade Agreement (DR-CAFTA) on agricultural production, wages, and rural incomes and welfare. By nesting agricultural household models into a general equilibrium framework, DREMs make it possible to model the responses of heterogeneous actors to policy shocks in an economywide setting. It appears that if DR-CAFTA reduces the prices of agricultural goods, agricultural producer households lose in terms of net welfare, as well as some rural non-agricultural households who suffer from labor-market effects The simulations uncover substantial differences in the impacts of trade reforms by gender. The difference between the responses of female and male wages to the shock is substantial, and female-headed households tend to do better in terms of welfare shock than comparable male-headed households.

Introduction

The impacts of market liberalization on welfare in rural areas of less developed countries have received increasing attention from both researchers and policy makers as relatively poor countries become integrated into world markets and trade pacts. However, despite fundamental differences between men and women in rural labor markets, production activities and households, gender has not been a focus of either policy design or modeling. The goal of this project is to bring gender squarely into models aimed at understanding the impacts of agricultural trade and policy shocks in rural economies. The key questions we wish to address are whether gender shapes these impacts, and if so, how it does so. In particular, are female workers and female-headed households affected differently than male workers and male-headed households?

Fontana and van der Meulen Rodgers (2005) identify three levels on which gender-awareness should enter into economic thinking about policy impacts. On a "macro" level, economic shifts have gender-differentiated impacts through the labor market. The distribution of males and females across occupations is notoriously unequal; women tend to participate disproportionately in service provisions, while most highly-paid managerial positions are occupied by men. Overall, the world's labor force is strongly gender-segregated, as shown by the Index of Dissimilarity (ID), which measures the percentage of females who would need to switch jobs in order to equalize the distribution. On average, the ID is about 60 percent throughout the world and usually higher in developing than in developed countries (Anker 1998:175). Given the gender segregation of the labor market, macroeconomic shocks affecting different employment sectors are likely to have a gender-differentiated impact on labor demand and on the male-female wage gap (see case studies by Ghiara 1999 and Kanji and Jazdowska 1993).

On a "micro" level, females frequently control different resources than males and participate in different household production and reproduction activities. In many developing rural regions, females have control over subsistence agriculture and males over commercial agriculture. It is widely recognized that females tend to spend their income differently than males (Dwyer et al. 1988). Changes in income are thus likely to have different impacts on expenditures in female-headed households. In non-female headed households, if income is not perfectly pooled between spouses, an exogenous transfer of money to a woman may not yield the same expenditure outcome as an equal transfer to her husband.

On a "meso" level, institutions create differential opportunities for males and females. Examples include public expenditures, legal structures, and market institutions with different effects on men and women. These are not an explicit focus of economic models. Nevertheless, the behavioral responses

represented in economic models inevitably are affected by the institutional environment in which economic agents operate.

Modeling the Impacts of Agricultural Trade and Policy Reforms

Overwhelmingly, the view of researchers and policy makers alike has been that urban residents win but rural populations lose from the elimination of own-import tariffs on agricultural commodities. The urban gain results from lower consumption costs, while the rural loss is the consequence of increased competition with imported agricultural and livestock goods, depressing both profits and wages in a sector in which less developed countries presumably have a comparative advantage. This raises serious welfare concerns, because many of the world's poor live in rural areas.

Tangermann (2005) reports the finding from a Global Trade Analysis Project (GTAP) model that full agricultural liberalization by high-income countries would enhance the nonagricultural terms of trade for developing countries, thus leading to income gains. However, Anderson and Valenzuela (2007), also using a GTAP model, find negative effects of own-country agricultural trade reforms on agricultural value-added in all the developing countries they considered. The implication of these findings would seem to be that the more narrowly one focuses on the less developed country rural economy and on own-country tariff reforms, the greater the likelihood of finding negative welfare impacts of agricultural trade liberalization.

Micro-agricultural household theory suggests that the impacts of agricultural market liberalization on less developed country rural welfare are not clear cut, even if less developed country producers do not acquire greater access to high-income markets for their agricultural output. As agricultural producers or suppliers of factors (e.g., labor) to farms, rural households lose when the prices of farm goods decrease. However, rural households also are consumers, and many studies have shown that farmers are net buyers of protected commodities (e.g., Minot and Goletti 1998). Like urban households, they stand to benefit as consumers. Whether the negative production or positive consumption effect dominates is an empirical question, and the answer may be different for different rural household groups.

Even on the production side, a decrease in price (e.g., of food grains) may benefit households that are engaged in other crop activities (e.g., fruits and vegetables) if factor prices (e.g., wages) decrease. Even the impacts of agricultural trade reforms on factor prices are ambiguous; they depend on the relative factor intensities of the directly and indirectly affected activities.

Disaggregated Rural Economywide Models (DREMS)

Understanding the impacts of agricultural trade reforms on rural economies in less developed countries requires an economywide modeling approach that embeds a microeconomic focus capturing both the heterogeneity of rural households and the diversity of activities in which these households participate. GTAP and other economywide models are useful to explore aggregate impacts of trade policy reforms; however, their high level of aggregation precludes a rural micro focus.

New research using disaggregated rural economywide models (DREMs) casts doubt on the assumption that rural household welfare is inversely related to food prices. DREMs highlight the ways in which the diversity among households shapes both the aggregate and distributional outcomes of policy and market changes (Dyer, et al. 2006; Taylor et al. 2005). One such study concluded that lower import tariffs on food would reduce nominal incomes for nearly all rural household groups in El Salvador, Guatemala, Honduras, and Nicaragua. However, they would also lower consumption costs substantially. The net effect on rural households' welfare is positive in most cases, implying that pre-CAFTA agricultural protection policies are disadvantageous for most rural household groups.

DREMs represent an important step in policy modeling, nesting heterogeneous and interacting agricultural household models within a rural economywide model. Nevertheless, there has been little effort to design models that represent the gendered characteristics of households or of labor factors. To

the best of our knowledge, there have only been two published attempts at "engendering" computable general equilibrium (CGE) models, both in a 2000 special edition of *World Development* (Arndt and Tarp 2000; Fontana and Wood 2000). These "are gendered in the sense of distinguishing between men and women in the labor market." Fontana and Wood's (2000) framework addresses gender disparities in labor markets on a macro level. As explained previously, labor markets are only one of the avenues through which gender can shape policy impacts in rural economies.

"Engendering" a CGE to Analyze the Impacts of CAFTA in the Dominican Republic

We construct a rural economywide model for the Dominican Republic, disaggregating both the labor force and household accounts with respect to sex. The model distinguishes six types of households with respect to the household head's national origin (Dominican or Haitian), sex, and whether the household participates in the agricultural sector. Labor is disaggregated not only by sector and wage status but also by sex and national origin. The model is the basis for assessing the rural economywide and household-specific impacts of the recently initiated free-trade agreement DR-CAFTA (Dominican Republic and Central American Free-Trade Agreement). An economywide version of the compensating variation is used to examine the likely welfare effects of DR-CAFTA, with particular focus on households traditionally regarded as most vulnerable: migrant and female-headed households. In this model, each household group has its own set of accounts in a rural-sector Social Accounting Matrix (SAM). This endows each household group with its own income and expenditure functions, adding another "gendered" dimension to the model.

Model Description and Data Sources

Our engendered DR-CAFTA model nests a series of microeconomic models for each of six household groups. The equations of the model are presented in Annex G. The originality of the model lies in the gendered disaggregation of the labor and household accounts. We distinguish among twelve labor types (See Box 4.2). Each of these labor types tends to be employed in specific activities. For example, sugarcane plantations traditionally hire Haitian men for most of their labor, while tobacco and coffee producers typically employ women. One would thus expect a fall in the profitability of sugarcane production to disproportionately reduce employment opportunities for Haitian men. There would be a smaller direct effect on Dominican agricultural laborers. All labor groups would be affected indirectly through rural general equilibrium effects, but those effects are difficult to predict intuitively without performing simulations.

Our household disaggregation is based on three criteria: activity, sex, and origin. The model contains the following six groups (see Figure 4.1):

1. Agricultural households headed by a Dominican female
2. Agricultural households headed by a Dominican male
3. Non-Agricultural households headed by a Dominican female
4. Non-Agricultural households headed by a Dominican male
5. Households headed by a Haitian female
6. Households headed by a Haitian female

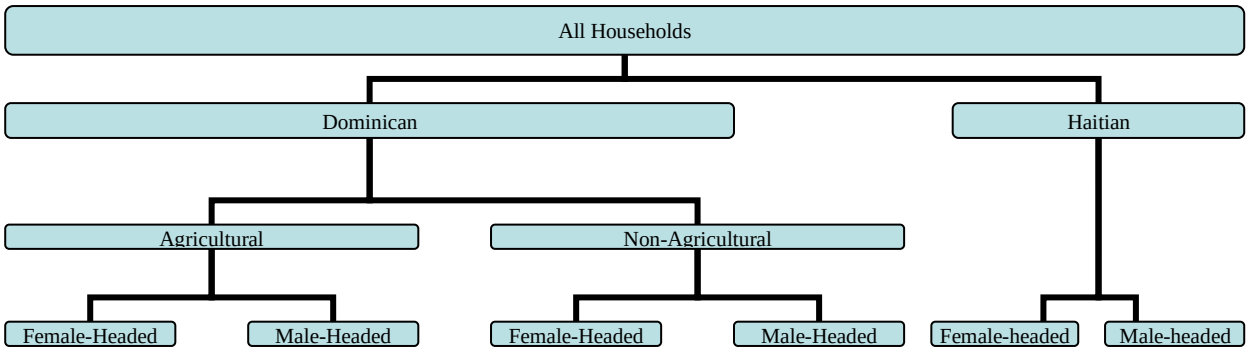

Figure 4.1. Model of Household Types

The choice of these groups permits each household type to be engaged in a distinct activity mix, have distinct patterns of incomes and expenditures, and thus experience CAFTA policy changes differently.

Differentiating between agricultural and non-agricultural households is crucial given the evolution of the rural sector. The view that rural households are agriculture-based is increasingly viewed as outdated, even in reference to developing economies long thought to be predominantly agricultural (Ellis 2000). "Agricultural" households are those for which at least one member receives revenues from an agricultural activity, either self-employed or as a hired laborer.

Box 4.2. List of Labor Categories

1. Dominican Hired Females employed in Agriculture
2. Dominican Hired Males employed in Agriculture
3. Dominican Hired Females employed outside of Agriculture
4. Dominican Hired Males employed outside of Agriculture
5. Haitian Hired Females employed in Agriculture
6. Haitian Hired Males employed in Agriculture
7. Haitian Hired Females employed outside of Agriculture
8. Haitian Hired Males employed outside of Agriculture
9. Female Family labor working in Agriculture
10. Male Family labor working in Agriculture
11. Female Family labor working outside of Agriculture
12. Male Family labor working outside of Agriculture

Table 4.1 provides a breakdown of income by source for each household group. Almost sixty percent of rural Dominican households have no agricultural revenue whatsoever (groups 3 and 4). Table 4.2 presents descriptive statistics: strictly non-agricultural rural households tend to be younger, wealthier, more educated, and to have a higher socio-economic status. They are affected directly by changes in food prices only as consumers. Indirectly, they may be affected via general equilibrium effects operating through rural factor, labor, commodity, and service markets. In contrast, agricultural price changes affect agricultural households directly on both the income and consumption sides.

The most innovative feature of the model is its consideration of gender and country-of-origin. Haitian households generally have weaker access to physical assets than natives (see Table 4.1). Less than 2 percent of their income comes from self-employed production activities, by far the smallest percentage of all ten groups. They also earn, on average, much less than the other household groups, thus representing the most income-constrained group in our model. Unfortunately, given the small number of Haitian (especially female-headed) households in the available data, it is not possible to disaggregate these groups by activity without encountering very small sample sizes.

The breakdown of households into male and female-headed is revealing. A perusal of Tables 4.1 and Table 4.2 reveals that female-headed households have access to different sources of income and rely on different survival strategies (Dwyer et al. 1988; Sen 2001). Gender differences are evident not only with regard to households' participation in labor markets but also in terms of their asset ownership and access to credit, land, or capital markets. These aspects may be just as critical as the labor market in determining the impacts of trade reforms on women; however, they are not adequately captured by models that simply distinguish male from female labor. Moreover, women and men spend their incomes differently (Table 4.3) and thus should not be assumed to share the same utility function. Distinguishing households by the sex of the household head makes it possible to capture part of this difference in a policy-evaluation model, assuming that female-headed households display a more "female" utility function and male-headed ones a more "male" one. In reality, both types of households are composite units. Nevertheless, this rough approximation of household gender proves to be informative.

As in standard CGE models, a Social Accounting Matrix (SAM) provides the data to parameterize the system of equations in our model. The SAM was constructed using various data sources. The information on incomes and expenditures of households was found in the ENCOVI survey (Encuesta Nactional de Condiciones de Vida) carried out in 2003 by the Dominican central bank. The ENCOVI surveyed more than nine thousand households, 3991 of which were rural. They are statistically representative of the approximate 930,000 Dominican rural households (3.5 million people, with an average of 3.9 people per rural household). 3759 households in the rural sample had information complete enough to be usable. Data on input and factor use in different agricultural activities were collected via an original targeted survey of 220 Dominican farmers. Shares of factors and inputs in specific industrial sectors, for example, food processing, came from a 1991 SAM obtained from the Dominican Central Bank.

The share of each type of hired and family labor employed in agricultural production was elicited in our production-side survey of 220 farmers. The value of hired labor was determined using data on agricultural wages. Family labor was not valued at the agricultural wage, which would assume that family and hired labor are perfect substitutes. Instead, we estimated the value created by family labor inputs econometrically by regressing family value added (gross value of production minus cash outlays on inputs, including hired labor) on family labor and capital. The labor shares by gender reflect the relative proportions of male and female family labor used in each crop.

Table 4.1. Shares of Yearly Income of Dominican Households

	Dominican						
	Agricultural		Non-Agricultural		Haitian		
	Female	Male	Female	Male	Female	Male	All
Yearly Per Capita Income ($US)	723	768	994	1206	379	637	**976**
Yearly Household Income (US$)	3348	3214	3485	4719	1098	1984	**3823**
Female Paid Labor	7.5%	4.5%	16.6%	7.6%	31.6%	2.9%	**8.1%**
Agricultural	(0.4%)	(0.1%)			(3.4%)	(0.3%)	**(0.1%)**
Non-Agricultural	(7.0%)	(4.5%)	(16.6%)	(7.6%)	(28.2%)	(2.6%)	**(8.0%)**
Male Paid Labor	27.9%	24.1%	24.2%	44.7%	54.2%	94.9%	**37.7%**
Agricultural	(13.1%)	(14.4%)			(16.0%)	(43.8%)	**(6.3%)**
Non-Agricultural	(14.8%)	(9.7%)	(24.2%)	(44.7%)	(38.2%)	(51.1%)	**(31.4%)**
Income from Production Activities	50.0%	63.4%	25.9%	34.2%	0.0%	1.4%	**39.4%**
Agricultural	(33.2%)	(50.0%)	(0.0%)	(0.0%)	(0.0%)	(0.5%)	**(12.2%)**
Non-Agricultural	(16.9%)	(13.3%)	(25.9%)	(34.2%)	(0.0%)	(0.9%)	**(27.2%)**
Transfers from Other Rural Households	1.1%	0.5%	1.5%	0.4%	1.3%	0.0%	**0.6%**
Government Support	0.0%	0.1%	0.1%	0.1%	0.0%	0.0%	**0.1%**
Sales of Land and Other Forms of Capital	0.9%	0.8%	0.2%	0.4%	0.0%	0.0%	**0.5%**
Remittances from Migrants to Urban Areas	3.3%	1.7%	4.7%	1.3%	3.9%	0.1%	**2.0%**
Remittances from Migrants to Foreign Countries	5.7%	3.1%	18.0%	9.0%	2.2%	0.1%	**8.4%**
Other	3.6%	1.8%	8.8%	2.5%	6.7%	0.6%	**3.3%**
Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	**100.0%**

Source: SAM constructed for this model.

Table 4.2. Descriptive Statistics, a sample used to construct the SAM for the Dominican Rural sector

	Dominican						All
	Agricultural		Non-Agricultural		Haitian		
Sex of Household Head	Female	Male	Female	Male	Female	Male	
Sample size	199	1139	731	1522	20	148	3759
Average Yearly Household Income (US$)	3348	3214	3485	4719	1098	1984	3823
Average Age of Household Head	54.0	49.6	47.8	43.7	41.3	40.8	46.7
Average Education of Household Head (years of schooling)	4.7	6.0	7.8	8.7	2.1	3.2	7.3
Percent of Household Heads who Completed High-School ("Bachillerato")	9.0%	8.9%	20.9%	21.8%	5.0%	0.7%	16.1%
Average size of Household (# people)	4.6	4.2	3.5	3.9	2.9	3.1	3.9
Percent of bi-parental households	40.7%	80.4%	17.0%	83.1%	15.0%	45.9%	65.4%
Percent of HH with running water	14.1%	13.3%	23.8%	24.1%	5.0%	4.7%	19.4%
Percent of HH with dirt floor	14.6%	24.4%	7.4%	7.9%	20.0%	20.9%	13.7%
Percent HH with temporary roof	1.0%	4.0%	1.1%	1.8%	10.0%	12.8%	2.7%
Percent of HH without any form of latrine	9.5%	13.2%	7.4%	6.4%	25.0%	41.9%	10.3%

Source: ENCOVI survey from 2003.

Table 4.3. Shares of expenditures of types of Dominican households.

Sex of Household Head	Dominican				Haitians		All
	Agricultural		Non-Agricultural				
	Female	Male	Female	Male	Female	Male	
Self-Consumed Subsistence Crops (estimated at market value)	6.1%	7.1%					2.1%
Out-of-Home Meals	1.1%	1.5%	2.6%	3.6%	1.1%	3.3%	2.8%
Purchases from Commerce	72.8%	72.6%	72.5%	71.0%	84.7%	85.0%	72.4%
Transportation	2.9%	3.9%	3.6%	5.1%	3.1%	1.5%	4.3%
Taxes	0.0%	0.1%	0.1%	0.1%	0.1%	0.0%	0.1%
Transfers to Other Households	0.5%	0.7%	0.6%	0.6%	0.0%	1.0%	0.6%
Investments in:							
Land	3.7%	3.2%	5.0%	4.1%	4.5%	1.8%	3.9%
Education	1.8%	1.4%	2.4%	2.0%	0.3%	0.4%	1.8%
Health	6.5%	5.0%	5.4%	5.4%	2.2%	1.7%	5.2%
Other	1.7%	1.5%	1.8%	2.2%	0.5%	0.5%	1.9%
Other Costs	2.9%	3.1%	5.9%	5.9%	3.4%	4.8%	5.0%
TOTAL	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Source: SAM constructed for this model.

Simulations and Results

This section presents the results of simulations using our model of the Dominican rural economy, with a focus on the effects of price shocks likely to result from the DR-CAFTA trade agreement. The purpose of these simulations is not to predict the future or make projections, but rather to explore the possible effects of shocks related to policy reforms, to identify the households that would be most affected under distinct possible scenarios, and to gain an understanding of how markets transmit policy shocks through the rural economy in ways that may be different for men and women.

Simulations of the CAFTA Trade Reforms

The negotiations leading to the entrance of the Dominican Republic into DR-CAFTA determined the evolution of the country's tariffs on agricultural products over the ensuing twenty years. In 2004, the Dominican Republic levied tariffs of 20 percent on rice, potatoes, sweet potatoes, and milk, and tariffs of 25 percent on beans, onions, garlic and most meats.[59] Each product follows its own tariff-reduction path over periods of varying length, and many different simulations can be run once the model is parameterized. Three simulations, reflecting low, medium, and complete tariff elimination, were run. These scenarios correspond to the tariff reductions scheduled for the sixth, twelfth, and twentieth years,

[59] In this model, livestock accounts were consolidated into a single activity for lack of reliable data to estimate separate production functions.

respectively of DR-CAFTA. All of the simulations assume immediate and simultaneous tariff shocks, which are translated into price-shocks of equal magnitude. They do not attempt to include inter-temporal components, the possible evolution of world market prices, transition policies that might be implemented, nor hypothetical increases in export demand from the United States. The simulated price changes are reported in the top panel of Table 4.4.

DR-CAFTA price changes have many effects, all interlinked in our general equilibrium model. The next sections present the effects on prices, production, income, wages, migration, and remittances and provide a measure of rural economywide compensating variations, to assess net welfare changes for each household group. Column (i) presents the results in the "low case," which corresponds to the tariff levels reached after the sixth year of DR-CAFTA; column (ii) presents the "middle case" and column (iii) the "full case," corresponding respectively to 12 and 20 years of tariff elimination. The prices of non-affected agricultural goods are assumed to be exogenously fixed and do not change in the simulations; thus, export crops such as tobacco, coffee, and tropical fruits are absent from the table even though they are present in the model. The table shows that all affected prices decrease and that the magnitude of the price drop increases from the low case to the full case.

By the twentieth year, when all tariffs are eliminated (the "full" case), the prices of all affected goods drop by 16.7 to 20 percent, reflecting the elimination of 20 to 25 percent tariffs, respectively.

Table 4.4. Direct and indirect price shocks (percent) resulting from the DR-CAFTA tariff reductions in three simulations.

	Percentage Change in Price		
Goods or Services	**(i) Low Case (6th Year)**	**(ii) Medium Case (12th Year)**	**(iii) Full Case (20th Year)**
Exogenous Prices of Agricultural Goods			
Rice	0.00	-2.70	-16.70
Beans	-8.00	-16.00	-20.00
Potatoes	-8.40	-16.70	-16.70
Sweet Potatoes	-6.70	-13.40	-16.70
Onion	-8.00	-16.00	-20.00
Garlic	-8.00	-16.00	-20.00
Livestock	-4.70	-10.7	-19.00

Source: Model simulations prepared by authors.
Note: The livestock price-shock is an output-weighted average of shocks on beef, pork, chicken, and milk.

Production Effects

Price shocks affect the profitability of activities, prompting actors to alter their production decisions. Table 4.5 shows changes in production resulting from our tariff-reduction simulations. The production of all agricultural goods is affected, regardless of whether the goods were targeted by DR-CAFTA policies. For goods whose prices change, given the non-linearity of production functions, there is no reason for production shifts to be of the same magnitude as price shocks. In fact, because actors are facing a whole set of price decreases simultaneously, the production of a given product whose price falls may actually increase if the product becomes more profitable relative to other goods. The clearest example is when the output prices of other goods decrease more than the price of the good in question. Less directly, output of a good may increase if other goods make more intensive use of inputs that become more expensive. Rice in the medium scenario is a case in point: its price falls by 2.7 percent, but production rises somewhat (by 3.47 percent).

Because the impacts of the price shocks are complex and many are indirect, there is little correspondence between percentage changes in output prices and production for the affected crops. Some crops experience a larger percentage decrease in output than the price-shock they suffer (beans), and others a much smaller one (sweet potatoes). In the full case, the rural sector shifts away from rice and bean production, the staples of every Dominican meal.

Table 4.5. Production shifts (percent) in response to DR-CAFTA-induced price drops.

	Percentage Change in Production		
Goods or services	**(i) Low Case (6th Year)**	**(ii) Medium Case (12th Year)**	**(iii) Full Case (20th Year)**
Rice	2.48	3.47	-4.61
Sugarcane	1.66	4.12	9.65
Traditional Exports	1.27	3.00	6.25
Beans	-12.58	-23.87	-19.36
Potatoes	-6.48	-12.80	-8.34
Sweet potatoes	-1.81	-3.74	-4.62
Cassava	0.84	1.97	4.05
Onion and Garlic	-6.25	-12.39	-12.87
Industrial Tomato	0.65	1.50	2.92
Other Fruit	0.98	2.20	4.05
Vegetables	2.24	5.90	15.56
Plantain	1.02	2.40	4.97
Livestock	-5.57	-12.70	-22.42
Construction	-0.10	-0.21	-0.39
Hotels/Restaurants	-0.56	-1.24	-2.26
Transportation	-0.40	-0.89	-1.60
Other services	-0.14	-0.31	-0.53
Commerce	-1.01	-2.50	-5.47

Source: Model Simulations.

On the other hand, export crop production increases: traditional export crops (coffee and tobacco) and sugarcane experience increases in production even in the low scenario, while the output of vegetables, a more recent export crop, increases sharply in the full case at the twentieth year. Table 4.5 illustrates that DR-CAFTA potentially influences the production of all crops. Due to the diversity of the agricultural sector and rural factor market linkages, non-CAFTA crops in some cases may be more affected in percentage terms than some CAFTA-crops. The last five rows in Table 4.5 show slight decreases in the output value of rural service activities. Rural services are affected on the cost side as factor markets adjust to the DR-CAFTA price shocks. Changes in rural household incomes also influence service demand. The simulations suggest that on balance these effects are negative.

Wage Effects

Table 4.6 reports the labor-market effects of the simulated price changes. The model assumes that the total size of the labor force is fixed, and rural wages adjust to equilibrate supply and demand, the market wage in the case of hired labor, and for family labor, the shadow value of family time.

Rural wages increase in most cases. In simulations (i) and (ii), only male agricultural labor loses value (whether Dominican or Haitian, hired or domestic), and female agricultural wages increase slightly, despite the general decrease in agricultural prices. In simulation (iii), the wage effects persist and become more pronounced, with wages of hired Dominican male agricultural workers losing over 25 percent of

their value and female agricultural labor wages increasing more than 6 percent. While at first glance this result might seem surprising, it is consistent with the transformations of the productive landscape described above. The Pontificia Universidad Católica Madre y Maestra (PUCMM) survey of farms reveals that females do not represent a significant part of the hired labor force for any of the products directly impacted by the reforms. They are more likely to perform agricultural work in export crops, including coffee, tobacco, and fresh vegetables for US markets. Inasmuch as activities traditionally employing women become more profitable and increase their production, employment opportunities for women in the agricultural sector expand. Male-intensive activities are replaced by more female-intensive ones. This is also reflected in the changes in rural wages. Non-agricultural employment, which is concentrated in rural service activities, increases in scenarios (i) and (ii) but not in scenario (iii).

Male workers are systematically more adversely affected than female workers in each sector and country-of-origin category, albeit sometimes by a small amount. The only exception is for hired Haitian non-agricultural labor in simulations (i) and (ii). It appears that, with regard to DR-CAFTA, the traditional gender division of agricultural labor in the Dominican Republic favors female laborers. This result highlights the importance of accounting for gender when evaluating the likely labor market implications of trade reforms.

Table 4.6. Percentage changes in wages after DR-CAFTA price shocks.

Labor Force Group				Percentage Change in Factor Wage		
				(i) Low Case (6th Year)	(ii) Medium Case (12th Year)	(iii) Full Case (20th Year)
Hired	Dominican	Agricultural	Females	0.53	1.87	6.92
			Males	-3.61	-9.73	-25.16
		Non-Agricultural	Females	0.39	0.56	-0.33
			Males	0.38	0.51	-0.41
	Haitian	Agricultural	Females	1.26	2.97	6.18
			Males	-1.89	-4.16	-7.30
		Non-Agricultural	Females	0.27	0.27	-0.86
			Males	0.47	0.73	-0.01
Family	Agricultural		Females	2.07	4.50	7.62
			Males	-1.30	-2.69	-3.95
	Non-Ag		Females	3.30	7.10	11.66
			Males	2.22	4.66	7.20

Source: Model simulations conducted by authors.

Trade reforms have ramifications for the spatial distribution of employment. Rural-urban labor migration increases in all three simulations. As a consequence, income remittances from migrants increase.

Income Effects

One would expect agricultural incomes to fall as a consequence of lower agricultural prices. The effects on incomes in non-agricultural households, on the other hand, are less obvious, because the rural service sector shifts to a "higher-wage but lower-output" equilibrium. Table 4.7 presents the percentage change in income for each of household group. As expected, agricultural households lose in terms of nominal income. The sign of the effects on non-agricultural households, however, varies by gender: female-headed households gain while male-headed ones lose. The effects on non-agricultural households are of much

smaller magnitude than the effects on agricultural households. Haitian households participate in both agricultural and nonagricultural activities and mostly suffer nominal income losses.

Although almost all households lose income, the percentage changes in income are of smaller magnitude than the percentage changes in agricultural prices. This reflects the diversity of the rural sector, which makes it possible for households to reallocate resources among activities and buffer themselves against the impact of price shocks.

Table 4.7. Percentage changes in income after DR-CAFTA price shocks.

Household Group			Percentage Change in Nominal Income			Female-to-Male Difference (Full Case)
			(i) Low Case (6th Year)	(ii) Medium Case (12th Year)	(iii) Full Case (20th Year)	
Dominican	Agricultural	Female-headed	-1.88	-4.45	-9.17	2.79
		Male-headed	-2.58	-6.00	-11.96	
	Non-Agricultural	Female-headed	0.31	0.49	0.04	2.67
		Male-headed	-0.33	-0.96	-2.63	
Haitian		Female-headed	0.02	-0.01	-0.20	3.16
		Male-headed	-0.83	-1.86	-3.36	

Source: Model simulations conducted by authors.

The magnitudes of nominal income effects favor female headed households. Of all household groups, the least affected are the Non-agricultural Dominican Female-headed and the Haitian Female-headed households. They either gain slightly or lose somewhat, but their nominal income change is always less than 1percent, even under the full case scenario (iii). Among female-headed households, only the agricultural households are significantly impacted by CAFTA in terms of nominal income. Column (iii) reports the difference between the same-demographic female and male income effects under simulation (iii). In all cases, females fare better than males by 2.67 to 3.16 percentage points. This reflects the favorable effect of CAFTA on female wages compared to male wages.

Welfare Effects

To measure the effects of DR-CAFTA tariff removal on household welfare, we calculate a general-equilibrium variant of the compensating variation (CV). The CV is the amount of cash transfer needed to maintain each household at the same level of utility as before the tariff adjustments. It was estimated in our simulations by fixing each household group's utility at the pre-DR-CAFTA level and including a slack variable in the household income equations. This "DREM-CV" represents an ex-post measure of welfare change after allowing each household group and the rural economy as a whole to adjust to the policy shock. As in the case of the classic CV from consumer theory, this does not mean that households purchase the same consumption baskets as before, but rather, the cheapest basket that can provide them with the same level of utility given the new market conditions. However, unlike the classic CV, which only allows for consumer decisions to shift in accordance with preferences, the DREM-CV permits the entire general-equilibrium economy to readjust.

Table 4.8 reports the DREM-CVs in thousands of US dollars and as a percentage of base (pre-reform) income. For agricultural households the DREM-CV is positive in all of the simulations, indicating that DR-CAFTA hurts agricultural households in terms of welfare. This corresponds to the common conception of free-trade effects on agriculture; however, it is not a predictable result because of

the dual nature of agricultural households as producers and consumers. The negative effect of lower nominal income appears to outweigh the positive effect of lower food costs.

Table 4.8. Measures of compensating variation (CV), percentage of pre-reform income.

Household Group			Compensating Variation as a Percentage of Pre-Reform Income			(iii) Female-to-Male Difference (Full Case)
			(i) Low Case (6th Year)	(ii) Medium Case (12th Year)	(iii) Full Case (20th Year)	
Dominican	Agricultural	Female-headed	1.56	3.69	7.65	-2.53
		Male-headed	2.21	5.12	10.18	
	Non-Agricultural	Female-headed	-0.42	-0.79	-0.78	-2.06
		Male-headed	0.13	0.41	1.28	
Haitian		Female-headed	-0.12	-0.25	-0.31	-3.21
		Male-headed	0.73	1.62	2.90	

Source: Model simulations conducted by authors.

Negative Compensating Variation means household is better off.

Among non-agricultural households, the sign of the welfare effect is different for male- and female-headed households. Non-agricultural households, as pure consumers, strictly benefit from cheaper food. However, the DREM takes into account changes in the rural non-agricultural economy in response to the agricultural price shocks. For male-headed non-agricultural households, a negative income effect slightly offsets the positive food-cost effect.

The right-hand column of Table 4.8 presents the percentage-point difference in the impact of the agricultural price changes on male and female-headed households. Female-households, across the board, fare better than their male counterparts. Female Dominican non-agricultural households and female Haitian households experience welfare gains. This reflects the positive effect of the policy shock on female wages, differences in female-headed household's income sources, as well as different preferences exhibited by the expenditure patterns of female-headed households. These CV results illustrate general equilibrium effects that are difficult to predict without a gendered economywide model.

How much does CAFTA matter? Offsetting the effects of CAFTA with relief strategies

The analysis in the previous section reveals that CAFTA had negative effects on welfare in agricultural households and even some non-agricultural households. Indeed, the overall CV for the entire rural sector is +3.56percent of total income, a non-negligible figure. In this section, we explore ways to offset this effect. We conduct three experiments: an increase in agricultural productivity, an increase in the exports, and urban labor demand. In each experiment, we ask ourselves how large of a change would be needed in order to offset CAFTA's negative effects. The design of these experiments reflects the evolution of rural economies in developing countries in general and the likely future evolution of the Dominican rural economy in particular. Productivity growth is a fundamental feature of agricultural development and a focus of agricultural policy. Increases in exports are an anticipated effect of free-trade agreements such as DR-CAFTA, and a shift in labor demand from the rural to the urban sector is one of the most fundamental features of economic growth and modernization (Taylor and Martin, 2001).

Table 4.9 reports the results of the exercises. The negative welfare effect of DR-CAFTA can be offset by a 17.5 percent increase in agricultural productivity (column iv), a 35 percent increase in traditional exports (column v), or a 6.5 percent increase in labor demand from the urban sector (column

vi). The increase in agricultural productivity has a particularly important welfare effect in the two agricultural household groups.

Table 4.9. Offsetting negative effects of DR-CAFTA.

Household Group				DR-CAFTA-offsetting evolutions of the rural economy			
			iii	iv	v	vi	vii
			Base (iii) scenario	(iii) + Agricultural productivity	(iii) + Exports	(iii) + Urban demand	(iii) + Combination of effects
Size of the offsetting effect needed to neutralize overall rural CV							
Agricultural productivity				+17.5%		-	*
Export demand				-	+35%	-	+47%
Urban demand for labor				-		+6.4%	**
Welfare Effects – DREM-CV							
Dominican	Agricultural	Female-headed	7.65	0.95	1.25	4.76	-3.90
		Male-headed	10.18	1.29	1.32	7.16	-4.16
	Non-Agricultural	Female-headed	-0.78	-0.34	0.27	-2.91	-3.87
		Male-headed	1.28	0.03	0.39	-3.31	-7.17
Haitian		Female-headed	-0.31	-3.43	-8.48	-1.33	-4.18
		Male-headed	2.90	-5.88	-14.41	1.98	-4.06
Income Effects							
Dominican	Agricultural	Female-headed	-9.17	-1.77	-1.74	-4.21	6.27
		Male-headed	-11.96	-2.32	-1.99	-6.61	6.73
	Non-Agricultural	Female-headed	0.04	0.09	-0.33	4.85	7.55
		Male-headed	-2.63	-0.28	-0.49	5.84	12.85
Haitian		Female-headed	-0.20	3.16	8.46	2.14	5.86
		Male-headed	-3.36	5.61	14.38	-1.12	5.79

Notes:
1. Ag stands for Agricultural, F and M respectively for Female-headed and Male-headed.
2. *Differs for each crop in the model (range -8.8 to +78 percent).
3. **Differs for male and female workers (males +2.8percent, females +28.2percent).

Combined with the extreme CAFTA-DR scenario, it results in welfare increases of 0.95 percent and 1.29 percent in the female-and male-headed agricultural groups, respectively. Increases in traditional exports (coffee, sugarcane, and tobacco) are less effective in countering the negative welfare effects of CAFTA-DR, but they favor the Haitian and female groups, inasmuch as these sectors tend to employ women and migrant workers. An increase in urban demand for labor is most effective at counteracting the negative effects of the agricultural price changes. It tends to favor non-agricultural laborers. As in all of our simulations, these capture rural economywide effects under each of the experiments.

These exercises suggest that there need not be unrealistically large changes in the evolution of the Dominican rural economy in order to offset the negative effects of DR-CAFTA on agricultural

households. The right-hand column (vii) presents the results of an integrated experiment in which existing trends in agricultural productivity, export growth and off-farm employment are extrapolated over the course of the CAFTA-DR 20-year phase-in period. FAOSTAT data[60] was used to compute yearly growth in agricultural yields and total export value, averaged over the 1984-2004 period. Average yearly growth in manufacturing employment was calculated over the 1996-2007 period using the LABORSTA dataset (available online from the International Labor Organization website). The simulation shows that the extrapolated trends in productivity, export growth and off-farm employment easily offset the negative effects of DR-CAFTA over the 20-year implementation period, and all households see substantial increases in both welfare and income. In year 20, taking these trends into account, the DREM-CV for the rural economy is -5.57percent of total rural GDP, It ranges from -3.87 to -7.17 across the six household groups.

How Much Does Gender Matter? Comparing Identical Gendered and Non-Gendered Models

The previous section presented results from a fully gendered model with six labor and ten household accounts. They showed that female-headed households benefited more from, or were less harmed by, the DR-CAFTA policy reforms than male-headed ones. These results underline the importance of integrating gender into policy evaluation models. In this section we explore the value of "engendering" policy models by asking how well this model performs compared with a non-gendered model or a simple "Fontana-and-Wood" (FW) type model, in which labor factors— but not households— are disaggregated by sex and analyzed for gendered consequences.

We repeated all of the simulations reported above using three reduced models: a non-gendered model (model A); a model gendered only for labor (model B, *a la* FW); and a model gendered only for households (model C). The fully gendered model used in the previous section is named model D. We compare the results from the four models for Simulation (iii), the complete elimination of all tariffs on agricultural goods. Table 4.10 reports the simulated impacts on wages in all four models. As far as labor alone is concerned, model B is the labor-gendered version of model A, and model D is the labor-gendered version of C.

Three key findings emerge from this analysis. First, the models that are not gendered for labor (A and C) give almost identical results, as do the two models that are gendered for labor (B and D). Second, the non-gendered percentage changes in wage for model A are not always in between the male and female results for model B. The same is true for models C and D. Therefore, reducing a gendered model to a non-gendered one will not simply produce a weighted average of policy effects on males and females. It will yield a different result, reflecting the implicit constraint that male and female labor market outcomes are identical. Third, the difference between male and female wage-shocks, ranging between 0.06 and 32.08 percentage points, is far from trivial.

All of these observations support the argument in favor of constructing gendered CGE models and confirm that allowing for a gendered labor market is a first, crucial step in this direction. As far as measures of wage-shocks are concerned, the FW-type model (B) performs just as well as the fully gendered model.

[60] Available online from the Food and Agriculture Organization website, www.fao.org.

Table 4.10. Impacts on wage in simulation (iii) compared for non-gendered and gendered models.

Household Group				Percentage Change in Wages					
				A Non-Gendered	B Gendered Labor	C Gendered Households		D Fully Gendered	
				percent	percent	percent	f-m	percent	f-m
Hired	Dominican	Ag	F	-24.42	6.92	32.08	-24.42	6.92	32.08
			M		-25.16			-25.16	
		Non-Ag	F	-3.01	-0.25	0.06	-3.11	-0.33	0.06
			M		-0.31			-0.41	
	Haitian	Ag	F	-6.22	6.18	13.47	-6.23	6.18	13.48
			M		-7.29			-7.30	
		Non-Ag	F	-2.78	-0.75	-0.82	-2.87	-0.86	-0.85
			M		0.07			-0.01	
Family		Ag	F	-6.54	7.57	11.54	-6.62	7.62	11.57
			M		-3.97			-3.95	
		Non-Ag	F	3.64	11.63	4.42	3.61	11.66	4.46
			M		7.21			7.20	

Note: The "percent" columns give the percent wage shock for each group; the "f-m" columns show the gender differential between female and male wage-shocks in the same group.

Such is not the case, however, for outcomes other than wages. Tables 4.11 and 4.12 respectively present a comparison of income and DREM-CV results using the four models. As reported in the previous section, the fully-gendered model D finds differences in the income shock of up to 3.56 percentage points, and differences in CV of up to 3.21 percentage points, between male-headed and otherwise similar female-headed households. The non-gendered model A and the FW-type model B cannot pick up these impacts. The pairing of models that are not household-gendered (A and B) versus models that are (C and D) is still visible, though not as clear as in the case of wages alone. The results of models A and B on the one hand and C and D on the other are no longer nearly identical, and in some cases the impacts do not even carry the same sign. In fact, the fully gendered model D is the only one in which any household has a positive compensating variation. Model D systematically reveals greater "f-m" differences than the only partially gendered model C.

Table 4.11. Impacts on income in simulation (iii) compared for non-gendered and gendered models.

Household group			Percentage Change in Incomes					
			A Non-Gendered	B Gendered Labor	C Gendered Households		D Fully Gendered	
			percent	percent	percent	f-m	percent	f-m
Dominican	Ag	Female-headed	-12.01	-11.58	-9.93	2.42	-9.17	2.79
		Male-headed			-12.35		-11.96	
	Non-Ag	Female-headed	-3.39	-1.92	-1.55	2.50	0.04	2.67
		Male-headed			-4.05		-2.63	
Haitian		Female-headed	-3.06	-3.24	-0.85	2.30	-0.20	3.56
		Male-headed			-3.15		-3.36	

Note: The "percent" columns give the percent income shock for each group; the "f-m" columns show the gender differential between female and male income-shocks in the same group.

Source: Model simulations conducted by authors**.**

How much does gender matter in these policy evaluation models, then? Based on Columns A and D in the above tables, a fully gendered model recognizes that wage effects for male and female laborers may be of different signs. The compensating variation for Dominican, agricultural female-headed households is 7.65 percent of pre-reform income, rather than 9.84 percent for the non-gendered group: with 22 percent, this is only the least dramatic change in the table. These results reaffirm that engendering CGE models is a valid goal to pursue and a fully gendered model improves upon previous attempts to engender CGEs.

Conclusions

This study proposes a gendered disaggregated CGE model of the rural sector of the Dominican Republic and simulates the effects of the DR-CAFTA trade agreement. It can be seen as an experiment in "engendering" CGE modeling techniques. With respect to both these goals, several lessons were learned.

The simulation results illustrate that the impacts of trade reforms in the rural economy are complex and vary by gender. A decrease in agricultural prices, reflecting scheduled tariff adjustments, results in most rural household groups being worse off, including some non-agricultural households, as shown by their positive DREM-CV measures. The disaggregated general equilibrium modeling approach makes it possible to net out consumer and producer-side influences of policy shocks while accounting for market linkages that affect different household groups and labor groups differently. This is of particular importance when evaluating policy impacts in rural economies, in which the lines between agricultural and non-agricultural actors are not easily drawn.

The conclusion that non-agricultural households may be harmed as laborers and service-providers more than they benefit as consumers is not particularly surprising, yet it contradicts conventional knowledge among those who claim that only agricultural producers suffer from trade reforms. Lower consumption costs may not be sufficient to counter adverse effects of trade reforms on rural household incomes. The welfare effects of changes in food prices are context specific and must be estimated empirically, using models designed to capture key structural features of both rural and urban economies.

The fact that the simulated welfare effects of DR-CAFTA are of opposite signs for some of the households in our model supports the use of disaggregated models for trade policy analysis. Lumping households together can hide substantial variation. Our simulation results suggest that failing to recognize the gender diversity of labor markets would likely yield inappropriate predictions concerning the effects of policy reforms. In terms of total welfare, aggregating our general-equilibrium model up to a single representative rural household yields an overall CV equivalent to +4.01 percent of income in the full case

(iii), but this figure actually ranges from -0.31 percent to +10.18 percent under our most gender-disaggregated specification.

The most positive effect of DR-CAFTA turned out to be for the groups usually considered to be the most vulnerable to policy and trade reforms: female laborers, female-headed households, and migrant households. For Haitian female-headed households, the DREM-CV is actually positive, suggesting the effect of cheaper food, for them, outweighs income losses. Higher wages for females may reshape household expenditures in ways that influence welfare, e.g., via child nutrition and education. Though not an explicit aim of DR-CAFTA, they could also contribute to the empowerment of rural females as they participate more in off-farm, cash-generating work.

A gendered DREM is a critical step towards understanding gender differences in impacts of trade policy reforms; however, it has some limitations. The most important limitation is that household aggregations overlook the role of gender in shaping decision making within households. A model integrating intra-household resource allocations could shed light on the true differential welfare outcomes of trade and other policy reforms for males and females. Adding an intra-household dimension to DREM and CGE models is likely to reveal key insights and should be a priority of future research.

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3. CONCLUSION

What Next? Thoughts about the Way Forward

By Siwa Msangi and Marzia Fontana

An Economy is More Than Markets and It is Gendered

Research studies of gender and the economy have made significant advances in the past few years. A crucial step in the advancement of gender awareness within economic analysis is the recognition of gendered socio-economic relationships and the fact that the economy consists of much more than markets. The market is just one element of a broader system of production, distribution, and consumption of goods and services. Research in the social sciences has now illuminated the close interdependence between the sphere of the market and the sphere of "social reproduction," where the latter encompasses the continuation of society through the care given from birth through to old age, and the institutions, such as the family, that provide that care. Social reproduction not only contributes directly to people's well-being and their harmonious living but is also a significant determinant of labor force productivity, contributing to the maintenance of a healthy economic system. The recognition of those activities that fall within the sphere of social reproduction is often lacking in traditional economic analysis and social accounting frameworks, essentially creating a "hidden" sector of the economy whose outputs and linkages to other sectors is grossly undervalued and often ignored. The division of roles and responsibilities within and between the two spheres of market production and social reproduction has strong gender connotations, leading to a systematic under-valuation of women's work within the household and in other spheres that fall outside of the traditional framework of national socio-economic accounts.

A key challenge to building a meaningful and rich analysis of gendered socio-economic interactions within the household and the relevant linkages to the wider economy has been that of enriching the existing quantitative representations of important macro- and micro-level economic behavior with the considerable body of qualitative evidence that illustrates the importance and relevance of gender in a variety of socio-economic relationships. The work embodied within this project report reflects a concerted attempt to build on findings from both descriptive and largely qualitative studies, as well as those which are more quantitatively rigorous, in order to construct a framework which links policy-driven interventions and investments with the socio-economic impacts and changes in welfare that they generate, through highly gendered pathways. In order to do this, successfully, we have to deepen our understanding of the way in which gender intersects with socio-economic issues, while also making better use of the quickly-improving database of information that capture important dimensions of gender and economics, such as household-level time use data and improved quantitative methods with which to use this information. This embodies two important components, which we now describe in more detail.

First, there is an increasing awareness that promoting gender equality is not simply about the targeting of women and girls, but about analyzing the position of women in relation to men and addressing the disadvantage faced by specific groups of either women or men, depending on the circumstances. Women tend to be more disadvantaged than men according to many economic indicators, and are therefore the focus of many targeted policy efforts. Even though much of the evidence that describes these inequalities is of a more qualitative nature, good efforts that have been made to quantify them, within a variety of empirical settings, so as to provide a useful basis for policy analysis. Second, gender-aware economic analysis requires solid, sex-disaggregated data. Increasingly, data are becoming available that make a clearer distinction between the behavioral patterns of men and women, and which are collected for a variety of countries and at differing levels of disaggregation allowing for more nuanced types of gender-differentiated analyses. In this report we were able to look closely at the time use patterns in both rural and urban Tanzania, evaluate potential educational outcomes for girls in Bangladesh and

Turkey, and explore various opportunities for increasing agricultural or non-agricultural incomes in the Dominican Republic.

A key challenge in bringing out the "hidden" and highly gendered aspects of the economy is in representing the interactions between households and the socio-economic market environment, in terms of both production and consumption, for goods that have either an explicit or an implicit price or value. Good qualitative evidence can be used to better define and further refine the hypotheses that are used in the specification of quantitative models that can then be calibrated to whatever quantitative types of data that have a strong gender component. In doing so, one can enrich the structural simulation models that illustrate the impact of policy on households with more qualitative types of data and knowledge that are informative in describing where gender really matters in socio-economic interactions. The outputs from this kind of analytical framework can provide policymakers with the information they need to evaluate the underlying tradeoffs that exist when targeting investments and policy interventions towards improving the welfare outcomes for women and men.

In the following section, we discuss the attempts that have been made in the past to capture gender within an economic modeling framework and the shortcomings that they have had in addressing key issues. After bringing in some insights from an expert consultation on modeling gender, we then point out some promising directions in the literature, and how the various pieces of work done within this project could be further improved.

Early Gender-Aware CGE Models and their shortcomings

Early gender-aware SAMs and related CGE models can be broadly distinguished in two groups: those which only disaggregate labor factors of production by sex (Arndt and Tarp 2000; Sinha and Sangeeta 2003; Thurlow 2006; and Arndt, Robinson and Tarp 2006) and those which, in addition to representing some gender characteristics of the labor market, integrate non-market activities into the broad CGE framework, making them visible alongside market activities (Fontana and Wood 2000; Fontana 2001, 2002; Fofana, Cockburn, and Decaluwe 2003; Siddiqui 2009). Studies in the first group, since they exclude the unpaid household economy, cannot fully capture the gender effects of economic policy reforms. The reasons why some modelers consider gender only in the paid labor market may partly reflect their ideology, but also depend greatly on data availability. Even if the task is not without complications, the data required for the sex- disaggregation of labor value added in market production can be usually calculated from standard Labor Force Surveys which are available for most developing countries.

Those CGE models that have attempted to represent the household sector and its interactions with the market sectors have done so in a simplified manner. Their common approach is to construct a household sector for each household type in the Social Accounting Matrix (SAM). Members of each type of household are assumed to "produce" particular kinds of "care" (or "social reproduction"), which is not traded among households but consumed by the members of only that household category. This "care" good is produced overwhelmingly by the females in the household and consumed by the family as a whole (without a clear distinction drawn in the model over which family members are likely to benefit the most from it). A common method is to assume that production in the household uses only labor time and to value time inputs at some specified wage. The estimated outputs of household production appear in the SAM both in the production accounts and in final demand. These estimations are usually based on strong assumptions due to the paucity and poor quality of the data.

Although encouraging as a first attempt, this approach has some limitations since unpaid household activities are all lumped together into one homogenous sector (and are considered to be produced only with time inputs—they are assumed to require neither capital nor land nor intermediate inputs). Compare, for example, the activity of collecting fuel and water with the activity of preparing a meal, or with the task of taking care of a terminally ill family member, in the hospital or at home.

As these examples illustrate, household activities are varied and differ from each other in terms of their relation to the other institutions within which production and distribution of their output takes place. The household uses inputs from the market, the State, and the non-profit sector which are combined with time inputs from family members to produce "well-being." Importantly, the socioeconomic characteristics of households (rural/ urban, wealthy/poor, engaged in formal/informal labor, extended/female-headed and so on) define the modality of access to the technology required: for instance, one needs electricity, water, raw vegetables and wheat to cook a meal but some people have to use charcoal instead of the stove and grind their own flour instead of buying it already ground; one can collect water through water pipes installed in one's home or by having to walk long distances to the nearest well; one can provide adequate care to a sick child only if supported by quality public health services, and so on. In other words, the provision of food, shelter and care (and hence the outcomes of "being well-fed" and "being in good health") can be achieved through different combinations of time inputs, raw material, intermediate inputs bought from the market and public services. It is usually the most vulnerable households, and in particular female members within them, who carry the bulk of the time burden in a society. This time is needed to make up for the lack of adequate physical and social infrastructure available to them.

The Usefulness of Time Use Surveys for Economywide Modeling Of Gender Impacts

There is clearly the need, as evidenced by this brief discussion, to develop further gender-aware modeling by breaking down the non-market sector in several activities and by providing a more detailed and integrated way of representing interactions between unpaid work and the market economy. The increasing availability in developing countries of good quality and detailed nationally representative Time Use Surveys (TUS) in the last few years (for example, in Argentina, Mexico, India, South Korea, South Africa and Tanzania) offers an opportunity to address some of the early limitations in gender modeling.

Time use surveys aim to document activities people perform over a given period (generally a day) as well as how much time they spend on each of the specified different activities. They usually report both the System of National Accounts (SNA) and non-SNA activities but focus in greater detail on non-SNA activities.[61] Such surveys, especially in developing countries, are often the sole source of information on unpaid work by different groups of women, men, and children. These surveys partly address "the problem of women's activities" (see Elson and Cagatay 2000): they are often not "counted" in statistics, not "accounted for" in representations of the economy, and "not taken into account" in policy making.

Non-SNA activities are usually specified in great detail (see Box 5.1). The survey makes it possible to learn how the burden of carrying each of these activities is distributed across a range of socio-economic characteristics including location, gender, income, and age.

Methodologies as well as the scale of TUSs often vary, pointing to the need for greater standardization in the future (Folbre and Yoon 2008). Time use surveys can be planned as stand-alone surveys or add-on modules to other general surveys such as household surveys and labor surveys. The great advantages of add-on modules is that patterns of time use can be then matched with a wider range of households' and individuals' characteristics. This has the advantage that, among other things, time use data can be more easily integrated into a SAM framework. A SAM with detailed activity and household

[61] The UN System of National Accounts (SNA) recognises as productive work the following categories: employment for establishments; primary production activities not for establishments such as agriculture, animal husbandry, fishing, forestry, fetching of water and collection of fuel wood; services for income and other production of goods not for establishments such as food processing, trade, business and other services. Water and fuel collection have been included only since 1993 and are often still not included in measurement of GDP. Household maintenance, management and shopping for own household; care for children, the sick, the elderly and disabled; community services and help to other households are still considered "non-productive" activities hence not recorded. Only some countries record these activities but as separate "satellite accounts." It is these activities that most gender-aware literature calls non-SNA work or extended-SNA work.

accounts, including time accounts, becomes a powerful instrument for studying the distribution of real income and household living standards (beyond simply monetary income) and their gender dimensions.

Box 5.1. Non-SNA Activities from the 2006 Tanzania Time use Survey

- Preparing food (grinding, milling, cutting, heating water, chopping wood)
- Preparing food and cooking (both together)
- Cooking, making drinks, setting tables and serving
- Cleaning up after meal; Cleaning house and surroundings
- Washing clothes, ironing, mending and ordering clothes and linen;
- Shopping for personal and household goods;
- Accessing government services;
- Household management: planning, supervising, paying bills, buying pre-paid electricity
- Do it yourself home improvements and maintenance
- Chopping wood, lighting fire and heating water not for immediate cooking
- Physical care of children: washing dressing, feeding including breast feeding
- Teaching, training, and instruction of children in household
- Accompanying children to places
- Physical care of the sick, disabled, elderly: washing, dressing, feeding
- Accompanying the sick, disabled, or elderly adult to receive personal care services
- Supervising children needing care
- Supervising adults needing care
- Community organized construction and repair
- Cleaning of public buildings; Volunteering with or for an organization
- Caring for non-household children
- Caring for non-household adults

Time use analysis can strengthen policies in key sectors such as agriculture modernization and commercialization, infrastructure, and employment. It can provide guidance in prioritizing sectoral allocation of public expenditures to ensure gender-equitable outcomes. For example, our recent study based on the 2006 Tanzania Time Use Survey in this volume shows that women from low income groups living in remote rural areas carry the bulk of the burden of water and fuel collection. Children, too, are heavily involved in water and fuel collection, and girls more than boys, reproducing patterns found in the adult population. This evidence calls for priority to be given to public policy interventions in water infrastructure and sanitation services that are likely to have significant positive multiplier effects. A gender-aware model which incorporates time use data can quantify such effects and can be used to explore alternative policy scenarios.

Promising Approaches from the Literature

A number of related studies for developed countries (Gronau and Hammermesh 2003; Uriel et al. 2005) could constitute the starting point for building an integrated analytical framework which treats unpaid household time as the necessary input to transform any good or service produced in the market economy into well-being for household members.

In a seminal article, Graham Pyatt (1990) underlines the importance of valuing goods consumed by a household at *user cost* rather than market price: "… the difference between user cost and market price is to be interpreted…as the value of time in transforming goods purchased at market prices in order to satisfy needs and desires of consumers…" (1990: 33). In their more recent study of Israel and the United States, Gronau and Hammermesh (2003) use household data on expenditures of time and goods to generate an exhaustive set of commodities that households produce/consume using them (such as "eating", "health", "lodging", etc.), and calculate their time/goods intensity. They show how the time intensity of some commodities varies with age and education. Uriel et al (2005) apply a similar approach to Spain by modifying an existing SAM to include non-SNA time and by adding to it a number of activities such as "providing food," "providing clothes," "providing care and education" and so on, which result from the transformation of SNA commodities. Their work could be adapted to a developing country context.

As the driving interest in this IFPRI project is a concern with the economy-wide distribution of the costs and benefits of unpaid work across different socio-economic groups (and with macro-policies and infrastructural investment that may contribute to a fairer distribution), the approach just reviewed would seem attractive in that it would allow emphasis on the varied circumstances of the households in terms of their needs and the access they have to goods and services, infrastructure, and technology to satisfy those needs. This analytical framework could be operationalized in different steps. A first step would involve a simple mapping of households and their combined use of time and goods to produce a set of final "commodities." This mapping would aim to show which groups have to contribute a much larger number of unpaid time inputs than others to achieve the same minimum acceptable standards of well-being.

Unpaid work could be initially measured simply in physical units (i.e., hours of time). However, in a second step, a monetary value for it would need to be imputed. There exist two main approaches to impute a value to unpaid activities. Most estimates of non-market output multiply labor inputs in physical units by some monetary market wage. What would be the most appropriate wage for such estimates is also object of much debate (Goldschmidt-Clermont 1990). An alternative (but rarely used) method of valuing household production is the output-value method which counts the quantity of outputs, such as the number of children cared for or meals prepared by household members over a certain period of time, and values them at the prices of equivalent market goods and services. In both these imputations, money values need to be borrowed from the market, either as wages or as prices for goods and services.

Another potentially useful method (only attempted so far for a few developed countries, see Ironmonger, 1996 and Uriel et al. 2005) involves combining input and output approaches. Household output is valued at market prices, and the value of labor inputs can then be calculated as the residual, after deducting the costs of capital and intermediate inputs used in household production. The strength of this method over the others is that the actual, rather than the imputed, value of labor spent on household production would be calculated, hence avoiding problems arising from assuming that labor has same productivity in both market and non-market activities, and, more in general, that market wages truly reflect labor productivity. A frequent problem in most input-based valuations is that women's labor in the household is attributed a lower value than men's labor because of significant gender wage gaps in the market mostly due to discriminatory practices rather than differences in productivity. What is the best choice of method will ultimately depend on data availability and on the type of questions posed.

Synthesis from the Workshop, "Modeling Gender within a Micro-Macro Framework"

The workshop held at IFPRI on September 15 and 16 brought together scholars and practitioners to review several of the papers included in this volume as well as to provide additional cases currently being explored outside of the project. The purpose of the workshop was to build on the work of the participants to rethink some mainstream modeling assumptions and methods so that there could be a more effective treatment of gender-relevant issues within policy models – especially with respect to the linkages made between micro-level quantitative and qualitative data and structural macro-models.

A number of general principles emerged from the session, including a strong embrace of the value and need for more nuanced gender analysis, which builds on existing quantitative and qualitative evidence gathered across various disciplines. Overall, many important and compelling issues were discussed and debated including the following areas for future work and collaboration that the participants identified:

- the treatment of labor markets;
- the treatment of reproduction within the household;
- relaxing the assumption of the unitary household decision-making model driven by the objective of self-satisfaction;
- addressing important considerations such as risk and uncertainty; and,
- incorporating dynamics into the analytical framework to capture important inter-temporal trade-offs between investments made now (e.g., in education or care) and future returns to labor and productivity.

One of the main conclusions from the workshop was that the treatment of gender and labor, within models, needs to be greatly improved. Much of the work that has been done in capturing gender within the treatment of labor has mostly been confined to disaggregating the supply of labor from men and women, in such a way that a rough distinction can be drawn between the wages paid to men and women within various sectors of the economy. Much of this modeling work is done with an assumption of full employment, such that the increase in the demand for labor, from either men or women, must be met with a commensurate change in the prevailing wage, in order to provoke a response from the labor market. Much of this work also ignores the importance of bargaining outcomes, which gives powerful employers the ability to set wages at exploitative rates – leading to significant inequalities. Starting from the work of Lewis (1954) and Fei and Ranis (1964), we also know that in a number of developing country contexts, there is an excess of labor in certain sectors, which allows more labor to be mobilized at a flat and prevailing wage level, until the point that response of workers becomes limited by supply, and higher wages are needed to elicit other workers to switch from alternative sources of employment. It is only at that point, when price responses within the economy begin to resemble those expected under the assumption of full-employment.

At the same time, we have to recognize that the factors guiding the labor choice decisions of household members are strongly tied to considerations of both reproduction and production. Women have to trade-off the needs and demands for care, within the household, with the earning potential that they can expect in the wage market–fully knowing that their reproductive labor contributes to the wage-earning ability of other household members as well. So, given this perspective, it becomes clear that labor markets are really at the intersection of production and reproduction – and need to be modeled that way in order to really capture the essence of the key gender-related issues that underlie the dynamics of labor response. The treatment of gender and labor markets within macro-models has tended to rely on the disaggregation of employment by sex, since that type of distinction is more readily available than actual sex-disaggregated wages. The additional nuances that are needed to bring out the different constraints that

men and women face when choosing between whether to allocate their time to the wage market or to other paid or non-paid activities, are usually not present in most modeling efforts – mostly due to the fact that micro-level information that can inform the modeling of these tradeoffs, as well as the requisite conceptual framework, is usually missing, and has resulted in the rather limited treatment of gender inequalities within labor markets.

A key step to understanding the tradeoffs faced within the household in terms of labor and resource allocation is building an adequate understanding of the reproductive domain of activities and how it intersects with other decisions at the household level. It is not just an issue of household allocation decisions though. Policies and decisions at the macro level limit significantly and influence the range of choices available. This conclusion came out very strongly from the workshop, and was underscored by the paucity of papers within the literature that seek to address this aspect of gendered micro economics. The need for making this "hidden sector" more visible in theoretical and empirical modeling of gender-relevant issues was illustrated by a number of participants, who appealed to the concept articulated by Fontana and Wood (2000) and others who show how the activities of care and nurture that take place within the household can serve to "renew" and sustain the household-level workforce on a daily basis, and enhance the productivity of those workers in the wage market or in income-generating activities.

The central concept is that market goods need to be transformed into consumable goods at the household level, through the expenditure of time and other intermediate goods purchased from the market, to provide the nourishment and sustenance that leads to continued livelihood and well-being within the household. This transformation process is work, if unpaid, and needs to be reflected in the model. It was pointed out that this concept of reproduction is embedded in the concept of a household activity that produces a good which is non-tradeable—such as a subsistence good that can only be consumed within the household and that is implicitly priced in terms of resource scarcity or "shadow values" observed only by agents within the household, but not reflected by prices in the market. Some worthwhile discussion was generated around the parallels between a full-blown and explicit treatment of reproduction as a separate sector, and its implicit relationship to the non-tradeable activities of a household-firm, and it was resolved to continue looking at this issue further.

Another issue brought up in the workshop was the treatment of the objective criterion guiding the behavior of the household agents being modeled—and how the assumption of a unitary, satisfaction-seeking objective function could be replaced with a more appropriate treatment of intra-household dynamics and to address behavioral motives that go beyond simple work-avoidance and self-centered satisfaction. Some participants preferred to avoid the words "utility" or "preferences," in order to escape from the classical notion of introspective, self-satisfying motives that can be represented by a mathematical construct that embodies strictly-ordered hierarchies of preference that are non-contradictory and measurable across all combinations of goods. The imposition of a single objective criterion that explains the behavior of the household was also pointed out to be too simplistic and ignorant of the bargaining and negotiation that actually takes place within the household, over various domains of activity. The particular activities over which negotiation takes place can vary widely: some are contested, in terms of their domination by the men or women within the household, while others are strictly assigned to one domain or another.

The issue of risk and uncertainty was brought up in the discussion of how to appropriately model the objective criteria by which household agents behave, and how to encompass the different exposure that men and women have to risk in both the market as well as within society. For example, women will take lower-paying jobs that embody lower exposure to risk and a higher degree of flexibility in being able to respond to household-level situations, including emergencies. Since women bear the disproportionate burden of providing for the need and care of family, within many society, they modify their behavior to avoid unnecessary risk in earnings and which provides the greatest degree of flexibility in how they can substitute between work done within the wage market and within the household. The way in which men and women respond differently to perceptions of risk is also reflected in the way that savings and

investment decisions are taken – with clear examples given in the literature of how investment decisions made by women will tend to favor outcomes that provide the highest level of household within the household.

The treatment of dynamics in economic models that address gender-relevant behavior was also pointed out as an additional area of deficiency requiring redress within the current economic literature. One key aspect of inter-temporal dynamics that is often overlooked by economic models that try to address gender is that of savings and investment decisions. This idea draws from that area of the literature which motivates the idea of women making resource allocation decisions that favor higher endowments towards the care and nurture of children in the short run, in order to make them more productive in the future, so that they can supply the needed elder-care and remittances that will be anticipated in the future. A completely myopic decisionmaker would ignore those future considerations and simply pursue the maximization of self-satisfaction–or perhaps even consider the immediate gratification of other household members, as well–but overlook the "investments" that need to be made now in order to provide a more stable source of support, care, and income in the future. Many of the economic models which claim to be dynamic in the way that they address gender, as pointed out in the presentation by Filipsky and Taylor in this volume are actually simply "recursive" in the way they handle dynamics, and simply update the "moving" variables, such as population and cumulative savings, in order to re-solve the myopic decision problem in the next period. A significant improvement could be made to this kind of recursive updating, if the productivity of the labor force in the later periods were made to be dependent on the level of reproductive care that is given in earlier stages, as was suggested by Fontana (2003). This would be a first step towards making the treatment of labor productivity more meaningful to a gender-focused analysis, and could be followed up by considering the inter-temporal tradeoffs between consuming less in the present period (and reducing the immediate gratification and satisfaction in the near-term) in order to carry over a higher "stock" of human and productive capital into the future period, as part of the consumption choices made within the household over time. Doing this would bring out the kinds of choices that women make about household production and consumption decisions, which go beyond the scope of what the standard-type of static, utility-maximizing framework would suggest when only looking at work and leisure in a very simplistic way.

Refining and expanding our analysis further

Building on the insights provided by the expert meeting, and the latest developments occurring in the literature, we now lay out some ways that the analysis done for this project could be expanded and improved in the future to give an even more detailed and comprehensive analysis of gender issues. Each section below explores the implications of the topics addressed by one or more papers in this volume.

Linking Sectoral Investments to Improvements in Well-being

The major refinements to the empirical examples presented in the paper by Msangi and Ewing are both conceptual as well as empirical in nature. On the conceptual level, the disaggregation of access to education and clean water and sex-specific demographics to the household level is key to making the global-level simulations of a model like IMPACT relevant to the kind of gender-based dynamics and interactions that lead to welfare outcomes at a more micro-level. The treatment of access to water and female education within the IFPRI analysis is relevant to issues of health, time use, fertility and labor productivity, topics that were also touched upon in other papers of this volume. The absence of individual agent behavior and interaction between agents, however, makes it difficult to understand how the policy-targeted improvements in clean water access or female enrollment in secondary school actually get realized, ultimately, in better outcomes for child malnutrition, health and avoided loss of productivity due to illness. The reduced-form relationship that relates improvements in water access and education status to nutrition outcomes hides some of the agent-specific interactions and behavior that are relevant for understanding where unexpected constraints or confounding obstacles might arise, as well as ignoring the

role of reproduction and care in the economy – thereby reducing the intended impact of policy. Having a more explicit representation of care economies would also help the IFPRI analysis to extend its results for avoided water-related sicknesses into implications for additional home care burden on women (and the loss of labor participation that might result from that)

Disaggregating Social Accounts with Time Use Data

The original intent of this effort was to combine the analysis done in by Fontana and Natali with a full set of country-level CGE model-based simulations for Tanzania to illustrate a number of policy interventions. However, problems emerged when in trying to reconcile the data in the time use survey to the social accounting matrix of the Tanzania CGE model. Some of these are articulated here and could be addressed in a next iteration of the research. Conducting a full macro-level analysis would be very useful, and provide additional insight into potential policy interventions and impacts. Tanzania seemed to be a good case for testing this new analytical framework because of the availability of both a high-quality nationally representative TUS recently released by the Bureau of Statistics and a fairly detailed and partially gender-disaggregated Social Accounting Matrix (SAM).

The task of integrating the two sets of data proved to be much more difficult than initially anticipated thus far because, at a closer look, the structure of the available SAM[62] appeared to fit less well with the patterns emerging from our preliminary analysis of time use across gender, location, income, and age. The paper by Fontana and Natali in this volume presents some initial findings from the time use analysis and identifies the socio-economic characteristics of what is defined as the "overburdened," or time-poor. These findings could be used to inform the disaggregation of accounts in a possible new gender-aware SAM in the future.

Three areas of the SAM deserve further attention: the activities and commodities it encompasses, the factors used in disaggregation, and its treatment of households. The available 2001 Tanzania SAM has 43 production sectors, of which 21 are in agriculture. There are six categories of services. Public administration, health, and education are all assembled in one sector, and business services and personal services are merged, which could mask important differences between business sectors and personal services (usually consisting of domestic services), with the former characterized by higher male-intensity and skill-intensity than the latter. The report documenting the SAM construction notes that it would have been possible to construct a SAM with the 79 original sectors contained in the available I/O table, but that a 79-sector disaggregation was decided to be unnecessary at the methodological workshop conducted at the time. At present, IFPRI has constructed an improved and updated SAM for Tanzania – which still lacks, however, any disaggregation by gender in any of the accounts.

Considerable attention seems to have been paid in disaggregating factors in the 2001 Tanzania SAM. Labor is disaggregated by both sex and four educational categories,[63] for a total of eight categories. There is also a child labor category, including all working children between the ages of ten and fourteen (not disaggregated by sex) and a "subsistence factor," which is a composite of subsistence land, labor, and capital used in home own production (thus not allowing for the fine distinction of inputs into the process of home production that would be required for gender analysis as outlined in earlier sections). Since most of agricultural activities are subsistence activities, not disaggregating the subsistence by sex leaves out a lot of important information that could inform the gender analysis for agriculture.

Moreover, after further inspection and several consultations with the principal author of the SAM, it has emerged that the female and male shares in agricultural value added attributable to non-subsistence

[62] The SAM that was first used and later abandoned was constructed by IFPRI for 2001. For that year, the data set also constituted a problem for data reconciliation since the TUS is for 2006. To move forward, the SAM needs to be updated by using both standard labor statistics and time use data from the most recent 2006 Integrated Labor Survey.

[63] These categories are: no formal education, not finished primary school, not finished secondary school, and completed secondary or higher education.

labor were simply based on "informed guesses." Outside agriculture, the gender division of labor draws on more reliable data and shows very pronounced patterns: very little female labor is used in manufacturing and services, with the exception of tourism and textiles. It is possible however that female labor, particularly if precarious labor or unpaid, is used in these activities but not reported. The SAM does not include information on unpaid work.

In the SAM, there are 12 household categories that are disaggregated by 2 locations (urban/rural), education level of the household head[64] and poverty levels. Households are not distinguished by the gender of the household's head. The analysis by Fontana and Natali in this volume suggests that a different grouping of households would be required to better capture inequalities in the distribution of time burdens in various activities and household differences in needs and access to physical and social infrastructure.

Further Expanding the Demographic Model

The analysis by Leiwen and Hardee used three key parameters to quantify alternative drivers of change in demographics that are relevant to gender and policy, particularly fertility and education transition rates. Their findings show that education alone is not enough to achieve favorable demographic transitions, but that choice of fertility is also important. This is an aspect of intrahousehold dynamics (i.e., the choice of how many children to have) that is often not modeled directly, but is of critical importance to women in deciding between alternatives of work, home, leisure and career that are of critical importance to their quality of life, both in present and future. Although they did not model the actual interactions and intrahousehold dynamics between agents, the researchers were still able to simulate the case of increased fertility control to demonstrate the outcomes on the composition and skill level of the labor force. Some important extensions to this work would be to incorporate more specific socio-economic considerations in the fertility decision, and try to model them explicitly, to see how market conditions lead to different demographic outcomes, through the feedbacks created between the wider economy and household level behavior. One important example would be an interacting model of the labor market and a demographic model, to see the feedbacks between labor force growth, and occupation-specific wages (which are a determinant in both work/leisure decisions as well as choice of occupation).

Building the Gendered Disaggregated Rural Economywide Model (G-DREM)

The major refinements to the DREM framework used in the paper by Filipski and Taylor that would allow it to better capture important policy-relevant aspects of gender at the household and economy-wide level were identified by the authors and by other discussants at the final project workshop. One of the most important extensions would be to include intrahousehold dynamics, such that we relax the assumption of a unitary structure to household-level decision-making that allows us to better see the various domains over which men and women have decision-making power, and where compromises must be made (or conflict might arise). While the authors did distinguish between male and female headship, it was recognized that this does not go far enough in uncovering actual gender-relevant dynamics that affect decision-making and welfare outcomes at the household level. Another important extension to the DREM framework that was discussed at the workshop was that of creating a care sector, which allows for certain activities like childcare, cooking, cleaning, and other non-paid household activities to be recognized explicitly within the modeling framework. Some of the elements necessary to build a care sector already exist within the DREM model, since it allows for certain non-tradeables to be both produced and consumed at the household level, e.g., a certain kind of non-marketed staple crop. Extending this concept of non-tradability to goods produced by household care and nurture is feasible with the DREM framework, at a conceptual level, but will require good time use data to properly quantify and operationalize it, empirically. Introducing this would provide a perspective on care economies within the

[64] The education categories are: no education, not finished primary, not finished secondary, and completed higher education. The poverty level categories are: below food poverty line, between food and basic needs poverty lines, and non-poor.

household that is very similar to that used by Fontana and Wood (2000), for their single-country CGE model of Bangladesh. The main difference would be that the DREM would focus more specifically on the rural economy, and allow for a more detailed look into the production and consumption decisions of different household types, than is normally possible with standard CGE approaches.

Conclusion

This chapter points out the key innovations that could be introduced to greatly enhance the gender-relevance of policy-focused macro-economic modeling, and improve its linkage to important micro-level household factors. The insight into how best to move forward in expanding the analysis done for this report was greatly helped by the expert workshop, whose concluding discussions focused around the need to mobilize resources and intellectual effort so that they can be adequately addressed in the future research work program suggested by the major topics identified by the workshop participants. It was agreed that any future effort should mobilize a range of data and methods embodied in the institutions and researchers represented at the workshop, and to include some additional perspectives on how quantitative methods and qualitative knowledge of important gender issues could be better combined. The preference expressed was to establish a consortium structure to organized periodic meetings to discuss and strategize towards further progress on these issues.

At the workshop, it was clearly recognized that no single modeling framework can adequately address all of these areas at one time, and that a variety of stylized prototypes would have to be developed to address parts of the larger puzzle. Having teams of researchers who combine the talents of theoreticians, modelers and policy experts to work in parallel on specific areas of the wider agenda was felt to be the most fruitful way of making progress and which would allow for the necessary level of concentration and focus on the key areas needing improvement. Maintaining the interaction and dialogue among these various teams and re-visiting the overall goals and objectives as a group was also deemed to be a useful strategy for creating a vibrant discourse and an active community of practicing professionals that can help push the development of gender-aware economic models to the level needed to address the urgent and important issues confronting policy-makers today.

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