IMPACT OF INVESTMENTS IN FEMALE EDUCATION ON GENDER EQUALITY

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EXECUTIVE SUMMARY

While the benefits of educating girls and women for societies, in general, and their families, more specifically, are well-understood, the case for education serving as a catalyst in reducing gender inequality, or benefiting women themselves, is less clearly established. It is often assumed that education enhances women's wellbeing and gives them a greater voice in household decisions, greater autonomy to determine the conditions of their lives, and improved opportunities to participate in community affairs and the labor market. This paper reviews existing literature to assess the empirical validity of this assumption in order to inform those investing in and interested in women's education about whether, how, and under what conditions women's education directly improves their own lives and decreases gender inequality in the family, society, and economy.

We examine the relationship of education to four broad aspects of gender equality in which improvements in women's wellbeing, empowerment or relative position to men are especially desirable:

1. Health and wellbeing
2. Position in family and society
3. Economic opportunities and returns
4. Political participation

Our review indicates that education is a necessary, but not sufficient investment for achieving gender equality or improving women's wellbeing. Of the twelve indicators we examined in the four themes above, education has a consistently favorable impact on women's wellbeing and gender equality for only two outcomes, namely, maternal health and women's mobility. For all the other aspects that we examined, the empirical literature suggests that a range of underlying social and economic conditions needs to be favorable in order for female education to have a beneficial effect on gender equality and women's well being. Female education is most beneficial to women in settings which are already less patriarchal, where women have access to services, options and opportunities, and where market and social conditions favor positive returns. The review also indicates that often it is only secondary or higher levels of schooling that leads to improved options, opportunities, and outcomes for women.

For policymakers, this suggests that investments in education often need to be accompanied by investments in improving the enabling conditions within which schooling has the greatest payoff for girls and women. This requires improvement in provision of services and opportunities, and more fundamentally, shifts in social and economic structures and gender norms.

1. INTRODUCTION

Women's access to education has been recognized as a fundamental right, and increasing girls' education is a central policy aim of the international development community and most developing country governments. Gender equality in education is a critical element of the Millennium Development Goals. This international commitment is, in part, founded on a large literature that establishes the positive effects of women's education on a broad range of development outcomes, from reductions in fertility and child mortality to increased productivity and economic growth (World Bank 2001). However, while the benefits of educating girls and women for societies, in general, and their families, more specifically, are well-understood, the case for education serving as a catalyst in reducing gender inequality, or benefiting women themselves, is less clearly established. It is often assumed that education enhances women's wellbeing and gives them a greater voice in household decisions, greater autonomy to determine the conditions of their lives, and improved opportunities to participate in community affairs and the labor market. To what extent there is broad-based empirical support for this assumption is not well known.

In this paper, we review the existing empirical literature from a variety of social science and health disciplines to understand what is currently known about the impact of investments in female education on gender equality, women's empowerment, and their wellbeing. We draw on literature in the fields of economics, demography, sociology, anthropology, and political science and restrict ourselves to studies on developing countries published within the last decade and a half.[1] We examine outcomes for which the linkage to female education has been examined empirically in four specific spheres where improvements in women's wellbeing and empowerment or reductions in gender inequality are especially desirable:

1. Health and wellbeing
2. Position in family and society
3. Economic opportunities and returns
4. Political participation

In reviewing the literature, our primary aim is to establish whether the preponderance of existing evidence supports a positive relationship between girls' education and specific outcomes within each of these thematic areas and to identify the strengths and weaknesses of this evidence. Equally importantly, through this review we aim to lay the foundation for identifying some of the specific institutions and policies that need to be in place for human economic, cultural, and institutional conditions under which investments in girls' and women's education reduce gender inequality by enhancing women's capacity, opportunities, security, and empowerment.

[1] A few unpublished works that were presented in professional forums are also included. It should be noted that our review included few studies that examine the impact of programmatic interventions that aim to increase girls' schooling, since the evaluation of such interventions is generally not rigorously conducted or well-documented.

1.1 Methodology

The outcomes we focus on in this review are limited partially by the availability of empirical literature on specific issues within and beyond the thematic areas listed above[2] and partially by our definition of gender equality, women's empowerment, and wellbeing. In using the term "gender equality," we are following the definition posited by the World Bank in its policy report *Engendering Development*: equality for men and women under the law, equality of opportunity (including equality of rewards for work and equality in access to human capital and other productive resources that enable opportunity), and equality of voice (the ability to influence and contribute to the development process) (World Bank 2001). Thus, measures of gender inequality considered in this review as outcomes of interest focus on women's position relative to men and span the four specific spheres defined above.

By "women's empowerment," we are referring to the expansion in women's ability and freedom to make strategic life choices, a process that occurs over time and involves women as agents who have the ability to formulate choices, control resources, or enact decisions that affect important life outcomes (Malhotra, Schuler et al. 2002). In considering studies that focus on education and women's empowerment, we have included those that measure women's decision-making input, power, or ability to act more autonomously. For the most part, these studies fall within the third thematic area outlined above (position in family and society), although empowerment is occasionally an issue of interest within other thematic areas as well.

Our choice of the four themes also results from the idea that education can benefit women not only by improving gender equality or empowering women, but also by improving their opportunity structure or wellbeing. Thus, we include empirical literature that examines the relationship of schooling to women's health and physical welfare as well as the literature on their economic options and rewards. Political participation can signify both improvement in opportunity structure and possibly the empowerment of women by giving them a voice in the public sphere and, as such, we include this as a category of interest. However, it is important to note a priori that our efforts at identifying empirical literature that examines the connection between women's education and political participation yielded very little.

In the empirical studies reviewed here, the definition of the term "female education" is not contested, but it is relatively narrowly operationalized in terms of a few, very specific, measurable aspects of schooling. In studies at the micro or household level, female education is measured either by the years of schooling a girl or woman has or the level of schooling (primary, secondary, higher) she has achieved. At other times, literacy

[2] For example, although it would have been desirable to consider psychological and self-esteem issues, or the enforcement of legal rights, rigorous studies examining the linkage between such outcomes and female education in developing countries are, for the most part, lacking. Several authors have identified the multiple dimensions of gender equality and empowerment and the specific indicators within each dimension (see, for example, (Kishor 1995; Mason 1998; Malhotra et al. 2002)). Although girls' education could potentially have an impact on a significant number of these indicators, the empirical literature focuses on only a handful.

is simply identified as education, or a basic distinction is made between the "educated" and the "uneducated." In all these cases, studies are referring to formal schooling rather than informal, religious, or cultural education. At the macro-level (i.e. cross-national studies), female education is generally measured by proportion of girls who are enrolled in primary, secondary, or tertiary schools in a given year. Completion rates for girls at these levels are considered only infrequently because these data are not available in many secondary data sets. In both micro and macro level studies linking education to outcomes of gender equality, women's empowerment, or their wellbeing, more nuanced indicators of education (such as quality of education, the content of educational materials, the teaching environment, or the effect of single-sex versus coeducational schooling) are rarely considered.

2. THE EFFECT OF FEMALE EDUCATION ON WOMEN'S HEALTH AND WELLBEING

Summary of Findings: Female Education and Women's Health and Wellbeing

- Women's education is consistently associated with higher use of maternal care services.
- For women's sexual and reproductive health or service use, female education is not always protective, and needs to be considered in the context of other risk factors.
- Female education is effective in reducing violence against women where norms are already less patriarchal and more gender-egalitarian, but less so in rigid, conservative settings.
- Son preference and gender inequality in child health may be reduced as well as exacerbated due to female education, but there is little consensus about which contextual factors contribute to negative or positive education effects, or how they do so.
- Female education at higher levels is consistently associated with improved health outcomes, and with stronger effects than lower levels of schooling.

We discuss the relationship between female education and four different aspects of women's health and wellbeing:

1. Maternal health
2. Sexual and reproductive health (including reproductive tract infections, sexually-transmitted diseases, HIV/AIDS, and female circumcision)
3. Domestic violence
4. Son preference[6] and gender differentials in child health

[6] Although gender preferences are strictly an indicator of larger gender inequality in the social sphere, we include it here because much of the empirical work on gender preferences addresses sex differences in childhood mortality.

We were able to identify between eight to twelve empirical studies that examine the relationship between female education and each of the four outcomes above (table 1). Given the nature of the topics, the studies are largely from the fields of demography, sociology, or anthropology. In addition, the studies on HIV/AIDS include research done by epidemiologists, and the domestic violence literature includes work by economists. For two of the three outcome categories (domestic violence and gender equality) the studies reviewed here are predominantly from Asia. This reflects the fact that most of the available published literature in English on the effect of education on women's well-being for these outcomes has been conducted in Asia. This is particularly the case for gender equality in child health and gender preferences for children, where eleven of the twelve studies are from Asia, and ten of these eleven from South Asia. On the other hand, the largest geographic concentration for studies on reproductive health is Africa, reflecting the preponderance of studies with HIV/AIDS as the outcome studied in this category for this paper. Overall, Latin America is poorly represented; this largely reflects language barriers as much of the relevant literature is in Spanish

Table 1
Distribution of Studies Reviewed on the Effects of Female Education on Women's Health and Wellbeing

	Outcomes			
Characteristics of Studies	**Maternal Health**	**Sexual and Reproductive Health**	**Domestic Violence**	**Son Preference and Gender Equality in Child Health**
Total Studies	8	10	11	12
Relationship to Education				
Beneficial	6	4	4	2
Null		2	3	2
Harmful		1		1
Conditional	2	3	4	7
Measure of Education				
Years of formal education	5		2	2
Level of education	3	9	6	4
Literate vs. illiterate		1	3	6
Context Considered				
Yes	3	4	6	9
No	5	6	5	3
Region				
Africa		5	1	
MENA	2	3		1
Asia	3	1	8	11
LAC	3	1	2	
Main Data Source				
Quantitative Survey	8	10	10	12
Qualitative Ethnography			1	

2.1 Maternal Health

In examining the relationship between women's education and maternal health, we review studies from South and South-East Asia (India and Indonesia), North Africa and the Middle East (Egypt and Jordan), and Latin America (Peru and Nicaragua). A variety of maternal health outcomes are used in these studies to test the education-health relationship, including the timing, sources, and quality of antenatal care used; location and attendance of trained practitioners at delivery; use of postnatal care; and use of private versus public health care, and to a more limited extent, women's nutrition and more general non-reproductive health outcomes. All the eight articles on maternal health focus on the use of maternal health services, rather than maternal mortality or morbidity. On the whole, results suggest that women's education improves their use of maternal health services, independent of related factors such as urban/rural residence or socioeconomic status and across the range of types of services and stages of maternal care (LeVine et al. 1991; Obermeyer and Potter 1991; Elo 1992; Bhatia and Cleland 1995a; Govindasamy 2000; Beegle et al. 2001; Bloom et al. 2001).

Studies focusing on the relationship between education and maternal health measure education by years of schooling as a continuous variable, with three looking specifically at levels of education. All the studies reviewed here are quantitative, relatively large-scale studies, with ethnographic data supplementing quantitative data in only one case (LeVine, LeVine et al. 1991).

Studies that examine the use of ante-natal care services measure this outcome in terms of whether any care was sought, in which trimester of pregnancy it was sought, and frequency of antenatal care visits. All the studies reviewed here find that, controlling for likely confounders such as urban/rural residence and socioeconomic status, educated women are more likely than less or uneducated women to use antenatal care, to use it early and frequently, and to use trained providers and medical institutions (LeVine, LeVine et al. 1991; Obermeyer and Potter 1991; Elo 1992; Bhatia and Cleland 1995a; Govindasamy 2000; Beegle, Frankenberg et al. 2001; Bloom, Wypij et al. 2001). Studies that examine circumstances surrounding delivery also find a significant positive relationship between education and a safe delivery (most often defined by whether or not a delivery was conducted by a trained attendant such as a physician or trained midwife) (Obermeyer and Potter 1991; Elo 1992; Govindasamy 2000; Beegle, Frankenberg et al. 2001; Bloom, Wypij et al. 2001). Only one of the studies we reviewed look at postnatal care, once again finding a positive relationship with education (Bhatia and Cleland 1995a).

The studies that measure their independent variable in terms of different levels of female education rather than a continuous indicator on the years of schooling clearly show that the level of education matters. Higher levels of education—at least 6 years or more, or secondary schooling—always have a positive effect on a woman's use of a variety of prenatal and delivery services, as well as postnatal care, and the effect is always much larger than is the effect of lower levels of schooling (Elo 1992; Bhatia and Cleland 1995a; Govindasamy 2000). For lower levels of education, the existence of a positive

effect varies by type of outcome, such that primary education tends to show more of an impact on the use of prenatal services compared to delivery or postnatal services (Elo 1992; Bhatia and Cleland 1995a).

The extent to which the beneficial effect of education on maternal health is conditioned by context is not clear. Levine et al. (1991) find in Mexico that context does not matter: maternal education has a significant effect on women's use of prenatal and delivery care in both a rural area with limited health care facilities and in an urban area with better access to maternal care services. Behrman and Wolfe (Behrman and Wolfe 1989) find in Nicaragua that, even taking into account a woman's unobserved childhood background factors that may contribute to her motivation and ability to seek care, her own education continues to have a large and significant effect not only on her own health, but also has an intergenerational effect on the health and nutrition of her daughters and their households.

On the other hand, several of these studies point to other factors that may have an equally or even larger impact than education on the extent to which women use maternal care. The main factor of concern is the lack of good quality or easily accessible services, particularly for poorer or more disadvantaged areas or socioeconomic groups. In Peru, for example, Elo (1992) finds that uneducated women in Lima are more likely to have medical assistance for prenatal and delivery care than even the most educated women in the rural Sierra, and argues that this differential is due to the very poor availability of services in the rural area. Further, she finds that equalizing education between the two areas would not, by itself, eliminate the estimated differences in use of services. Other studies echo this theme, although most do not test it as well empirically (Obermeyer and Potter 1991; Govindasamy 2000). In contexts of very low use of maternal care, pre-existing norms regarding what is acceptable care, or norms restricting women's mobility, may be an additional factor inhibiting both educated and uneducated women from using the limited services that are available (Govindasamy 2000; Bloom, Wypij et al. 2001).

2.2 Women's Sexual and Reproductive Health

In contrast to maternal care, the evidence for a positive effect of education on other aspects of reproductive health is mixed. Some research shows no effects or harmful effects of education. Studies in India and Egypt find that after controlling for various confounders, women's education does not have any significant impact on their risks for a range of gynecological morbidities and infections including white discharge, pelvic inflammatory disease, genital prolapse, and other health problems such as anemia, hypertension, or obesity (Younis et al. 1993; Bhatia and Cleland 1995b). In fact, Younis et al. (1993) find that women's education is significantly associated with *higher* risks of urinary tract infections (UTIs). Some studies of HIV prevalence also find that education is associated with somewhat higher risks of disease, particularly for higher levels of education (Quigley et al. 1997; Gregson et al. 2002). Authors suggest that women with more education may engage in certain behaviors or life-styles that are more risky, such as douching in the case of UTIs (Younis, Khattab et al. 1993; Quigley, Munguti et al. 1997).

Other studies of HIV in Africa and Latin America find that education has a strong and protective effect on women's risk of HIV infection, on the prevalence of risky behaviors associated with STDs including HIV, and on women's ability to discuss HIV with a partner, ask for condom use, or negotiate sex with a spouse (Wolff et al. 2000; Fylkesnes et al. 2001; Gregson, Terceira et al. 2002; Silveira et al. 2002; Jewkes et al. 2003). Similarly, Bhatia and Cleland (1995b) find that educated women—particularly those with higher education—are more likely to seek care for certain reproductive health problems such as acute pelvic inflammatory disease and anemia. Studies of female circumcision in Egypt also point to a largely protective role of female education, which is found to be associated with a lesser intent to circumcise, lower risks of circumcision of young girls, as well as the use of more medical means of circumcision when girls are circumcised (El-Gibaly et al. 2002; Yount 2002).

Of the studies that find a protective effect of education, most compare across different levels of female education. In these studies, the specific level of education matters. In some cases, any education has a beneficial impact compared to no education, but the effects are stronger at higher than at lower levels of schooling (Bhatia and Cleland 1995b; Silveira, Beria et al. 2002; Yount 2002). Others find a "threshold effect" suggesting that it is *only* at secondary or higher levels of schooling that education has a significant beneficial effect on women's own health outcomes for risks of disease, or their attitudes and behavior regarding female circumcision (Bhatia and Cleland 1995b; Fylkesnes, Musonda et al. 2001; El-Gibaly, Ibrahim et al. 2002; Gregson, Terceira et al. 2002).

Some methodological concerns should be considered in interpreting both positive and negative results. First, as some authors themselves note, information on past and current sexual behavior used as indicators to gauge risk in studies of HIV may be inaccurate because of recall or reporting bias (Quigley, Munguti et al. 1997). If this bias is related to education in any systematic way (eg, if educated women are consistently more or less likely to under- or over-report certain risk behaviors) then the relationship found between education and HIV-risk behaviors may be inaccurate. None of the studies examined here consider this issue. Second, several studies of risk factors for STDs or HIV present multivariate analyses that include education and control for various factors including age, husband's characteristics, and community of residence, but do not control for socioeconomic status (Quigley, Munguti et al. 1997; Silveira, Beria et al. 2002; Jewkes, Levin et al. 2003). If educated women are more likely to come from wealthier households, and if socioeconomic effects are likely to be similar to education effects, then some of the results attributed to education may actually be due to household wealth. Thus any positive (or negative) relationship of women's education to the outcome may be over-estimated.

Generally, these studies do not examine the context within which education is related to risk factors, behaviors, or prevalence, either empirically or in their narrative. Among the few studies that do focus on contextual factors, the findings indicate that education has a beneficial effect on women's attitudes, behaviors, and risks only in contexts that are otherwise favorable to reducing risks or adopting safe behaviors. Thus protective effects

of women's education on prevalence of HIV or risky behaviors are stronger in urban than in rural areas (Fylkesnes, Musonda et al. 2001). The authors suggest that this differential is due to attitudinal and service-related barriers to change in rural compared to urban areas, including less favorable attitudes towards condom use. The extent to which education can lower HIV risk for women is also related to other gender-based issues, such as violence, that may stop women from convincing their partners to adopt safe behaviors or accessing care if HIV-positive (Jewkes, Levin et al. 2003). The protective effect of maternal education on girls' circumcision in Egypt is similarly context-dependent: the decline in young girls' circumcision associated with higher schooling among their mothers in recent as opposed to older age cohorts suggests that education has had an impact on female circumcision in Egypt only since public discourse and exposure to negative messages about the practice have increased over the last few years (El-Gibaly, Ibrahim et al. 2002).

In sum then, it appears that women's education may have a beneficial effect for their own health, but not in all cases. For female circumcision in Egypt, women's education is protective, and inter-generationally, so that educated women are less likely to circumcise their daughters or, if they do, to use medical practitioners. On the other hand, it is not clear that education is always protective for women's risks or experience of reproductive tract infections (RTIs), STDs, or AIDS. Part of the ambivalence of this relationship may be due to methodological gaps in studies: for instance, the failure to control for other confounding factors (Quigley, Munguti et al. 1997) or the select nature of the samples studied (Gregson, Terceira et al. 2002). It is also possible that for RTIs and STDs, and especially for HIV, other risk factors may be much more important than education and, thus, after controlling for them we may see no remaining independent effect of education per se on actual prevalence or risks of contracting an infection. Education may, however, be associated with intermediate outcomes for STDs, such as women's ability to negotiate sexual behavior or to protect themselves through condom use or refusing sex.

2.3 Domestic Violence against Women

While studies on domestic violence have been conducted in various parts of the developing world, our search for published papers that specifically examine women's education as a possible protective factor yielded research primarily from South Asia (India and Bangladesh), with one article from Sierra Leone and two from Nicaragua. Most of these are multivariate quantitative studies, though several include qualitative or ethnographic data to elaborate on their results (Schuler et al. 1996; Rao 1997; Jejeebhoy 1998; Sen 1999; Ellsberg et al. 2001a). Only two of the studies reviewed here rely on bivariate analysis (Sen 1999; Visaria 1999). All the studies reviewed are based on analyses from primary data that the authors have collected either specifically to study violence, or as part of larger, multi-year studies. Samples are representative of the area in which the study is conducted, except for the study from Sierra Leone (Coker and Richter 1998).

These studies examine several aspects of domestic violence. The most commonly-used outcome is a woman's own report of having suffered physical abuse at the hands of her husband or others in the family, either ever in her life, currently, or in the previous year (Schuler, Hashemi et al. 1996; Rao 1997; Coker and Richter 1998; Jejeebhoy 1998; Sen 1999; Visaria 1999; Bloch and Rao 2000; Duvvury and Allendorf 2001; Koenig et al. 2003). Other aspects of domestic violence examined include psychological abuse, resistance to abuse, the ability to leave an abusive relationship, and women's own justification of violence (Jejeebhoy 1998; Sen 1999; Visaria 1999; Duvvury and Allendorf 2001; Ellsberg, Winkvist et al. 2001a). Our search did not focus on sexual abuse, and thus, only one among the articles reviewed here includes an analysis of sexual abuse (Coker and Richter 1998). Approximately half of the studies we reviewed on this issue treat education either as a continuous variable for years of schooling or as a yes-no dichotomy, while six out of eleven look specifically at possible different effects by level of education.

Possibly because these studies have been designed by researchers with a significant interest in and knowledge about the issue of domestic violence, most examine the context within which women experiencing violence live. The contextual factors explored in this area of research include women's participation in community development or credit organizations; social and cultural gender norms; community attitudes about sexuality and violence, and family history of violence. Some studies model the effect of the context as its influence on the education-violence relationship (Schuler, Hashemi et al. 1996; Jejeebhoy 1998; Koenig, Ahmed et al. 2003). Others either include contextual factors among independent variables in their multivariate analysis (Rao 1997; Bloch and Rao 2000). Yet others discuss the importance of the social, economic, or sexual context for women's experience of and response to violence in their interpretation of results (Coker and Richter 1998; Sen 1999; Visaria 1999; Ellsberg, Winkvist et al. 2001a).

A clear picture of the relationship between women's education and domestic violence does not emerge from these studies. Part of the problem may be methodological, since much of the data is based on women's self-report of violence. The extent to which women are willing to report violence may itself be influenced by education (Visaria 1999; Koenig, Ahmed et al. 2003). Moreover, the direction of this bias is not certain, ex ante. If violence is more stigmatized among the educated, then educated women may be more likely to under-report violence. On the other hand, educated women may be more willing or able than un-educated women to recognize and vocalize violence, perhaps because of greater exposure to the issue (Duvvury and Allendorf 2001). Thus, any negative or positive relationship of violence with women's education may at least partly reflect education-related differences in reporting rather than in actual experience of violence. Violence may also be under-reported in certain survey designs, such as Demographic and Health Surveys, either because of interviewing protocols, or inappropriate or unsafe interview settings (Ellsberg et al. 2001b).

Despite these caveats, several studies point to a highly significant and protective effect of women's education on their risks of violence. Ethnographic research and bivariate analysis of quantitative data from various parts of India indicate that women with no

formal schooling are less likely to resist violence than women with at least some schooling (Sen 1999). Educated and uneducated women report different forms and precipitating factors for violence, and higher levels of education are associated with lower reported physical or psychological violence (Sen 1999; Visaria 1999; Duvvury and Allendorf 2001). In settings as different as India and Nicaragua, education beyond primary schooling is also found to be associated with women's ability to leave an abusive relationship (Sen 1999; Visaria 1999; Ellsberg, Winkvist et al. 2001a). These results, however, should be interpreted with caution since none of these analyses control for socioeconomic status which is also likely to be associated with the violence-related outcomes examined. Thus, some of this reported protective effect of education may actually be one of household (or women's) wealth that also enables women to effectively resist violence, or to suffer less violence.

Other work in India and Bangladesh that does control for socioeconomic status and a variety of other background and contextual factors echoes these themes. Studies find that women's education remains protective for experiences of violence even after controlling for a host of related factors in multivariate analyses (Schuler, Hashemi et al. 1996; Jejeebhoy 1998); though secondary education has a stronger effect, the influence of education is strong even at primary levels (Koenig, Ahmed et al. 2003).

At the same time, some research in India (Rao 1997; Bloch and Rao 2000) and in Sierra Leone (Coker and Richter 1998) finds no evidence that education protects women from violence. The study in Sierra Leone did not control for socioeconomic status, and the sample was a convenience rather than a random, representative sample, making the results difficult to interpret. In the studies on India, Rao (1997) finds that while the ethnographic data suggest that women who are less educated may suffer more violence because they are less valued, analysis of quantitative data from the same study shows that a wife's education is not significantly associated with her risks of being ever-beaten, though the direction of the relationship is a negative one (Rao 1997; Bloch and Rao 2000). Part of the reason for this non-significant relationship may be the small sample size in the study, and a lack of variation in the education variable: the average schooling for women in this area is just above one year, and very few go beyond primary education.

It is also possible, however, that education by itself is insufficient to enable a woman to overcome reasons for violence that have to do with issues such as excessive liquor consumption by husbands and disputes over dowries (Rao 1997; Bloch and Rao 2000). Education alone may also not enable women to resist violence in a cultural context – such as exists in the study areas and in many other parts of the world -- where violence is largely justified by men, women themselves, and the community. Other work in north and south India supports this hypothesis, showing that women with primary education are no less likely to approve of wife-beating than illiterate women, and even those with secondary education are only mildly – and not significantly – likely to disapprove of wife-beating (Jejeebhoy 1998).

Thus, contextual factors appear to play an important role in the extent to which women's education can influence their risks of violence. Only in one of the articles reviewed did

context not matter. Koenig et al. (2003) found in Bangladesh that education remained strongly and negatively associated with domestic violence even when community-level variables of education, autonomy and credit-group membership were included, and in both geographical areas studied. In contrast, other studies in India and Bangladesh, show that at least some part of the protective effect attributed to education is due to women's participation in community-level organizations, whether they are credit-based groups (Schuler, Hashemi et al. 1996) or activist organizations involved in campaigning against violence (Sen 1999).

Education also has a much stronger protective effect, and at lower levels of education, in areas that are already less patriarchal and where women face relatively egalitarian social norms, compared to more rigid and conservative regions. For example, Jejeebhoy (1998) finds that the beneficial effect of education in reducing risks of violence are much stronger in the relatively less patriarchal state of Tamil Nadu in southern India, compared to the relatively more patriarchal state of Uttar Pradesh in the north. Further, while any education provides a protective effect in Tamil Nadu, it is only at secondary schooling or higher levels that educated women in Uttar Pradesh report lower levels of violence.

Aside from the broader community, the family context is also important in providing women with the support they may need to prevent or rectify violent situations, and for shaping women's views of their acceptable options. Ellsberg et al (2001a) find that in addition to a woman's own education, a family history of abuse is associated with how fast a woman permanently leaves an abusive relationship. Finally, women's own attitudes about sex and relationships – which may well be conditioned by the gender-based social structures they live in – also matter: Coker and Richter (1998) find these are much stronger predictors of sexual and physical violence than is education.

Overall, the majority of the studies we reviewed suggest that to decrease women's experience of, attitudes towards, and resistance to violence, education may be effective in contexts that are less patriarchal and already supportive of women in various ways. However, where communities, families, and women themselves condone gender-based domestic violence, education alone is not sufficient for reducing prevalence and the social acceptability of domestic violence, and more substantial normative and social is required.

2.4 Son Preference and Gender Differentials in Child Health

Gender differentials can exist in many aspects of health and through the life course of women and men, but the bulk of the evidence and the largest-documented differentials that show a female disadvantage are in child health and mortality, and in parental preferences for sons. Thus this review will focus on son preference and gender inequality in child health. There is a large body of literature, primarily in South Asia, examining different facets of gender inequality in child health, focusing specifically on excess female child mortality. Much of it does not, however, explicitly examine whether the mother's education has an effect on gender differentials. Consequently, the literature

reviewed here is a sub-set of the much larger literature on gender differentials in child health that specifically focuses on or includes maternal education as a determinant of the gender inequality in health among children.

Given the context specific nature of son preference and related gender differentials in child health, most of the evidence reviewed here is from South Asia (India or Bangladesh), with some articles from other areas that show unequal health outcomes for girls and boys, namely, North Africa (Morocco, Tunisia) and East Asia (China). All but one (Basu 1992) of the articles reviewed here use quantitative analyses, based for the most part on portions of large data-sets such as the Demographic and Health Surveys or other similar national data-sets such as the demographic surveillance data from ICDDR,B in Bangladesh. A few of the articles reviewed here are bivariate studies (Das Gupta 1987; Bhuiya and Streatfield 1991; Bourne and Walker 1991; Basu 1992); the others are all multivariate studies. In all but one study (Ren 1995), the multivariate studies include controls for socioeconomic status.

The most commonly-studied outcome is excess female child mortality or gender differentials in infant and child mortality. Only a few authors examine the effect of maternal education on gender inequality as evidenced in non-mortality child outcomes such as the use of health care services (Govindasamy and Ramesh 1996) or the extent of son preference (Obermeyer 1996; Pande and Astone 2001). Most studies included in this review examine education either as a simple dichotomy of educated versus un-educated or as a continuous variable for years of schooling; a handful specifically include levels of education in their analysis (Bhuiya and Streatfield 1991; Bourne and Walker 1991; Govindasamy and Ramesh 1996; Pande and Astone 2001). All the studies pay some degree of attention to the context in which the maternal education-gender inequality link is examined.

The link between female education and gender bias in child health is far from clear. In all but a few cases, whether the relationship is positive, null, or negative is conditional either on the level of education, sex composition of children in the household, or broader contextual factors. The exceptions are three studies that find either no statistically significant impact of maternal education for gender differences in mortality (Muhuri and Preston 1991; Choe et al. 1995), or find that maternal education is associated with greater mortality risks for girls than for boys (Bhuiya and Streatfield 1991), regardless of other contextual factors. In addition, Murthi et al., (1995) find that in India, higher rates of female literacy are significantly associated with lower gender differentials in child survival regardless of the region being examined in the country.

Excess female child mortality rarely occurs before 6 months of age, when genetic factors condition mortality risks for both girls and boys such that boys have higher mortality risks, and is highest between 6-59 months, when behavioral factors dominate and increase mortality risks for girls where there is son preference (Waldron 1983; Waldron 1987; Makinson 1994). Multiple studies find that in such a context, a little education may not be enough to overcome strong gender-biased social norms. In fact, low levels of education may provide women with the means to better implement existing gender

preferences. As a consequence, daughters of educated mothers face *worse* discrimination than daughters of uneducated mothers.

Consistent with this pattern, Ren (1995) finds that in China mothers' literacy improves the odds of girls surviving relative to boys in the neonatal period, but following that (between 12-59 months of age), it is the boys, not girls who have improved odds of survival. Studies in India consistently show that first daughters, who may be wanted because parents want to achieve some balance in the sex composition of children, have somewhat lower mortality if mothers are educated. However, as parents do not want multiple daughters, second and higher birth order daughters of educated mothers actually face higher mortality risks (Das Gupta 1987; Amin 1990). These results clearly point out that in the absence of efforts to change entrenched gender-biased norms, low levels of maternal education increase gender inequalities.

It is possible that a "threshold", higher-level of education is required for reducing son preference and gender differentials in child health. Recent research in India shows that higher levels of education have a significantly stronger effect as compared to primary education in lowering the entrenched preference for sons (Pande and Astone 2001). Studies suggest – but do not empirically test the hypothesis -- that it is only at high levels of education that women are successful in rejecting gender-biased norms, or find alternative opportunities, roles and support structures than those afforded by giving birth to sons (Bourne and Walker 1991; Basu 1992; Govindasamy and Ramesh 1996; Pande and Astone 2001).

In India, many researchers have demonstrated the "north-south" pattern of socio-cultural and patriarchal systems, with larger gender-inequalities in education, health, and autonomy in the North compared to the South, and more recent research suggests that as a result, educational effects on improving women's situation may be weaker in the North than in the South (Jejeebhoy 1996). In examining sex preferences and mortality differentials by sex, however, we do not find a consistent pattern across geographic regions. For example, some studies find that women's education has a stronger effect in reducing gender differentials for mortality risks and for treatment of diarrhea in the north rather than in the south, (Bourne and Walker 1991; Govindasamy and Ramesh 1996). In contrast, Basu (1992) finds that the sex ratio of childhood mortality among her sample from Uttar Pradesh in the north is actually *worse* among educated as compared to uneducated women. In a yet more complicated result, Govindasamy and Ramesh (1996) note that in the northern state of Uttar Pradesh and for India as a whole, maternal education decreases gender differentials in immunization, but only at levels of high school or more; at levels below that, maternal education is actually associated with worsening gender differentials, particularly in Uttar Pradesh.

Work in other regions of the world where son preference is high also suggests that the social context is important in defining the relationship between female education and son preference, although the exact mechanisms are not clear. Obermeyer (1996) finds that despite higher overall female education in Tunisia as compared to Morocco, son

preference is higher in Tunisia. Further, while female education is significantly associated with lower son preference in Morocco, the same does not hold for Tunisia.

Overall then, for education to have an impact on gender differentials in child health and mortality, and on son preference, the context in which these outcomes occur, seems to be of critical importance. Even low levels of maternal education appear to lower gender differentials for first ("wanted") daughters. Beyond this sub-group, and in contexts where son preference is strong, a little bit of education is not enough for shifting norms and attitudes. Several studies suggest that only at higher levels can women's opportunity structures, valuation of self, and sources of support change in ways that enable them – and make it worthwhile for them – to invest equally in girls and boys (Bourne and Walker 1991; Basu 1992; Govindasamy and Ramesh 1996; Pande and Astone 2001).

3. THE EFFECTS OF FEMALE EDUCATION AND WOMEN'S POSITION IN THE FAMILY AND SOCIETY

Summary of Findings: Female Education and Women's Position in Family and Society

- Female education may or may not lead to women having increased decision making power in the family; the positive relationship is more evident in settings where the family structure is less patriarchal and employment opportunities are favorable to women.
- Female education is consistently associated with increased mobility and freedom of movement for women.
- Female schooling at the secondary level is more consistently and strongly associated with increased decision-making and mobility for women than schooling at the primary level.
- Evidence on the effect of female education on women's time allocations to domestic work is inconclusive because of the limited number of studies examining this relationship.
- Evidence from a limited number of studies suggests that female education may have litte or no influence on gender equality in social structures, primarily because of the strength of gender norms and hierarchies.

In reviewing the literature, we identified four specific outcomes that can be classified as indicators of women's power, autonomy, roles or position in the family and society:

1. Women's decision-making power, autonomy, and control of resources in the household.
2. Women's freedom of movement and mobility.
3. Reduction in women's time allocations to domestic work.
4. Gender equality in social structures (i.e. family, school, etc).

The vast majority of the literature on the relationship between education and the indicators around this theme focuses on the first two outcomes listed above. As Table 2 shows, we were able to identify sixteen studies that empirically examined the relationship between female schooling and some aspect of women's decision-making power or autonomy in the family. Half, or eight, of these studies also examined the link between

education and women's freedom of movement. Most of this literature emerges from the fields of demography and sociology, with a few studies from anthropology. Demographers have been motivated to explain the strong and consistent negative relationship between female schooling and fertility, and women's freedom of movement and ability to make decisions within the family have been seen as key mediating factors (Mason 1986; Sathar et al. 1988; Schuler and Hashemi 1994; Jejeebhoy 1995; Govindasamy and Malhotra 1996; Balk 1997). As a result, demographers have been at the forefront of empirical efforts to measure these concepts and test their linkage with women's education.

Table 2
Distribution of Studies Reviewed on the Effect of Female Education on Women's Position in the Family and Society

	Outcomes			
Characteristics of Studies	**Women's Decision-Making or Autonomy in Household**	**Women's Freedom of Movement/ Mobility**	**Reduction in Time Allocated to Domestic Work**	**Gender Equality in Social/ Economic Structures**
Total Studies	16	8	4	4
Relationship to Education				
Positive	6	7	1	1
Null or Negative	5	1	1	3
Conditional	5		2	
Measure of Education				
Years of formal education	6	4	3	
Level of education	8	4		
Literate vs. illiterate			1	1
Quality/content of education	1			3
Not specified	1			
Context Considered				
Yes	10	1	2	3
No	6	7		1
Region				
Africa	3			
MENA[1]	2	2		
Asia	11	6	3	4
LAC[2]			1	
Main Data Source				
Quantitative Survey	13	8	4	1
Qualitative Ethnography	2			3
Quantitative & Qualitative	1			

[1]MENA stands for Middle East and North Africa
[2]LAC stands for Latin American and Caribbean

In contrast, we were able to identify only a handful of studies that examine women's education and its linkage to time allocations in domestic work or to familial and social aspects of gender equality more broadly. The four studies on time allocations are all from the field of economics, and existing reviews have acknowledged that data and analysis of men's and women's time use in developing countries are limited (Ilahi 2000). Broader analyses of gender equality in specific societies emerge mostly from ethnographic accounts of anthropologists who have been motivated to consider whether education as a modernizing factor improves women's position relative to men on a variety of social, economic, and familial aspects.

3.1 Women's Decision-making Power

Table 2 shows that the empirical findings on the relationship between female education and women's decision-making power are not consistently positive across the various settings where this linkage has been examined. Of the sixteen studies we reviewed, a positive relationship is demonstrated in six and a null or negative relationship in five studies. Another five studies demonstrate a conditional relationship where the positive relationship is evident at only certain levels of education or only in specific contexts but not in others. A majority of the studies are from Asia (11) covering India, Pakistan, Bangladesh, Nepal, Sri Lanka, and Indonesia, but the distribution of positive, conditional, null or negative results is not geographically specific to this or any other region. Most of the studies reviewed are based on data from quantitative surveys and the results are drawn from multivariate analyses that control for a number of confounding factors such as socioeconomic status, rural-urban residence, employment status, and household structure and composition. A significant number (10) of the studies consider the importance of contextual factors in defining the relationship between female education and women's decision-making power either in the analysis or in the interpretation of results.

In the empirical literature we reviewed, women's decision-making power, autonomy, or control in the family is measured through a variety of ways. The most common indicators are indices constructed from women's self-reported responses to a series of survey questions on who within the household makes decisions on matters that range from the mundane to those of critical importance. These include decisions on: cooking, children's or own health, social visits, household purchases, buying and selling of land, wife's participation in paid work, number of children to have, use of family planning, etc. Women's control of household resources is frequently considered a key aspect of their decision-making power, and it is usually measured in terms of decision-making input in household finances and budgets, ability to access their own or husbands' earnings, or having access to cash or other resources that they can utilize without approval from others. The number and nature of elements included in indices varies, ranging from two or three to twenty or more.

Instead of an index, some studies use single questions as indicators of a specific type of decision-making (e.g. economic, social, child-related, or minor versus major household

issues) (Malhotra and Mather 1997; Sengupta and Johnson 2003). Although actual behavior with regard to decision-making is captured in most cases, several studies also use a combination of attitudinal measures on decision-making, such as a woman's opinion on who in the family should control the budget, or who should make decisions regarding family planning (Kishor 1995; Govindasamy and Malhotra 1996; Kritz and Makinwa-Adebusoye 1999)). With the exception of two studies that consider the input of single women in decisions regarding their marriage and selection of a spouse, almost all of the empirical literature in this area centers on the decision-making power of women who are currently married or residing in a union.

All of the studies that find a positive relationship between education and women's decision-making power within the family are based on secondary analyses of large datasets collected for multi-purpose use. Thus, in their separate analyses of the 1988 Egypt Demographic and Health Surveys (DHS), Kishor (1995) and Govindasamy and Malhotra (1996) find that an increase in education means greater decision-making autonomy for Egyptian women in both attitudes and behavior. Women with higher schooling are more likely to say that their opinion has weight in household decisions, and they are also more likely to think that women should have decision-making input on matters both within and outside the customary female domain. Similarly, Cleland et al.'s (1996) analysis of the 1989 Bangladesh Fertility Survey and Balk's (1997; 1994) analysis of surveillance data from the Maternal and Child Health—Family Planning project in Bangladesh show positive effects of education on women's ability to make household decisions and control resources. A more recent study in India, based on the National Family Health Survey-II (NFHS-II), reports a strong and consistent positive relationship between women's schooling and their input on health care decisions for themselves and their ability to set aside money for personal use (Sengupta and Johnson 2003). For Indonesia, Malhotra's (Malhotra 1991) analysis of the Asian Marriage Survey demonstrates a strong and positive effect of girls' education on their decision-making input in the selection of a spouse.

In contrast, the studies that find a null, negative, or conditional relationship between education and women's decision-making power are almost exclusively (with one exception) based on primary data collected and analyzed by the authors. On the whole, these tend to be smaller studies (although several are surveys with significant sample sizes) where the authors have played a major role in research design and execution and the measurement of various aspects of women's empowerment has been a primary goal. Thus, the fact that it is this category of studies that shows null, negative, or conditional effects may reflect greater accuracy in measurement, better model specification, and/or more comprehensive understanding of the study areas by the researchers. This pattern of results may also reflect a tenuous relationship between education and women's decision-making power within certain social and economic settings, the specifics of which are not well-captured in analyses of more broad-based datasets.

That education does not lead to greater decision-making power in certain specific settings is well-demonstrated by the three studies in our review that focus on the state of Uttar Pradesh, India (Jeffery and Jeffery 1994; Jejeebhoy 1996; Bloom, Wypij et al. 2001).

Bloom et al. focus on health care and decision-making for a small sample (N=300) of urban poor and middle class women in Varanasi and find that education is immaterial in defining control over finances or household decision-making. From a longitudinal ethnographic account of several villages in the Bijnor district, Jeffrey and Jeffrey conclude that there is no difference by educational levels in girls having a say in when and to whom they marry; both women and parents see the value of education not as a route to increasing independence or employability, but as a necessity for increasing the girl's marriageability. Moreover, for young married women, there is no difference by education with regard to joint or separate living arrangements, financial implications of living arrangements, control over domestic resources, or fertility decision-making. Jejeebhoy analyzes a sample of 859 rural women from two districts at different development levels as part of a larger study and finds that in Uttar Pradesh there is no effect of women's schooling on their input in domestic decisions, access to, or control over resources. Despite the differences in study design and methodology, all three analyses reach similar conclusions.

The authors also propose similar explanations for the lack of a relationship, suggesting that within the context of a strongly patriarchal kinship and family structure in Uttar Pradesh, women's domestic decision-making is not only limited but also affected largely by family and kin conditions and characteristics, rather than by "modernization" factors such as education or employment. In their analysis of comparative data from Uttar Pradesh and Tamil Nadu, India, and the state of Punjab in Pakistan, Jejeebhoy and Sathar (Jejeebhoy and Sathar 2001) extend this point to cover a broader range of cultural and socioeconomic settings. Using a more comprehensive indicator of women's autonomy (including decision-making, mobility, freedom from threat/violence, and control over resources), they find it is only at the level of secondary schooling that education has a positive impact on women's autonomy in all three settings. In the two more patriarchal settings, Uttar Pradesh, India and Punjab, Pakistan, primary schooling does not lead to greater autonomy in the household, and in Uttar Pradesh the effect of secondary schooling is not as strong as in the other two settings. In contrast, in the less patriarchal setting of Tamil Nadu, India both primary and secondary schooling lead to greater autonomy for women.

From the large research project on five Asian countries of which the above studies are components of, Mason (1998) analyzes the determinants of women's economic decision-making power in Pakistan, India, Malaysia, Thailand, and the Philippines. Her results show that education is related to increased decision-making by women on economic issues in the household, strongly in Malaysia, Thailand, and Pakistan, more moderately in the Philippines, and not at all in India. She also concludes that the strong community differences in women's domestic economic power across the five countries arise in part because communities offer women distinct educational opportunities. So, while education is a generally a good investment for empowering women, an attack on the most restrictive traditions in specific communities may be necessary before programs designed to enhance women's education can hope to empower them significantly.

Studies in other Asian settings also point to the importance of the cultural, social, and economic context within which the relationship between education and women's decision-making must be examined. In Nepal, Niraula and Morgan (Niraula and Morgan 2000) find no relationship between schooling and women's decision-making ability in the household in either of the two different settings examined: one in a hill village and another in the plains. In their analysis, they suggest that in both settings, the gendered division of labor is such a strong driving force for women's roles and position within the family that factors such as education make almost no difference.

In Sri Lanka, a South Asian country known for gender relations that are less patriarchal and educational levels for women that are higher than its neighbors, Malhotra and Mather (1997) find that schooling is positively associated with young women's input in financial decisions in the household, but not in social and organizational decisions. The authors interpret these findings in the context of a supportive family system and widespread education combined with a lack of employment opportunities for women in Sri Lanka: household and life course factors rather than education allow women to build long term negotiating ability on social and organization decisions, but education and employment serve as important personal resources for gaining negotiating ability on financial matters.

That family structure and employment opportunities may be important in defining the relationship between education and women's decision-making in Africa as well is borne out by Kritz and Makinwa-Adebusoye's (1999) analysis of women's autonomy among five ethnic groups in Nigeria. When undifferentiated by ethnic group, the effect of education (primary and secondary) is positive on women's decision making authority. However, when examined by ethnic group, formal education has no effect on wife's decision making among the Ibo and the Ijaw ethnic groups. Among the Kanuri group both primary and secondary education increase decision making authority while among the Hausa and the Yoruba only secondary education is significantly related. The authors conclude that the system of gender stratification within the ethnic group and the opportunities allowed to women for education and employment are determinants of whether or not women have decision making power in the family.

In contrast, in her ethnographic analysis of women from the Ijo ethnic group in Nigeria Hollos (Hollos 1998)concludes that it is actually less educated women who have more independence and autonomy; given the tradition of women's economic contributions in polygynous systems, the modern system is shifting women to a more "dependent" status and the overall domestic power of better educated women is lower because they are perceived as bringing fewer resources into the household than their husbands. For Zimbabwe, Hindin (Hindin 2000) finds no relationship between women's schooling and their decision-making input using Demographic Health and Survey data, but does not discuss why this may be the case.

3.2 Women's Freedom of Movement

In our review, we find that women's freedom of movement, or their level of seclusion and mobility, has been analyzed in conjunction with domestic decision-making: eight of

the studies discussed above also conducted separate analyses of the relationship between women's education and their mobility, again, controlling for most confounding factors. The indicator on freedom of movement is relevant only in settings where women's mobility is restricted and, thus, it is most prominent in studies on Asia and the Middle East (table 2). Mobility is usually measured through women's self-reported responses on questions regarding their ability to go unaccompanied or without permission to a number of typical destinations: shopping or doing errands nearby, the doctor or clinic, temple or religious place, movies, fair or other entertainment, outside the village or community, or visit natal family. In some studies, women were also asked if they have to be veiled in order to go to these places.

As table 2 shows, in stark contrast to the mixed findings for decision-making, all but one study reported a positive relationship between women's education and their freedom of movement. It is only in her analysis of women's autonomy in Bangladesh that Balk (1994; 1997) finds a strong negative association between women's education and their mobility. Balk attributes this largely to socioeconomic status, arguing that better off Bangladeshi women are more likely to practice seclusion and that both wife's and husband's education serve in large measure as indicator of socioeconomic status.

In all the other studies we reviewed on this indicator, the relationship between education and women's mobility is positive. The analyses based on DHS or similar data discussed above, such as the studies by Kishor (1995) and Govindasamy and Malhotra (1996) on Egypt, Sengupta and Johnson (2003) on India, or Cleland et al. (1996) in Bangladesh all find support for a positive relationship between education and not just decision-making, but also mobility. Other studies based on primary data, which found a null or conditional relationship on decision-making in specific settings, find that for mobility the relationship to education is more clearly positive. For example, despite the strong patriarchal structure in Uttar Pradesh, India, both Bloom et al. (2001) and Jejeebhoy (1996) report a positive impact of schooling on aspects of women's mobility. Similar findings are reported by Niraula and Morgan (2000) for Nepal. These authors make the point that decision-making and mobility are two separate dimensions of women's autonomy and, as such, they are not necessarily determined by similar factors. However, the authors do not discuss what it is about strongly patriarchal family and social systems that allows for positive effect of education on women's mobility but not their ability to participate in domestic decision-making.

3.3 Women's Time Allocations in Domestic Work

Although how men, and especially women, allocate their time to domestic tasks is one of the most important indicators of gender equality and women's empowerment, few studies on developing countries empirically examine the indicator or its determinants. Of the four studies we identified on this issue, three focused on Asian settings—Pakistan, Bangladesh, and India—and one on Ecuador. In none of these studies were the authors' primarily focusing on the impact of education per se; it was generally included as one

among a set of controls in efforts to specify the most efficient and unbiased model for estimating the effects of some other independent variable of interest.

All the studies we reviewed are considering time allocations to various types of work—productive and domestic—of married women and, often, of men. Time allocations were measured in a variety of ways, from time allocated to all work activities (market and non-market) and thus specifying the residual as "leisure" time, to time allocation in home production (or non-market work), to share of daily or weekly housework relative to other members in the household. A range of variables were included as determinants along with education, including age, household composition, landholdings, estimated or predicted male and female wages, home technology, hired help, assets, etc. It is important to note that compared to the quantitative demographic and sociological studies discussed above, economic analyses of time allocation are less likely to have adequate controls for socioeconomic status because such measures are considered endogenous to time allocation. Also, since most of these studies are not interested in the effect of education per se, the degree to which education and socioeconomic status overlap is substantively less interesting to the researchers. In fact, education is added precisely because it is seen as a good exogenous measure of socioeconomic status.

As in the case of decision-making, these studies show mixed results with regard to the relationship between women's schooling and a reduction in women's time devoted to domestic work (or an increase in their leisure or productive time allocation). In their work on Pakistan, Ilahi and Grimard (Ilahi and Grimard 2000) find that literacy among women is associated with a reduction in their time spent on collecting water and on work overall, thus increasing their leisure time. In contrast, Newman (Newman 2001) finds that in Ecuador, increased schooling does not have a significant negative impact in reducing women's share of housework. For Bangladesh, Khandker (Khandekar 1988) finds that for women not participating in the labor force, education has a strong negative effect on time allocation in domestic work but that for women participating in the labor force, this effect is negligible. None of the authors discuss the possible reasons for these results. For India, Malathy (Malathy 1994)finds that increased schooling does reduce the amount of time spent by women in all non-market activities, except teaching children, which is positively associated with education. It is not clear to what extent her results are capturing simply the effect of being economically better off for educated women. Also, the author suggests that the results may not mean that women's domestic burden is reduced and that leisure time is increased; it could simply be a relative reallocation of time from housework to teaching children.

3.4 Gender Equality in Social Structures

Only a few studies have attempted to analyze the impact of girls' schooling on broader shifts in gender relations in the family and society, in terms of a range of issues on which women's position can be assessed relative to men. In our review, we document three studies with such a broad sweep, two focusing on India, and one on Taiwan. All three of these studies are based on extensive ethnographic data, and two of them take a

longitudinal perspective. We also include one study that is relatively unique in examining the impact of mother's education on gender differences in schooling for the next generation. The three ethnographic studies all report null (1) or negative (2) impact of schooling on gender equality, while the one quantitative study reports a positive impact.

Kambhampati and Pal (Kambhapati and Pal 2001) analyze school attendance data for boys and girls from six villages in West Bengal, India, to examine the relationship between mother's literacy and their children's enrollment in and completion of primary schooling, differentiated by the sex of the child. Controlling for such factors as age, children's characteristics, and household characteristics, the authors find that mother's literacy increases the chances of daughters being educated—both in terms of being enrolled in school and attaining primary schooling--but has no impact on boys.

Also in India, but in a completely different vein, Kumar and Vlassoff (Kumar and Vlassoff (1997) and Vlassoff (Vlassoff 1992; Vlassoff 1994) use mostly ethnographic data to examine the relationship between education and gender inequality in two different settings, a peri-urban area in the highly patriarchal, less developed state of Rajasthan and a rural area in the more industrialized and less patriarchal state of Maharashtra. Their focus is on gender relations in the family and society, in terms of preference for and reliance on sons, attitudes about marriage, dowry and girls schooling, husbands and wives' roles relative to each other, reproductive decision-making, purdah, and the concepts of honor and shame. Despite the contextual differences in the two settings, the authors find that in both Rajasthan and Maharasthra, the effect of women's education on gender relations is minimal because of the power of gender ideology and practice, lack of economic opportunities for women, and the largely irrelevant content and poor quality of education. In fact, for Maharashtra, Vlassoff argues that greater prosperity, modernization, and more wide-spread education for girls has actually reinforced patriarchal structures by defining an economically dependent role for women relative to their husbands. Moreover, it is only in theory that education is seen as a means of financial independence for girls; in practice, girls are educated to secure a husband, not to get a job.

In an older study focusing on a very different Asian setting, Greenhalgh (Greenhalgh 1985) has used ethnographic data on postwar progress in Taiwan to argue that despite increased levels of education for girls, the gap between sons and daughters in Taiwanese family and economy increased in the postwar period. The gender gap in education grew with girls having lower level skills and lesser access to higher paying jobs. Sons also gained more autonomy to leave home and develop on their own with higher levels of income, lower levels of remittances to parents, and greater acquisition of personally owned property. Greenhalgh argues that the Chinese family system with strong sexual and generational hierarchies and Taiwan's export-oriented economy based on low-wage female labor were both major contributing factors to this increasing level of gender differentiation despite educational advances. Since the new economy encouraged young un-married girls to get factory jobs, Taiwanese parents increased educational investments in their daughters only to the extent that they could be employed before marriage, and the

parents could extract increased returns from them before they belonged to their affinal homes. Sons, on the other hand, always belong to their parents and so, educational and other investments in sons were more substantial, and they were allowed more flexibility and freedom for longer term gains.

4. THE EFFECT OF FEMALE EDUCATION ON WOMEN'S ECONOMIC OPPORTUNITIES AND RETURNS

Summary of Findings: Female Education and Women's Economic Opportunities and Returns

- The relationship between female education and women's labor force participation is sometimes positive, sometimes U-shaped, and sometimes null; the nature and strength of the relationship depends on the level and type of schooling, the characteristics of the labor market, and marital status.
- The relationship between female education and women's earnings is also conditional on the level of schooling and economic sector.
- Evidence is mixed on the relationship between women's education and gender differences in wages, with some studies showing higher returns at certain educational levels for women and others showing higher returns for men.
- Higher levels of education (secondary and tertiary) show the most consistent positive relationship with an increase in women's economic opportunities and returns.
- In contrast to the earlier literature, recent studies of agricultural productivity of female farmers show that education has little or no effect on the probability that female farmers will adopt new technology or improve yields and output.

This section reviews the literature exploring the effect of female education on women's economic opportunity and returns, specifically, labor force participation, female earnings, and the gender wage gap.

In all, we reviewed 32 empirical studies. The majority of studies focus on the first two outcomes – participation in the labor force and earnings. As Table 3 shows, eighteen studies examine the relationship between female schooling and some aspect of female labor force participation. A smaller number of studies (9) investigate the link between education and female earnings, while fourteen studies explore the relationship between education and the male-female wage gap. Three studies also cover agricultural or rural labor and production outcomes.[7]

Most of this literature reflects the contribution of economists, although a few studies were conducted by anthropologists and other social scientists. The early work of three economists -- Mincer (1962), Cain (1966), and Becker (1986) -- laid the foundation for what has become a large literature on the determinants of women's labor force participation around the world. Much of this literature focuses on the role of human

[7] Although it represented seminal work, we did not include in our review the volume by Psacharopoulos and Tzannatos (1991) containing 21 studies on the determinants of women's employment and earnings in Latin America and the Caribbean since the data in these studies are from the 1980s. Many of the later studies confirm the findings of these earlier analyses.

capital - education and experience – although more recently it also includes consideration of other factors such as the role of social norms and culture, industrialization, urbanization, and the liberalization of trade on women's labor market participation. Studies on earnings are motivated to explain returns to schooling as well as the reasons why the returns to men and women who work in similar jobs, industries or occupations may differ.

Table 3
Distribution of Studies Reviewed on the Effect of Women's Education on their Economic Opportunities and Returns

	Outcomes			
Characteristics of Studies	**Women's Employment and Labor Force Participation**	**Women's Productivity and Earnings**	**Gender Equality in Wages and Earnings**	**Agricultural/ Rural Earnings, Labor Force Participation & Production**
Total Studies	18	9	14	3
Relationship to Education				
Positive	2	2	5[5]	1
Null or Negative	0	0	1[6]	2
Conditional	16	7	8	
Measure of Education				
Years of formal education	5	4	7	1
Level of education	14	6	9	2
Literate vs. illiterate[1]	3	1	1	
Quality/content of education[2]	4	3	3	
Not specified				
Context Considered				
Yes	12	6	4	2
No	6	3	10	1
Region				
Africa	1	1	2	3
MENA[3]	3	2	2	
Asia	11	5	6	
LAC[4]	3	1	4	
Main Data Source				
Quantitative Survey	18	9	14	3

[1] These studies measure both level of education and literacy
[2] These studies measure both level and content of education
[3] MENA stands for Middle East and North Africa
[4] LAC stands for Latin American and Caribbean
[5] Positive refers to a reduction in the gender wage gap
[6] Negative refers to an increase in the gender wage gap

All studies reviewed here use data from quantitative surveys and multivariate analytical models. Examination of Table 3 shows that all studies rely on large-scale household or labor force surveys undertaken by statistical agencies or universities. A few researchers collected their own data in order to obtain more detail about individual and household level characteristics or particular segments of the working population (e.g., informal workers) which are not available in larger-scale surveys (Malhotra and DeGraff 1997; Esim 2001; Olmsted 2001). By and large, the largest number of studies focus on Asia (with several exploring India, Indonesia, Sri Lanka, and Taiwan), followed by Latin America (with several studies on Mexico), the Middle East and North Africa, and Africa. There are noticeable gaps in coverage, including in western and southern Africa, in Central America and the Caribbean, and in the Middle East and North Africa.

In the economics literature, education is viewed as an investment that turns unskilled labor into skilled labor which increases returns in the labor market. As a result, education is expected to be positively related to labor market outcomes for women. Although the empirical studies suggest that this is generally the case, the majority of studies show that the relationship is conditional, in other words, that it holds for certain levels of education but not for others, or that it is stronger in some sectors or contexts than in others. Context is considered more frequently in analyses of women's labor market participation than in studies of earnings or gender wage gaps.

It should be noted that the empirical economics literature raises a number of methodological issues. Economists identify two types of problems in current studies, which should make researchers cautious about interpreting results: data limitations and definitional issues that hinder cross-country comparisons; and common biases (sample selection bias, omitted variable bias (especially measures of ability), and measurement bias). We are aware of these concerns and took them into account as we reviewed the empirical studies. However, since that is not the focus of this paper, we do not discuss the methodological issues in great detail.

4.1 Female Labor Force Participation

Eighteen of the studies we reviewed examined the relationship between female education and labor force participation. Empirical studies define labor force participation in a number of ways: as involvement in wage earning activity or not, as participation in different types of employment (e.g., participation in the formal sector or in self-employment or participation in the public sector versus in the private sector or by occupational or other categories). Nearly half of the studies distinguish among types of employment.

Fourteen of the studies reviewed here measure education in terms of the level achieved (primary, secondary, university), although a small number of studies (five) use years of schooling. Three of the studies that use levels also include a variable for literacy (Kingdon and Unni 1998; Assaad and El-Hamidi 2001; Cameron et al. 2001), and another four that use levels also explore the effect of type of education (e.g., vocational or technical) on participation (Deolalikar 1993; Tansel 1994; Glick and Sahn 1997;

Duraisamy 2002). In addition to education, most empirical analyses include a number of other independent variables such as age, household characteristics (composition, age and sex of other members, presence of dependent children, etc.), urban/rural distinctions, geographic location, ethnicity, religion, and in some cases, measures of household wealth or non-labor income and migrant status. Most studies include men and women in the sample, although a few restrict their samples to particular demographic groups. Cameron et al 2001 and Khan et al. 1996 restrict their sample to married women, while Malhotra and DeGraff 1997 examine a sample of young, single women.

No study finds a consistently negative relationship between level of education and women's labor force participation, and only two studies find a consistently positive relationship between years of education and female labor force participation. Rather, the majority of studies that we reviewed find that the relationship between education and labor force participation, although generally positive, is conditional on a number of factors including level and type of education, occupation or economic sector, and the marital status of women.

Several of the studies reviewed here suggest that the impact of education on female labor force participation is not uniform across levels of education. In some countries and sectors, education has a U-shaped relationship with participation in paid employment, that is, paid employment is high for women with no or little education, falls for women who have some primary education, and rises again for women with high secondary and university education. Cameron et al (2001) find a U-shaped relationship in Sri Lanka, as does Olmsted (2001) in her study of women's labor force participation in Bethlehem. Similarly, Kingdon and Unni (1998) identify a U-shaped relationship between years of education and participation in wage work in Tamil Nadu and Madhya Pradesh, India. The U-shaped pattern can be explained by the correlation of education with SES: at low levels of income and education, women are more likely to work due to economic need and it may be more socially acceptable for them to do so. Kingdon (1998) suggests two possible explanations for the downward part of the U-curve: returns to education in home production may increase faster at lower education levels relative to returns in market production. Alternatively, those with some low levels of education may not want to lessen their social standing by doing market work. At high levels of income and education, women may work because education has changed their ambitions, lowering their reservation wage, or they have stronger economic incentives to work as rates of return to education rise with education level.

In the Cameron et al (2001) study of the determinants of women's labor force participation in Korea, Thailand, Sri Lanka, Indonesia, and the Philippines, primary school education has either no effect or a negative effect on labor force participation of women in all the countries in the sample except Indonesia, which the author attributes to two factors: the wage returns to primary education are low or the returns may be positive but that girls in relatively higher income families do not need to work. On the other hand, in every country in the Cameron et al sample, women's tertiary education is positively related to the probability of working and in all countries except Korea the magnitudes of the effects are large. Secondary education also increases the probability of

women's participation in the labor force in Indonesia and Thailand but has no effect on women's participation in the other countries. Similarly, Mammen and Paxson (2000) find that post-secondary schooling has large effects on the probability that a woman is in the labor force in both India and Thailand; women with postsecondary schooling are 23 percent (India) and 25 percent (Thailand) more likely to be in the labor force than women with less than secondary schooling. In Assaad and El-Hamidi's (2001) study of Egyptian women, primary and preparatory levels of education slightly increased the probability of women's labor force participation in urban areas, but secondary and higher education had a much greater effect. In rural areas, participation declined with education up to the preparatory level but increased at the secondary level and above.

In some contexts, type of education (e.g., general versus vocational or technical) also affects the probability of labor force participation. Tansel (1994) reports that in Turkey a vocational high school graduate is more likely to be a wage earner as compared to a high school graduate. Glick and Sahn (1997) find that in Guinea, apprenticeship training is associated with women's entry into both self employment and private wage employment, while formal vocational schooling is associated with entry into private and public wage work.

Studies also show that, conditional on participation, the effect of general education varies across economic sectors. Glick and Sahn's (1997) study of women's labor market participation in Guinea distinguishes the determinants of entry into self-employment, wage employment in the private sector and wage employment in the public sector. They find that more education reduces the likelihood of being self-employed and strongly increases the likelihood of being in the public sector. Similarly, in India and Thailand, Mammen and Paxson (2000) find that more educated women are more likely to work in non-manual, "white-collar" jobs than in production or agricultural jobs. Anderson and Dimon (1999) examine the impact of education on the probabilities of participation by sector for single and married women in two Mexican cities. They find that, given a largely agricultural base in Torrean, as years of schooling increase, the probability of working in the formal sector increases at a high rate, but given a largely manufacturing base in Tijuana, it increases at a low rate. The type of formal sector jobs available in the two cities helps explain these differences in response to education.[8] In Brazil, Birdsall and Behrman (1991) conclude that the greater is women's schooling, the less likely they are to work in the informal and domestic sectors. Assaad and El-Hamidi (2001) note that in both rural and urban areas of Egypt, women with low levels of education are virtually shut out of regular wage work: "The probability of participation in such work increases somewhat with primary and preparatory education but explodes at the secondary level, especially when government employment is an option." In sum, then, more education increases the probability that women will choose formal wage employment and employment in the public sector over self-employment or informal work.

[8] In Torrean, 20 percent of single working women are employed in education and 16 percent in manufacturing, compared to 4 percent in education and 48 percent in manufacturing in Tijuana. The education field requires more years of education than does manufacturing, but within manufacturing, plants in Tijuana require less education from job applicants than those in Torrean.

One study in our sample examines the effect of education on the probability of being employed versus the probability of being unemployed, conditional on participation. Malhotra and DeGraff (1997) find a negative effect of higher education in being employed rather than unemployed for young unmarried women in Sri Lanka; in their words, "while higher education results in a higher labor force participation rate, it also leads to a lower probability of being employed once in the labor force," a finding which they attribute to higher reservation wages for more educated women.

Finally, marital status also conditions the effect of education on women's participation in the labor force. Malhotra and DeGraff (2000) report that in Sri Lanka, highly educated married women are more likely to work than are highly educated single women. Similarly, in Mexico, Anderson and Dimon (1999) find that higher education significantly increases the probability of married women's participation in the formal sector (although not in the informal sector). Olmsted (2001) notes that single women are more likely to be in the labor force than married women in her sample in Bethlehem.

In summary, the 18 studies show that female education does explain women's participation in the labor market, although the direction of the association (negative or positive) varies by level (or years) of schooling, economic sector and marital status. The coefficients of variables which measure the quality of education (e.g., vocational training) are consistently positive and significant across studies, implying that increases in female labor force participation are a function of how well education is linked to the demands of the labor market.

4.2 Women's Earnings

Nine studies in our sample explore the returns to women's education, controlling for age and experience at a minimum, and in some cases, other factors like location or sector of employment, marital status, and seniority. Most of the studies correct for selectivity bias. Economic theory predicts that increased education will be associated with increased earnings, and this is generally the case for the studies reviewed here.

The dependent variable in nearly all the studies is log earnings. Although it is common to measure education by years, most studies in our sample also explore the effect of differences by educational levels. One of these studies also includes a variable for literacy, and three others include a variable for type of education.

Birdsall and Behrman (1991) find that in Brazil, schooling increases returns to women in both the formal and informal sectors but that the increase is greater in the formal than in the informal sector. Esim (2001) analyzes returns to education for female entrepreneurs in Turkey and discovers that education has a positive and significant effect on the earnings of the self-employed. Kingdon (1998) reports that in Uttar Pradesh, India, schooling has a highly significant effect on earnings; the premium for each extra year of schooling is about 9.6 percent for women. This is confirmed in a related study by Kingdon and Unni (1998) of women in Tamil Nadu and Madhya Pradesh, India. It

should be noted that the Kingdon (1998) and Kingdon and Unni (1998) studies introduce a number of control variables for family background. The inclusion of these family background controls reduces the rate of return to education to 4.9 percent for women, which suggests that the results of the studies which do not introduce such controls may be affected by omitted variable bias. Correcting for selectivity also reduces the estimated return on years of education.

To further disentangle the relationship between education and earnings, Kingdon and Unni relax the assumption of linearity, substituting dummy variables for each education level. They find that for the primary level, the rate of return is insignificantly different from zero but that the rates of return to education generally rise with education level. Literacy is insignificant in their specifications. Similarly, Tansel (1994) finds that being a primary school graduate has no significant effect on earnings for women in Turkey, but the effects of higher levels of schooling are significant and increase with the level of education. The findings reported in these studies have an important policy conclusion: being literate or having only primary schooling is not enough to enhance productivity or obtain higher labor market rewards.[9]

Beyond level of education, some of the studies also distinguish type of education. In their study on Guinea, Glick and Sahn (1997) include dummy variables for apprenticeship training and vocational education; the coefficients on these variables are generally insignificant, suggesting that apprenticeship and vocational education do not confer direct productivity benefits on women. The exception was a very large increase in hourly profits accruing to women in self-employment who had apprenticeship training. About half the women with apprenticeship training in their sample engaged in trades or manufacturing, compared with four percent of all self-employed women. The Tansel study on Turkey discussed above also included a distinction between vocational and general education and found the opposite. Although positive, the coefficient on vocational education was low (in the range of 1-2 percent), indicating low returns to this type of education for women. Tansel speculates that such schools emphasize training in home economics that apparently are skills not in demand in the wage labor force. By contrast, in Duraisamy's 2002 study of returns to education in India, the coefficient on technical diploma was significant and larger than the coefficients on secondary education.

A few studies examine the effect of education on returns to women in different economic sectors. Glick and Sahn (1997) note that, for Guinean women in self-employment, completed primary schooling raises hourly enterprise profits by about 30 percent (relative to self-employed women with less than a primary education). There appears to be little incremental benefit to secondary or greater schooling for self-employed women. On the other hand, returns to women in the public sector are substantial at all levels of education.[10] Fussell (2000) examines the determinants of earnings of women working in

[9] This finding contradicts earlier findings of Psacharopoulos (1994) that the returns to primary education are greater than returns to other levels of education.

[10] The authors note that the selectivity-corrected earning regression for women in the private wage sector yielded highly implausible parameter estimates for schooling, perhaps reflecting collinearity of the schooling covariates with the selectivity term.

different occupations in Tijuana, Mexico. She finds that education is positively related to wages within services and commerce and self-employment, but there is no such relationship between education and wages for maquiladora workers, who consistently earn less than employees in commerce and services.

Kingdon's (1998) study in northern India is one of the few to examine returns to women across ethnic groups. She finds that low and backward caste women are at an earnings disadvantage relative to women in other castes, but this disadvantage stems from their lower economic status which influences earnings indirectly via lower investments in learning and lower quality education.

4.3 Gender Inequality in the Labor Market

Gender inequality in the labor market occurs along several dimensions. Two of the most common dimensions of inequality are earnings (or wages) and the occupational distribution of men and women. We reviewed fourteen studies examining the relationship between education and gender inequalities in earnings and two studies exploring the relationship between education and occupational segregation.[11]

4.3.1 Gender Differences in Earnings

In all countries around the world, men earn more than women, and this is true across different groups of workers (agricultural, production, etc.) and different types of earnings (hourly, annual, etc.). A large literature has sought to explain the reasons behind the male-female differential in earnings.[13] The empirical studies have found that women's education explains a portion of the differential, but cannot account fully for why men earn more than women.[14]

We reviewed fourteen studies that explore the contribution of education to gender differences in earnings. The most common dependent variables in these studies are log earnings and log wages, sometimes defined as hourly wages or daily wages. Seven studies define education in years, while nine define education in terms of levels. Three of these latter studies also include a measure of type of education, and one includes a variable for literacy. The studies examine gender earnings differentials in several Africa, Asia and Latin American countries. Although methodological problems complicate

[11] We found very few empirical studies examining the relationship between education and occupational sex segregation at the country level in developing countries.

[13] Gunderson (1994) identifies five sources of the male-female earnings gap: differences in human capital endowments such as education and experience; differences in pay within the same occupation caused by discrimination; differences in pay for work of equal value; differences in jobs desired; and differences in jobs available.

[14] To explain the gender wage gap, economists typically decompose the gender gap in earnings in two parts: the part explained by differential characteristics (e.g., education and experience) and the part not explained by those factors, which is commonly interpreted as sex discrimination.

analyses of labor market returns in these countries, a number of interesting and contradictory findings emerge from the studies reviewed here.[15]

In her study of the contribution of education to the male-female earnings gap in Uttar Pradesh, India, Kingdon (1998) finds that men have higher hourly earnings than women in part due to the fact that they have more education, but also because their earnings respond more to education than do women's earnings. In this analysis, education alone accounts for 64 percent of the gross gender gap in earnings, but within that, only 30 percent is due to men's higher levels of education than women; a much higher 70 percent is due to men's higher returns to education. Thus, from this study, it appears that women's lower years of education explains less of the wage gap than the differential way in which the labor market in India rewards education for men and women. A similar analysis for Tamil Nadu and Madhya Pradesh, India by Kingdon and Unni (1998) yields a different result. Only one percent of the gender wage differential in Madhya Pradesh, and five percent in Tamil Nadu, is due to educational differences among men and women. The authors conclude that the effect of men's higher education endowment (than women's) on the male-female earnings gap is largely offset by men's lower returns to education (than women's), and that education contributes little to the overall gender gap in wages.

Duraisamy's (2002) recent study of returns to school in India adds more complexity to these results. Comparing returns to men's and women's education, he finds that the returns to an additional year of women's education is higher than returns to men at the middle, secondary and higher secondary levels, and particularly so at the secondary level where the wage gains to women's education are more than twice that to men's education. In his analysis across time (from1983 to1994), Duraisamy also finds that the returns to middle level schooling have declined for both men and women, but the change is particularly large for women. Secondary and college levels of education appear to be more rewarding for women in recent years while there is no change for men. Having a technical diploma fetches higher returns for men and women in recent years, but the effect is smaller for women.

These findings are reinforced by several other national and cross-country analyses of returns to education. Aromolaran (2002) shows that even though the overall level of wages tends to be lower for women than for men, female wage earners are proportionately better compensated for an additional year of schooling than are men.

[15] In developing countries, where the self-employed (or informal workers) greatly outnumber wage earners, a number of problems arise. Estimation problems (such as ability bias and measurement error, which are common even in the developed country literature) are greater in developing countries, as a result of the prevalence of self-employment. Moreover, the division of the labour force into wage earners and self-employed is non-random, so that regressions that include only wage earners suffer from selection bias. And, since women constitute the majority of informal workers, this presents an additional bias. Another problem is the difficulty of calculating the incomes of the self-employed, especially when that activity involves many people such as family workers. Education, which likely varies among family workers, is hard to ascertain. Moreover, measuring hours of work of self-employed individuals is challenging because hours vary day by day and season by season (Glewwe 2002).

Moreover, the effect of education is stronger at each level of education, from primary, to secondary, to the tertiary level.[16] Deolalikar (1993) and Behrman and Deolalikar (1995) analyze data from Indonesia and find that while there is no significant gender difference in the association of primary school with wages or earnings, the schooling coefficient estimates are significantly lower for males than for females at all levels of higher schooling. In the latter study, the magnitudes of the difference are substantial: the point estimates imply that males with general senior secondary education receive wages that are 50 percent and earnings that are 54 percent below those that females receive for each additional year of schooling. The results of these country-level studies are broadly consistent with a recent cross-country analysis by Psacharopoulos and Patrinos (2002) who report that females experience somewhat higher returns to secondary education than do males (18 percent versus 14 percent).[17]

Three studies find that the extent to which educational differences among men and women explain the earning gap by gender is conditional on the sector of employment. Glick and Sahn (1997) show that 45 percent of the difference in male and female earnings among self-employed workers in Guinea is due to differences in human capital (education and experience), but that this accounts for only 25 percent of the male-female wage differential for public sector workers, and none of the difference for private sector workers. Appleton et al. 1999 find that in Ethiopia and Uganda, where there are substantial gender differentials in earnings in the public and private sectors, marked differences characterize the processes generating the gender wage gaps in each sector. In Ethiopia, differences in returns explain most of the difference in wages in both sectors, while in Uganda and the Cote d'Ivoire, differences in returns explain most of the wage gaps in the private but not the public sector, where differences in characteristics are more important. By contrast, another study of male-female earnings differentials of formal and informal workers in urban Brazil finds that differences in returns to human capital are not a major factor responsible for the gender wage gap in either sector (Birdsall and Behrman 1992).

In sum, it appears that the findings on returns to education are sensitive to contextual factors. Although male –female educational differences play a role in explaining male-

[16] These results contrast with the conclusion arrived at by Schultz (2002) in a recent review of the literature. He notes that "in many international statistical studies of the wage structure, it has been found that the increase in logarithms of wage rates associated with an additional year of a worker's schools is of about the same magnitude for women as it is for men."

[17] However, the returns to primary education are higher for males (20 percent) than for females (13 percent).

[21] While the proportion of the male-female pay differential that is attributable to occupational segregation is hotly debated in the research literature, there is general agreement that it is one of the most important determinants (Anker 1998).

female wage gaps, other factors such as the different occupational structures for men and women may also be important. We turn to that next.

4.3.2 Gender Differences in Occupational Structures

As noted above, male-female pay differentials have many sources. One source is occupational segregation – the distribution of men and women across different job categories.[21] Occupational segregation by sex is extensive and a pervasive feature of labor markets around the world. Anker (1998) reports, for instance, that a "typical" country has approximately 55 percent of its non-agricultural labor force in "male" or "female" occupations, defined as occupations where male or female workers comprise more than 80 percent of all workers.

It is commonly assumed that education (and labor market experience) affects women's choice of occupations. Although this is undoubtedly true, Anker (1998) makes two observations about this relationship. First, in low-income countries with small formal labor markets, there are often many more educated women than formal sector jobs. This implies, all else equal, that women should be reasonably well represented in a wide range of occupations in the formal sector and at least in proportion to female-male educational levels. Empirical analyses of occupation data in developing countries, however, find this is not the case. Second, the relationship of women's education (and experience) with occupation is bi-directional in nature. Women may not have the education to qualify for some occupations and therefore may not choose or be offered work in those occupations; conversely, many parents decide to give their daughters less education than their sons (and in less relevant subjects for the labor market) and young women may invest less in education because they don't have the same labor market opportunities as men. We found no studies at the national level that shed light on the strength and magnitude of these effects, although both are likely to be operating to some extent in developing countries.

We reviewed one study using macro data to examine whether occupational segregation by sex is related to national socio-economic and labor market conditions. Anker (1998) hypothesized that occupation segregation by sex decreases with economic development and rising income levels, as women become better prepared for the labor force (measured by improved female education levels) and less constrained by family responsibilities. However, his analysis of 41 countries shows that the average number of years of education completed by adult women is not significantly related to the index of dissimilarly in occupations by gender, controlling for regional and cultural differences.[22] Instead, regional variables account for over one-half the variation. The weak relationship between education and occupation segregation could be the result of limitations that constrain how education is measured, the level of aggregation used in this study, or other factors.

[22] Values of the index of dissimilarity range between 0 and 1, with 0 representing no segregation/same percentage female in each occupation and 1 representing complete segregation/each occupation is completely female or completely male.

At the country level, we found one study that explores the relationship between education, male-female earnings differentials, and occupational segregation. Birdsall and Fox (1991) explore the influence of location and training on teacher salaries in Brazil, where teaching is traditionally a female occupation and the mean income of female teachers is less than one-half the mean of males. This study draws on unusually rich background data on the education sector, including types of courses male and female teachers have taken. Like others, Birdsall and Fox find that education, measured simply as years of schooling is an important determinant of the outcome of a secondary school job for both sexes but much more so for females. However, controlling for education, they also find that the effect of type of course is markedly different for males and females. University training increases the probability of having a secondary school job for both sexes, but for males, completion of secondary school "second-level" academic or other secondary school curriculum significantly increases the probability of having a secondary school job; this is not the case for females. At the same time, completion of the teacher training type of secondary school which is designed to train primary school teachers has a negative effect on females' chances of holding a secondary school job but no such effect on males' chances. They note this is particularly important since more than half of all female teachers attended this type of secondary school compared with only 15 percent of male teachers. This study is noteworthy in this literature for highlighting how the content of education matters for women's economic outcomes.

4.4 Agricultural Productivity

There are relatively fewer studies of the relationship between education and the productivity of female farmers. This section reviews three studies, one which summarized the literature of the 1980s, and two more recent studies exploring the determinants of agricultural output or technology adoptions.

Quisumbing (1996) provides a comprehensive review of eight studies conducted in the 1980s of gender differences in agricultural productivity. The outcome variables in these studies are agricultural productivity, measured by yields and adoption of new technologies. All studies use one of three methodologies: production function estimates of technical and labor productivity, labor supply and earnings functions, and the determinants of technological adoption. Quisumbing notes that in the studies using the production function approach (and reported in Moock 1976), primary education has a positive and significant effect on yields for women farmers. Similarly in studies of the gender differences in technology adoption, increases in women's education have positive effects in some contexts. More educated female farmers in Kenya were found to be more likely to grow coffee (a cash crop) than food crops, and increases in women's education had greater effects on coffee adoption than increases in land size, all other things equal. Higher education also increased the probability of livestock adoption in Kenya and of the percentage area seeded and planted with modern varieties in the Philippines. On the other hand, in India, female schooling did not significantly affect the adoption of high-yielding rice varieties. Quisumbing warns that methodological problems plague many of these early studies and results should be interpreted with caution.

Two newer studies analyze the effects of education on the adoption of new agricultural technology and on agricultural output of female smallholder who were heads of households. Although theory predicts that more education will increase farmers' output and/or ability to adopt improved seed varieties, and in contrast to the findings of earlier studies, the empirical analysis in these two new studies show the opposite relationship. Mwangi et al. (2000) found that, in Tanzania, increases in education were not a factor in the decision of female-headed households to use imported maize seed or inorganic fertilizer. Addis et al. (2000) found that increases in education had no effect on agricultural output for female households in the Ethiopian highlands. Other factors, such as size of landholding, existence of family labor, and nature and reach of extension services, were more important to the adoption decision, suggesting that interventions which address these issues may be more effective than education in improving women farmer's agricultural productivity.

5. THE RELATIONSHIP BETWEEN WOMEN'S EDUCATION AND POLITICAL PARTICIPATION

Women's participation in political processes is seen as an important means of decreasing gender inequality by granting women greater voice in the formulation and implementation of national and local policies and development goals (World Bank 2001). Our search for empirical literature on the links between women's education and political participation in developing countries, however, yielded almost nothing. Although there is a substantial literature on this relationship in developed countries, this issue has not yet generated much empirical work for less developed settings. Often direct policy action through legislation or quotas is seen as the means for increasing women's political participation, rather than through the indirect means of educating girls (UNICEF 2002). If at all, the political science literature tends to examine the impact of women's political participation rather than its determinants.

We were able to locate only one study, on India, where the author uses census and election data to test the relationship between gender inequality in education and male and female voter turnout and candidacy levels. Gleason (Gleason 2001) created a dataset by combining district level census data from 1981 and election records to examine if a better female to male ratio on literacy in a district is, one, associated with higher proportions of women voting or, two, running for office. Controlling for caste, religion, economic and political, and various aspects of gender inequality in the district, she finds a positive relationship with education for both her outcome measures.

At the macro level, Grown et al. (Grown et al. 2003) have examined the bivariate relationship between educational enrollment for girls and proportions of national legislatures that are female for 119 countries in the world, using the most recent available data. They find a modest positive correlation only between level of girls secondary and women's political representation. Using the same data, we ran correlations among various levels of girls educational enrollment and completion rates for approximately 75 to 100 developing and transitional countries. We find a modest correlation (.21 for

enrollment, and .24 for completion) only between girls primary school enrollment or completion, and proportion of women in parliament. While intriguing, such results do not convey much since the relationship may be found to be entirely spurious once controls are introduced, and certainly more sophisticated modeling is required to establish any causality.

6. GAPS IN THE LITERATURE

6.1 Limitations in the Range of Issues Covered

In reviewing the wide range of literature to cover a number of indicators within the four sub-themes of women's wellbeing, empowerment, and gender equality considered in this paper, we find a greater preponderance of evidence on some issues and a much slimmer literature on others. The literature on maternal health, women's decision-making, their freedom of mobility, labor force participation, and son preference is fairly extensive. In some areas, the literature has emerged only in the last decade and as such, methodologies are still taking shape: for example on issues of domestic violence, or sexual and reproductive health. On other issues, there is an extreme paucity of literature despite the fact that these have been on the policy and academic radar screens for a much longer period of time: for example, time allocations in the household, or political participation.

With the exception of studies on women's decision-making, mobility, and issues of gender equality, most of the studies reviewed here were not specifically interested in the question of how women's education benefits women themselves. Rather, the central focus of much of the work on labor force participation, earnings, time allocation, or health was on a range of other determinants, and women's education was included mostly as a control variable. As a consequence, many of these studies offer little interpretation or analyses of their findings regarding the relationship between education and the outcome of interest; further exploration of interesting and important patterns is also rare. Thus, the prevailing priorities of the research agendas within specific fields hamper a complete answer to the question of how educating women benefits them directly, and what processes or enabling circumstances need to be set into motion for education to better offer women the tools they need to improve their lives.

6.2 Limitations in Definitions of Education Considered

Another handicap in the empirical literature that we reviewed is that education is typically defined and measured only in terms of the years or level of formal schooling. There is little discussion of the content or quality of education and how these may impact the relationship between female education and women's lives or gender inequality. Thus, where studies show no beneficial effect of education on an outcome, perhaps it is not education per se that is not of benefit to women, but, rather, that in the context under consideration, the quality or content of that education is flawed. In other words, where the literature fails to find a beneficial impact of education, perhaps research is not capturing the aspects of education that are most critical: e.g. a content that reinforces

gender stereotypes, or quality that is so bad that it has no relevance to women's lives. The literature from the fields of education and from social demography has also emphasized the importance of the *process* of education, specifically, the process of going to school, being outside of a constraining home environment, being exposed to new ideas, being socialized in a non-family situation. All these are hypothesized to empower women to improve their own lives and health. However, the empirical evidence does not explore these key aspects of the empowering power of education.

7. SUMMARY AND CONCLUSIONS

In conclusion, our review indicates that education is a necessary, but not sufficient investment for achieving gender equality or improving women's wellbeing. Our survey of the empirical literature on the relationship between women's education and their wellbeing, empowerment, and gender equality yields consistently positive effects of education under varying conditions only for some aspects. For most of the other aspects that we examined, the empirical literature suggests that a range of underlying social and economic conditions need to be favorable in order for female education to have a beneficial effect on gender equality and women's well being.

7.1 Summary of Findings

We reviewed evidence regarding twelve indicators of gender equality, grouped within the broader themes of health and wellbeing, position in the family and society, economic opportunity and rewards, and political participation.

1. We found evidence for a consistently positive relationship between female education and two indicators: freedom of movement and maternal health.

2. The direction and strength of the relationship of female education to women's participation in the labor force and their earnings is conditioned by the level of education, sector of employment, the category of women and the social and economic setting under consideration.

3. For three indicators—women's decision-making power, sexual and reproductive health, and experience of domestic violence, we found almost as many studies showing that education is immaterial, as those showing that it is beneficial. Several studies also found conditional results: beneficial under certain conditions, null or harmful under others.

4. For broader, structural measures of gender equality, including occupational segregation, son preference or gender differentials in child health and mortality, we found evidence of mixed findings, with a significant number of studies showing that under certain conditions, female education actually perpetuates, or even increases gender inequalities.

5. The evidence also indicates that relatively high levels of education--secondary or above--are consistently positively related to most aspects of gender equality, empowerment, and wellbeing, regardless of other conditions.

6. There were a few areas in which the evidence is so limited that no reliable conclusions can be reached, as in the case of the relationship of female education to time allocations in domestic work, or to women's political participation.

7.2 Policy Implications

Given that a significant proportion of the literature emphasizes that certain conditions are more or less conducive for female education to have a beneficial effect on women, what have we learned about these conditions? For some indicators these conditions are better specified than for others. For example, the research on women's access to and use of health care indicates that female education is more likely to have a positive impact if high-quality services (e.g. for maternal care, RTI/STD/HIV management) are readily available. Similarly, the literature on economic opportunity indicates that women are more likely to be able to translate the human capital of education into employment and wages if the labor market conditions are favorable; in fact, in some circumstances, the positive effect of labor market conditions may even override the positive effect of education. Some of the literature on domestic violence indicates that education allows women to escape violent situations only if alternative economic options and social support systems are available.

The specific conditions noted above tend to facilitate a positive relationship between female education and indicators of opportunity and wellbeing. Many of these are readily addressed by policy shifts and programmatic action, given the political will. For improving health outcomes, for example, policies and programs need to supplement programs aimed at educating girls with efforts that improve services and create an enabling environment for women to use these services. In order to have an impact on HIV, RTI and STD prevalence, it is clear that although education can be used as an effective policy lever to increase women's ability to negotiate their sexual environment, other key risk factors in the population must be addressed concurrently. Similarly, in the economic sphere, policy efforts at educating girls need to go hand in hand with adequate job creation to match the skills imparted by schooling.

In contrast, the conditions for a positive relationship specified by the literature that examines the link between education and indicators of women's empowerment or gender equality tend to be broader and more structural. For example, the gendered division of labor and sex-segregated occupational structures limit the extent to which increases in women's human capital can mitigate gender inequality in earnings. The findings regarding the contexts within which women's decision-making power, son preference, or gender equality is affected by female education suggest that in certain settings, patriarchal kinship structures, the gendered division of labor, the valuation of girls, and social norms are so deeply entrenched that education cannot improve women's situation in any meaningful way. At the same time, changing entrenched patriarchal structures

presents a tall order. Since the studies on these issues have been conducted largely by academics, the emphasis thus far has been on specifying that the contextual differences are important, rather than on delineating which aspects of patriarchal structures are amenable to policy or programmatic interventions.

An important lesson for further specifying precisely which policy and programmatic initiatives could facilitate the beneficial effects of education on women's empowerment and gender equality can be drawn from progress in the field of reproductive health in recent years. After years of targeting intervention designs on women who were the recipients of family planning services, in the past decade reproductive health programs have begun to learn that it is equally important to target those who most immediately have the greatest influence over women's lives: husbands, boyfriends, family members, employers, teachers. That is, just because the end goal is to empower women and improve their lives does not necessary mean that interventions and policies must exclusively be directed at women. The critical role of patriarchal structures in defining the relationship between education and women's empowerment also suggests that institutional shifts are likely to require interventions aimed at other key actors.

Finally, our review also suggests that the development community needs to reassess what is actually meant by educating women. The findings in the literature highlight the more consistently positive role of secondary schooling as opposed to lower levels of education. Thus, for example, the frequent U shaped relationship between education and employment indicates that a little bit of education actually is not a meaningful human capital investment in many developing country settings. Gender inequality in wages also seems to be reduced at higher but not lower levels of education. Similarly, several of the studies on health care indicate substantially stronger effects of secondary schooling. The studies on decision-making and gender differentials in child mortality also indicate that it is sometimes only secondary education that has beneficial impact of empowering women or reducing gender inequality.

These findings are important for two reasons. First, in a globalizing economy, it becomes increasingly important to consider options for educating girls not simply to get by, but to succeed in competitive labor markets and economic conditions. Second, the studies suggest a threshold effect of secondary schooling where women themselves are much more likely to be the agents of normative and structural change when they have higher levels of education. Where studies have examined the impact of the content and quality of education, they have also found them to extremely important. These studies indicate that general or vocational education that is poor quality and/or emphasizes women's traditional roles is not very liberating to women, either in terms of economic opportunity, or within the social or domestic spheres.

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Appendix A
EMPIRICAL STUDIES ON THE EFFECT OF FEMALE EDUCATION ON WOMEN'S HEALTH AND WELL-BEING

MATERNAL HEALTH

Study and Location	Sample and Design	Outcome of interest and how measured	Independent Variables	Findings
Beegle et al., 2001. Indonesia.	Indonesia Family Life Survey (IFLS) in 1997-98. Sample of 1679 married women ages 15-49 in 1997 with at least one pregnancy during the last 5 years, and their husbands; 1,415 deliveries in this period.	Use of prenatal care services. Measured by: any prenatal care, number of visits, timing of visits by trimester, location of delivery.	Years of schooling, wife's and husband's age, value of household assets, urban/rural residence, year of pregnancy, wife's share of household assets, relative social status of own and husband's families.	Women's education is positively and significantly associated with obtaining prenatal care on all measures.
Behrman and Wolfe. 1998. Nicaragua	Survey in 1977-8 of women ages 15-45. Sibling data collected for 500 women.	Disease history. Measured as: medically preventable, therapeutically treatable, preventable by public policy, and parasitic. Nutrient intake. Measured as calorie and protein intake.	Years of schooling, mother's and father's schooling, mother/father present during adolescence, woman currently accompanied, number of sibs, urban childhood, age, population, percent literate.	Women's education has a significant and beneficial effect on their own health, varying by type of model run. A respondent's mother's education has significant and positive associations with her nutrient intake and health.
Bhatia and Cleland. 1995. Karnataka, India	1993 survey of 2398 rural and 1197 urban mothers aged 35 or less with children below 5 years of age.	Use of maternal care services. Measured as: routine ante-natal checkup, check during first trimester, source of ante-natal care, institutional delivery, delivery in private institution, caesarean section, postnatal checkup	Levels of education (none, 1-5 years, 6+ years), residence, caste, SES, autonomy, pregnancy history, personal hygiene (all outcomes); place of delivery, surgical interventions in delivery, pregnancy problems (select outcomes)	Any education is positively associated with routine ante natal checkup, check during first trimester, and private source of ante-natal care. Higher education is associated with check during first trimester, delivery in private institution, and postnatal checkup.

Study and Location	Sample and Design	Outcome of interest and how measured	Independent Variables	Findings
Bloom, Wypij, and Das Gupta. 2001 Varanasi, India	1995-96 sample of 300 women who had delivered a child in the last three years; youngest eligible woman in a household interviewed.	Use of maternal care services. Measured by: a scale of antenatal care, and safe delivery	Years of schooling, autonomy index, SES, problems during pregnancy/delivery, age, parity.	Education was significantly associated with greater use of maternal health care for both outcomes.
Elo 1992. Peru	1986 Peru Demographic and Health Survey of 4999 women, 15-49 years.	Use of maternal care services. Measured as: use of trained nurse or midwife for (a) prenatal care, and (b) delivery.	Levels of education (none, 1-3 years, 4-5 years, 6+ years), childhood and current place of residence, age, language of questionnaire, husband's education, durable goods, piped water, order of births.	Maternal education has a significant positive impact on both measures. **Context:** Education has a stronger effect in Lima than in the rural Sierra.
Govindasamy, 2000. Egypt.	1992-93 Egypt Demographic and Health Survey (EDHS). 6,190 women ages 15-49 years who had had at least one birth since January 1987.	Use of maternal care services. Measured as: prenatal care from a medical provider, at least one dose of tetanus-toxoid injection, assistance at delivery from medical provider, place of delivery	Levels of education (none, some primary, primary through secondary, completed secondary or higher), social class, autonomy, region, urban/rural residence, employment, media, religion, age, parity, husband related.	Women's education was the strongest predictor of use of maternal care services for all the measures.
LeVine et al. 1991. Mexico	Interviews in 1987 of 333 mothers ages 15-35 in Cuernavaca, and 177 mothers, ages 15-35 in Tilzapotla.	Use of maternal care services. Measured by: percent of pregnancies in which mother sought prenatal care	Years of schooling, husband's schooling, SES (both sites); member of social security plan, neighborhood, (Cuernavaca); mother's age (Tilzapotla).	Maternal schooling is a significant predictor of using pre-natal care in both study sites.

Study and Location	Sample and Design	Outcome of interest and how measured	Independent Variables	Findings
Obermeyer and Potter. 1991 Jordan	1983 Jordan Fertility and Health Survey. Sample of 2,949 women between 15-49 years of age with a live birth in the last 5 years.	Use of maternal care services. Measured as: prenatal care, site of birth, type of birth attendant, type of hospital	Years of schooling, age, age at marriage, SES, urban/rural residence, source of income, household structure.	Female education is significantly associated with greater use of maternal health care for all four measures.

SEXUAL AND REPRODUCTIVE HEALTH

Study and Location	Sample and Design	Outcome of interest and how measured	Independent variables	Findings
Bhatia, Jagdish C. and John Cleland. 1995. India	Survey in Karnataka in 1991 of 3600 women ages 35 or less, with a child below 5 years old.	Symptoms associated with, and treatment-seeking behavior for menstrual problems, lower reproductive tract infections, acute pelvic inflammatory disease, and anemia.	Levels of education (none, 1-5 years, 6 or more years), age, urban/rural residence, caste/religion, SES, health education (all outcomes); pregnancy history, place of delivery, personal hygiene, contraception (symptoms); autonomy, duration of the problem (treatment-seeking).	Education was not statistically significant for the prevalence of symptoms or treatment for any morbidities.

Study and Location	Sample and Design	Outcome of interest and how measured	Independent variables	Findings
El-Gibaly et al, 2002 Egypt	1997 Adolescence and Social Change in Egypt Survey on a sample of 4,774 girls and 4,354 boys between 10-19 years old.	Female circumcision. Measured by: whether circumcised, choice of provider for circumcision, perception of necessity of circumcision, perception that women should be circumcised before marriage	Levels of education (none, incomplete primary; complete primary/any preparatory; vocational, >intermediate; any secondary and above), father's education, SES, residence (all outcomes); age and time of circumcision (for choice of provider); school attendance, respondent's sex (for perception outcomes).	Vocational or higher levels of education significantly associated with lower odds of being circumcised; primary/preparatory education significantly associated with higher odds of doctor performing the circumcision. Mother's education not significant for other outcomes.
Fylkesnes et al. 2001. Chelston Lusaka, and Kapiri Mposhi, Zambia	Interviews with 500 antenatal clinic attendees. 2 surveys in 1995-6 and 1998-9. Sample of 4419 people ages 15+ (59% women).	HIV prevalence rate, from results of HIV tests conducted on the sample, measured using risk ratios.	Levels of education (0-4, 5-6, 7, 8-9, >=10 years), age group, urban, rural.	Women with >7 years of schooling had lower HIV prevalence than others. **Context**: Education effects stronger in urban than rural areas, and weakened over time.
Gregson et al. 2001. Manicaland, Zimbabwe	Survey in 1998-2000 of 5138 women ages 15-44. Survey in 1998-2000 with 1215 pregnant women ages 15-44 attending antenatal clinics.	Age specific HIV prevalence rates determined according to HIV tests done on the sample, measured using risk ratios.	Education level: (none or primary versus secondary or higher), age group, marital status, residence, pregnancy status	In the general sample, women with secondary education have a lower risk of HIV than those with less education. Antenatal clinic attendees show a slightly higher risk among educated women.

Study and Location	Sample and Design	Outcome of interest and how measured	Independent variables	Findings
Jewkes, et al.. 2002. South Africa	1996 survey of women ages 18-49 years from 2232 households in three provinces.	Partner communication around HIV, measured as: discussing HIV with her partner of the past year, suggesting condom use to partner.	Post-matric education versus none, >1 partner in past year, perception of the relationship (both outcomes); partner's education, province, partner a migrant worker, >5 years age difference between partners, woman has some-one to talk to about relationship, financial and physical abuse (select outcomes).	Education was significantly associated with both more discussion of HIV by a woman with her partner, and with her asking for condom use.
Quigley et al. 1996. Mwanza, Tanzania	Survey in 1993 of 763 women and 653 men in Mwanza.	HIV prevalence rate, from results of HIV tests conducted on the sample.	Levels of education (none, primary 1-3, primary >=4, secondary or higher), present job, past residence, recent travel, ethnicity, religion, marital and spousal history.	Higher levels of education significantly associated with higher HIV risk.
Silveira et al. 2002 Brazil	Survey in 1999/2000 with a sample of 1543 women aged 15-49 in Pelotas.	Risk behavior score for STDs/AIDS, based on use of condom, use of alcohol by woman or partner, use of drugs by woman or partner, practice of anal sex, age at first sex, number of partners.	Level of education (0-1, 5-8, 9-11, >=12 years), age, skin color, marital status, income.	Higher levels of education significantly associated with lower risk score.

Study and Location	Sample and Design	Outcome of interest and how measured	Independent variables	Findings
Wolff et al., 2000. Masaka and Lira districts in Uganda	Negotiating Reproductive Outcomes (NRO) Study. Survey in 1995-6 with a matched sample of 1356 women ages 20-24 who were in a stable marital or non-marital relationship for the past 6 months, and their partners.	Women's difficulty in discussing sex with partners. Measured by: woman's relative over whether to have sex, score on conditions under which a married woman can refuse sex, speaking about sex to partner.	Level of education (none, incomplete primary, complete primary, lower secondary, upper secondary or higher), husband-wife education gap, household wealth, urban/rural residence, religion.	Women's education is positively and significantly related to all outcomes, more so for higher than lower levels of education.
Younis et al. 1993. Egypt	Survey in 1989-90 of 509 ever married, non-pregnant women in Giza.	Reproductive tract infections, genital prolapse, urinary tract infection, anemia, hyper-tension, obesity.	Level of education (none, up to primary, preparatory and above), susceptibility, age, husband available, personal hygiene, workload, SES, number of deliveries/recent pregnancy, current IUD/pill use (depending on outcome)	Women with the highest level of education have three times greater risk of UTI than do uneducated women. Education is not significant for all other outcomes.
Yount, 2002 Minia, Egypt	Longitudinal "Two Governorate Linkages" survey in 1995-97 on 3,000 ever-married women ages 15-54.	Probability of circumcision for daughters 5+ years old. Measured as: mother's intent to circumcise daughter(s), mother's decision to circumcise (daughters > 9 years old), choice of provider for circumcision	Levels of education (none, primary, preparatory, secondary, >secondary), age and birth order of daughter, mother's age, urban/rural residence, SES, father's education, mother's gold ownership, paternal and maternal grandmothers, mother's circumcision status and scarring.	Mother's education has a large, negative, statistically significant impact on intent and actual circumcision of daughters, stronger for higher levels of education. Mother's education not associated with using a doctor for circumcision.

DOMESTIC VIOLENCE

Study and Location	Sample and Design	Outcome of interest and how measured	Independent Variables	Findings
Bloch and Rao. 2000. Karnataka, India	Survey of 137 ever-married women over 15 years old. Date not clear.	Domestic violence. Measured as: self-report of whether severely physically assaulted.	Years of schooling, marriage squeeze ratio, marital history, husband's schooling, wife's family income, surviving male/female children, dowry, village.	Wife's education does not have a significant impact on whether the wife gets severely beaten.
Coker and Richter. 1998. Sierra Leone	Survey of 144 adult women in 2 towns, in 1994.	Domestic violence. Measured as: ever subject to violence, frequency, need medical treatment for violence, forced to have sexual intercourse	Elementary or secondary education versus high school or university.	Education had no significant impact on domestic violence for any measure.
Duvvury and Allendorf. 2001. Bhopal, Chennai, Delhi, Lucknow, Nagpur, Thiruvananthapuram, Vellore, India	Household survey of 9,938 women 15-49 years of age with at least one child under 18 years old currently living with them.	Whether experienced any violence. Measured as one of 11 behaviors considered to be psychological or physical violence.	Year of education (none, 1-8, 9-12, 12+ years)	Higher levels of education associated with lower lifetime violence. Only 12+ years of education associated with lower current violence.
Ellsberg et al., 2001 Nicaragua	Survey in Leon in 1995, of a sample of 488 women ages 15-49. Survey in Managua in 1997, of 378 ever-married women. Demographic and Health Survey (DHS) in 1998, of 8,507 ever-married women.	Domestic violence. Measured by current (within 12 months prior to interview) and lifetime physical violence, ever-experience of sexual violence.	Levels of education (none, primary, secondary), age and parity (for all 3 surveys), urban/rural residence (for Leon and DHS), economic status (for Leon).	**Context:** Women's education was significantly protective only for the DHS sample, with no difference for levels of education.

Study and Location	Sample and Design	Outcome of interest and how measured	Independent Variables	Findings
Ellsberg, et al., 2001. Leon, Nicaragua	Survey in 1995 of 488 women between 15-49 years.	Permanent separation from violent partner.	Primary or less versus high school, age, temporary separation, self-defence.	High school associated with quicker permanent separation than among women with primary or less schooling.
Jejeebhoy. 1998. Rural Uttar Pradesh and Tamil Nadu, India.	Survey in 1993-4 of 1842 women aged 15-39 from Uttar Pradesh (UP) and Tamil Nadu (TN).	Domestic violence. Measured by: wife beating, intimidation, justification of violence.	Levels of education (none, primary, secondary), wage work outside home, age at marriage, age, spousal education gap, autonomy, co-residence with mother-in-law, more sons than daughters, dowry, say in use of dowry, SES, religion, state.	Education associated with lower violence, but not with justification of violence. **Context:** in TN, primary and secondary education protective for physical violence and intimidation. In UP, only secondary education protective against violence and intimidation.
Koenig, Ahmed, Hossain, Mozumder. 2003. Jessore and Sirajgonj, Bangladesh	Family Health Research Project of ICDDR,B in 1993. Sample of 10,368 currently married women aged 15-49.	Domestic violence. Measured as: self-reported current physical violence from husband or husband's family.	Levels of education (none, 1-5, 6 or more years), age, autonomy, savings or credit group membership, religion, landholding, sons, husband's education, family structure, community-level women's education, credit group membership, autonomy.	Female education was significantly associated with lower reported violence, with larger effects for higher than lower levels of education.

Study and Location	Sample and Design	Outcome of interest and how measured	Independent Variables	Findings
Rao. 1997 Karnataka, India	Survey in 1992 of 160 ever married women over 15 years old.	Domestic violence. Measured as: self-report of ever having been beaten.	Years of schooling, dowry, expenses on liquor, monthly expenditures, marriage date, husband's schooling, female sterilization, surviving male/female children, natal household structure, village.	Wife's education does not have a significant impact on whether the wife has ever been beaten.
Schuler, Hashemi, Riley, and Akhtar. 1996. Bangladesh	Survey of 1300 women in 1992, ages 14-40+ years.	Domestic violence. Measured as self-report of whether beaten in the last year.	Ever attended school, age, religion, region, poverty, surviving sons/daughters, exposure to credit programs, contribution to family income.	Education significantly reduces the probability of being beaten. **Context**: Education effect not significant once credit programs are accounted for.
Sen. 1999. Calcutta, India	Ethnographic interviews in 1994-5 with 47 women ages 18-45.	Domestic violence. Measured as: ever experience physical violence, resistance to violence, whether remained in a violent relationship	Levels of education (none, 5 years or less, more than 5 years)	Education associated with better outcomes for all measures of violence considered.
Visaria. 1999. Gujarat, India	Survey of 346 currently married women (15-35+ years) with at least one child less than 3 years of age conducted between 1993-97.	Domestic violence. Measured as: self-report of psychological and physical abuse; report of psychological abuse only; no abuse reported	Levels of education (no formal schooling, lower primary, upper primary, secondary and beyond)	Higher levels of female education are associated with lower reported violence. Precipitating factors different for women with higher education than other women.

Study and Location	Sample and Design	Outcome of interest and how measured	Methodology and Controls	Findings
Amin. 1990. Punjab, India	Narangwal Health Project. Sample of 8,050 children 0-36 months old between 1969-74.	Child mortality. Measured as: hazard rate.	>1 year of schooling versus less, caste, born during Narangwal intervention, sex-specific birth order for daughters, mother's age, birth order, survival status of previous child, previous birth interval.	Compared to children of uneducated mothers, first daughters of educated mothers have significantly lower post-neonatal mortality, while second and higher order daughters have significantly higher neonatal mortality, relative to sons.
Basu, 1992. Delhi, India	Longitudinal survey of 2482 children among immigrants from Uttar Pradesh, and 2007 among immigrants from Tamil Nadu, below 12 years with at least 1 living sib <12 years.	Ratio of boys to girls for percent dead.	Some versus no education, state of origin.	**Context:** education is associated with less female disadvantage in Tamil Nadu and greater female disadvantage in Uttar Pradesh.
Bhuiya and Streatfield. 1991. Matlab, Bangladesh	Data from the Matlab Demographic Surveillance System. Follow-up till 1984 of 7,913 live births in 1982.	Conditional probability of dying at different ages for children 0-35 months old ($_nq_x$)	Level of education (none, 1-5 years (primary), 6+ years), SES, intensiveness of Matlab health program, sex and age.	*Mother's education worsens gender differentials in mortality.*
Bourne and Walker, 1991. India	1981 Census of India. Children under the age of 5 years, from 14 states and Delhi.	Child mortality, measured as annual probabilities of dying by a certain age.	Levels of education (illiterate, literate below middle, middle below matric, matric below graduate, graduate and above), state	**Context**: Mother's education has a stronger, negative impact on girls' mortality in northern and on boys' mortality in southern states.

Study and Location	Sample and Design	Outcome of interest and how measured	Methodology and Controls	Findings
Choe, Hao and Wang. 1995. China	1988 Two-Per-Thousand Survey of Fertility and Birth Control. A sample of 89,086 children born between 1965-1987 who survived the first year of life.	Monthly probabilities of dying by gender and birth order of the child.	Mother has formal education, year of birth, urban/rural residence, mother's age and occupation, ethnicity, sex of child, whether experienced a sibling death, birth interval, gender of older siblings.	Mother's education is not a significant determinant of gender differentials in mortality for first births or higher-order births.
Das Gupta. 1987. Punjab, India	1984 Khanna Study of 11 villages. Data from a baseline census, complete maternity histories from all ever married women aged 15-59.	Gender differentials in infant and child mortality. Measured as: the number of surviving children of the same sex at the birth of the indexed child.	No education versus 1 or more years of schooling.	Boys with older brothers and girls with no older sisters have lower mortality odds if mothers are educated. Girls born to mothers who already have at least one daughter have similar (or higher) odds of dying for educated versus un-educated mothers.
Govindasamy and Ramesh. 1996. India	1992-93 National Family Health Survey of India (NFHS)-1. Sample of 45,363 children born to the sampled ever-married women in the four years before survey.	Child health care. Measured as: percent with acute respiratory infection in the last 2 weeks who were taken to a health facility, percent with diarrhea in the last 2 weeks who were taken to a health facility, percent fully vaccinated among all children ages 12-23 months	Levels of education (illiterate, literate less than middle school complete, middle school complete, and high school +), SES, religion, caste, birth order, sex, age, urban/rural residence, maternal employment, state (Uttar Pradesh – UP, Tamil Nadu - TN), all-India	**Context**: Education is associated with worse gender differentials in immunization for all-India and UP for lower levels of education. Gender differentials in immunization are lower in TN for any education, and in UP for higher education. Education is associated with lower gender differentials in ARI or diarrhea treatment in UP, but not in TN or all-India.

Study and Location	Sample and Design	Outcome of interest and how measured	Methodology and Controls	Findings
Muhuri and Preston, 1991. Matlab, Bangladesh	Matlab Demographic Surveillance System and 1982 Matlab census. Sample of 7330 boys and 6795 girls between 0-5 years of age.	Conditional probability of dying at different ages for children 0-5 years old (${}_nq_x$)	None versus some schooling, age, gender, birth order, sibling sex composition , dwelling space, SES, born in Matlab project area.	*Mother's education did not have a statistically significant impact on gender differentials in mortality.*
Murthi, Guio, Dreze. 1995. India	296 districts from the 1981Census	Female disadvantage in child survival: ratio of the percent difference between female and male mortality.	Crude district female literacy rate, female labor force participation, poverty, urbanization, proportion of villages with medical facilities, caste/tribe, region.	Higher levels of female literacy in a district are associated with reduced odds of a gender gap in child mortality, regardless of region.
Obermeyer. 1996. Morocco and Tunisia.	1987 Morocco Demographic and Health Survey (DHS), 5982 married women of reproductive ages. 1998 DHS for Tunisia, of 4184 women of reproductive ages.	Son preference. Measured as probability of wanting more boys than girls.	Years of education, age, rural/urban residence, husband's education, husband related, consumer goods, sons and daughters, country.	**Context:** Mother's education has a significant impact on reducing son preference in Morocco, but not in Tunisia.
Pande and Astone, 2001. India	1992-93 National Family Health Survey (NFHS). Sample of 50,136 ever-married women ages 13-49 years old. Data on food grain production for 25 states (excluding Delhi) for 1989-90 and 1992-3, from the 1994-95 Economic Survey of India.	Son preference. Measured as: least preference, equal son & daughter preference, high son preference.	Levels of education (none/illiterate, primary, middle school, high school and above), sex composition of children, employment, age, age at marriage, household structure, SES, landholding, region, endogamy, caste, village characteristics, % rice/wheat in food grains.	Female education at any level has a strong, negative and significant relationship with son preference. Son preference is lower at higher levels of education than at lower levels.

Study and Location	Sample and Design	Outcome of interest and how measured	Methodology and Controls	Findings
Ren, 1995. Shaanxi, Liaoning, and Guangdong provinces, China	China In-Depth Fertility Survey – Phases I and II (IDFS), in 1985 and 1987. A sample of 22,073 male and 20,029 female children.	Conditional probability of survival ($1-{}_nq_x$) for neonatal (<1 month), post-neonatal (1-11 months) and early childhood (12-59 months) periods.	Literate versus illiterate, year of birth, birth order and birth weight, breastfeeding, place of delivery, urban/rural residence, father's education, province	Girls' odds of survival in the neonatal period improve more than boys' when mothers are educated. Education improves only boys' survival odds for early childhood.

Appendix B
EMPIRICAL STUDIES ON THE EFFECT OF FEMALE EDUCATION ON WOMEN'S POSITION IN THE FAMILY AND SOCIETY

DECISION-MAKING, FREEDOM OF MOVEMENT

Study and Location	Sample and Design	Outcome of interest and how measured	Independent Variables	Findings
Balk. 1994, 1997 Bangladesh	Survey sample of 6681 married women from 218 villages in the Abhoynagar and Sirajgong districts	Women's decision-making, control of resources, autonomy and mobility. Measured by 4 indices: Authority , Attitudes, Leniency, Mobility	Years of schooling. Age, spousal age difference, age at first marriage, head of household, dwelling size, land ownership, husband's occupation, number surviving children and sons, work outside the home.	Education is positively related with all indexes except mobility, with which it is negatively associated. **Context:** Village level predictors explain substantially more variation in outcome measures than do individual level variables, such as education, etc.
Bloom, Wypij, and Das Gupta. 2001 India	Survey Sample of 300 women from poor to middle income households, who had delivered a child within last three years, collected in urban Varanasi, state of Uttar Pradesh, 1995-1996.	Women's decision making and mobility. Measured as: control over finances, decision making, freedom of movement.	Years of schooling Economic status, age, parity, employment status, residence with mother- in-law, contact with natal kin.	Education is immaterial in defining control over finances or household decision making, but does increase women's freedom of movement. **Context:** Kinship and gender structure of Uttar Pradesh is more dominant factor

Study and Location	Sample and Design	Outcome of interest and how measured	Independent Variables	Findings
Cleland, Kamal, and Sloggett. 1996 Bangladesh	Bangladesh Fertility Survey, 1989 of 10,907 currently married women 15-49.	Women's decision making and mobility. Measured by: 2 indices based on principal components analysis of survey questions.	Level of schooling (none, primary, secondary) Urban/rural residence, region, age, SES	With an increment in educational attainment, there is an increase in participation in domestic decisions and in mobility.
Hindin. 2000 Zimbabwe	1994 Zimbabwe Demographic and Health Survey sample of 3701 married black African women	Women's decision-making. Measured by decisions regarding household purchases, wife working outside home, fertility, and other household decisions.	Level of education: none, primary, secondary, higher. Rural/urban, household wealth, language spoken, wife's age, husband's education, wife's work status, and marriage type	Education does not increase women's autonomy on any of the four measures.
Hollos. 1998 Nigeria	Ethnographic study of Ijo women conducted from 1982-86; 61 rural and 199 urban migrants of same ethnic group.	Women's decision-making, Measured as an index of who makes decisions regarding where to live, work status, finances, purchases, whether the wife should work, and fertility decisions.	Low vs. high level of education. Rural/urban, financial contributions to household, polygynous marriage, wife's occupation, husband's and wife's education.	**Context**: The overall domestic power of better educated women is lower because they are in nuclear conjugal relationships and are perceived as bringing fewer resources into the household than their husbands.

Study and Location	Sample and Design	Outcome of interest and how measured	Independent Variables	Findings
Jeffrey and Jeffrey. 1994 India	Ethnographic study among the Jat caste group in several villages of Bijnor district, conducted from 1983-1991.	Women's decision-making. Measured in terms of marriage arrangements for young women, control of economic resources, and fertility decision-making.	Education of young women (measure not specified)	There is no difference by educational level in girls having a say in when and whom they marry. For young, married women, no difference by education with regard to joint or separate living, financial implications of living arrangements, control over domestic resources, or fertility decision-making. **Context:** In UP, patriarchal structures are strong,; rural women do not experience education as something that liberates them.
Jejeebhoy. 1996 India	Survey of 1842 currently married women, 15-49 conducted in 1993-94 within two districts each in Tamil Nadu and Uttar Pradesh	Women's decision making, autonomy, control of resources, mobility.	Level of schooling: none, primary, secondary Age, participation in wage work, household possession of consumer goods, residence with mother-in-law, district, and religion.	Secondary education is consistently and significantly associated with all five indices. But the effect of primary education is not as strong or consistent. **Context**: Education is more closely related to decision making, autonomy, mobility indicators in Tamil Nadu.

Study and Location	Sample and Design	Outcome of interest and how measured	Independent Variables	Findings
Jejeebhoy and Sathar. 2001 India and Pakistan	Comparative surveys of currently married women aged 15-39 in Punjab, Pakistan (n=1036), and Uttar Pradesh (n=859) and Tamil Nadu (n=983), India, conducted in the early 1990s.	Women's decision making, control over resources, mobility, and freedom from threat. Combined into a summary index of women's autonomy	Level of schooling: none, primary, secondary. Age, wage work, surviving sons, daughters, residence with mother-in-law, size of dowry, household consumer goods, district, and religion.	Secondary schooling is associated with higher autonomy in all three areas. Primary schooling is moderately associated with higher autonomy only in Tamil Nadu. **Context**: In settings where gender relations are more egalitarian such as Tamil Nadu, education plays a more prominent role in enhancing almost every dimension of autonomy, than is the case in settings with wider gender disparities.
Kishor. 1995 Egypt	Egypt Demographic and Health Survey, 1998. Sample of 8219 currently married women.	Women's decision making and attitudes. Measured by 3 indices: customary autonomy index, non customary autonomy, and realized autonomy.	Years if education Region, SES, employment status, control of earnings, husband's education, husband's profession, household structure, age, religion, age at marriage	Increase in education means greater decision making autonomy for women in attitudes and behavior on all three indices.

Study and Location	Sample and Design	Outcome of interest and how measured	Independent Variables	Findings
Kritz and Makinwa-Adebusoye. 1999 Nigeria	1991 survey of wives in Hausa (n = 1002), Ibo (n=1197), Ijaw (n=1221), Kanuri (n=1168), and Yoruba (n=1049) societies, between the ages of 15-40.	Women's decision-making. Measured as an index based on 13 questions on women's ability to participate in household decision making.	Level of education – none, primary, secondary or higher. Age, religion, rural/urban residence, type of marriage arrangement, spousal age gap, polygynous household, no. of living children, work before marriage, work status, control of income, economic contribution to household.	When undifferentiated by ethnic group, the effect of education (primary and secondary) is positive on women's decision making authority. **Context:** When examined by ethnic group, the system of gender stratification within the ethnic group, and the opportunities allowed to women for education are determinants of whether women have decision making or not.
Malhotra. 1991 Indonesia	1979-80 Asian marriage survey of 1587 ever married women 15-44, and a sub sample of 888 of their husbands.	Women's (and men's) decision making input in selection of spouse	Level of schooling (none, less than primary, primary, or secondary) Cohort, family economic background, premarital work, premarital residence	Both primary and especially secondary education lead to increased input in marriage decisions for both urban and rural women. **Context**: In rural areas, educated girls are more likely to select their own spouses. In urban areas, educated girls are likely to select their own spouses with the involvement of parents.

Study and Location	Sample and Design	Outcome of interest and how measured	Independent Variables	Findings
Malhotra and Mather. 1997 Sri Lanka	Survey of 577 currently married women ages 13-33 conducted in 1992, along with qualitative data from focus groups.	Women's decision making. Measured by women's domestic power on financial decisions, and social and organizational decisions.	Years of schooling Current employment status, past work history, control over earnings, SES, ethnicity, age, marriage and household structure, husband's characteristics	Education is critical in determining women's decision making input on financial issues, but not on social and organizational matters. **Context:** results are shaped by family structure, educational levels, and employment opportunities in Sri Lanka
Mason. 1998 Five Asian countries	Comparative survey data on married women 15-39 from 59 (mostly rural) communities in Pakistan, India, Malaysia, Thailand, and the Philippines.	Women's economic decision making. Measured by a scale comprising decision making on purchases and work status.	Years of schooling Age, husbands schooling, , age, SES, work status, status in household, relation to husband pre-marriage	**Context:** Education is related to increased decision making on economic issues in the household: very strongly in Malaysia, Thailand, and Pakistan, more moderately in Philippines, and not at all in India.

Study and Location	Sample and Design	Outcome of interest and how measured	Independent Variables	Findings
Niraula and Morgan. 2000 Nepal	1993 survey of 313 ever married women ages 15-49 residing in the hills, and 352 ever married women ages 15-49 residing in the plains.	Women's autonomy. Measured by indices for mobility and household decision making.	Woman's education: none, 1-5 years, 6+ years Work for wage, poverty (landless, poor, non-poor), position in household, wife's age	Education has strong effects on women's freedom of movement but has no effect on their decision making capability. **Context:** the gendered division of labor in the two settings is very entrenched and is driving the education—autonomy relationshio.
Sengupta and Johnson. 2003 India	1998 Indian National Family Health Survey II, sample of 21,459 married women, aged 13-49, from 8 states	Women's decision-making and mobility. Measured by: accessing own healthcare, ability to set aside money for own use, and mobility.	Level of education: illiterate, less than primary, primary, middle school, high school, and secondary or higher). HH structure, composition, region, rural/urban residence, religion, age, household assets, employment.	Education is strongly related to decision-making on all three measures.

TIME ALLOCATIONS IN DOMESTIC WORK

Study and Location	Sample and Design	Outcome of interest and how measured	Independent Variables	Findings
Ilahi and Grimard. 2000 Pakistan	1991 Pakistan Integrated Household Survey (based on Living Standards Measurement Survey) of 2400 rural households.	Time allocated to all work activities and time allocated to water collection.	Literacy Age, adult female in household, SES, spouse's wages, estimated non-wage income, distance to market, estimated market wages, seasonality	Being literate increases leisure time and reduces time allocated to water collection.
Khandker. 1988 Bangladesh	A sample of 444 married women 15-19 from 8 Upazilas, 195 women participating in market oriented production and 249 working only in home production.	Time allocation in home production.	Years of schooling. Age, husband's education, husband's pre-marital assets, landholding, distance to schooling for children, distance to town, predicted male and female wage	**Context:** For women participating in the labor force, education has a negligible effect on time allocation in domestic work. For women not participating in the labor force, education has a strong negative effect on time allocation in her domestic work
Malathy. 1994 India	Primary survey conducted in 1980-81of 244 working and 422 non-working married women aged 20-59 in Madras city	Time allocation to non-market work, measured in terms of annual hours spent on housework, meal preparation, teaching children, and taking care of children.	Years of education. Wife's wage, husband's wage, family assets, age, composition of household, and home technology.	Higher female education reduces the amount of time spent in all non-market activities except teaching children which is positively associated with education.

Study and Location	Sample and Design	Outcome of interest and how measured	Independent Variables	Findings
Newman. 2001 Ecuador	Survey of 562 households and 2567 individuals modeled after the Living Standards Measurement Survey. Conducted in 1999 in two regions as part of a quasi-experimental design.	Share of weekly housework measured in hours.	Years of schooling. Marital status, religion, attitudes about housework, experience of verbal abuse, household composition, household assets, rural/urban residence, and treatment vs. control site.	Education does not have a significant negative impact in reducing housework share for women (and men).

GENDER INEQUALITY IN SOCIAL STRUCTURES

Study and Location	Sample and Design	Outcome of interest and how measured	Independent Variables	Findings
Greenhalgh. 1985 Taiwan	Longitudinal ethnographic study conducted in 1978-80, covering postwar social and economic changes from 1954-1978) of 80 families in northern Taiwan.	Gender inequality amongst sons and daughters in education, entry into the workforce, occupation, residence, income, property ownership, and remittances to parents.	Educational achievement, access, and content of daughters and sons education No clear control specified but SES and a range of economic and social factors taken into account.	Despite education for girls, the gap in education, skills, and employment opportunities between sons and daughters increased in the post-war period. **Context:** The Chinese family system with strong sexual and generational hierarchies and Taiwanese export-oriented economy based on low-wage female labor were major contributing factors to this increasing gender differentiation.

Study and Location	Sample and Design	Outcome of interest and how measured	Independent Variables	Findings
Kambhampati and Pal. 2001 India	School attendance data collected in 1987-89 on 543 boys and 493 girls aged 5-15 in 6 villages in West Bengal.	Gender differences in school enrollment and primary school attainment.	Mother's literacy. Child's age, birth order, HH structure, per capita HH expenditures, household agricultural activities, caste, father's literacy, and community characteristics	Mother's literacy increases the chances of daughters being educated (in terms of being enrolled in school and attaining primary schooling), but has no impact on boys
Kumar and Vlassoff. 1997 India	Two separate ethnographic studies conducted in Rajasthan (1991-92) and Maharashtra (1975-76 and 1987), jointly analyzed.	Gender relations conceived in terms of sex preferencs, reliance on sons, attitudes about marriage and dowry, girls' schooling, reproductive decision-making, purdah, and concepts of honor and shame.	Level, content, and quality of girls' education	**Context**: In both Rajasthan and Maharasthra, the effect of women's education on gender relations is minimal because of the power of gender ideology and practice, lack of economic opportunities, and the largely irrelevant content and poor quality of education.
Vlassoff. 1992, 1994 India	Longitudinal ethnographic study conducted in Maharashtra (1975-76 and 1987).	Gender relations in terms of attitudes about marriage and dowry, girls' schooling, reproductive and other decision-making, husbands and wives' roles		**Context:** Greater prosperity, modernization, and more wide-spread education for girls in Maharashtra have reinforced patriarchal structures by defining an economically dependent role for women relative to their husbands.

APPENDIX C
EMPIRICAL STUDIES ON THE EFFECT OF FEMALE EDUCATION ON WOMEN'S ECONOMIC OPPORTUNITIES AND RETURNS

LABOR FORCE PARTICIPATION

Study and Location	Sample and Design	Outcome of interest and how measured	Independent Variables	Findings
Anderson and Dimon. 1999 Mexico	Survey in 1987 of 1394 women age 13+ in Tijuana and Torreon.	Women's (married and single) participation in the labor force. Measured as being in the formal sector versus informal sector or working at home	Years of schooling Age, household characteristics, length of residence in city, household source of water, family income, marital status	Education increases the likelihood of labor force participation in the formal sector, but more so for women in non-export oriented contexts and married women.
Assaad and El-Hamidi. 2001 Egypt	October, 1988 Labor Force Survey of 15,760 women aged 15-64.	Participation in four employment types. Measured as non-agricultural wage work, non-wage non-agricultural work, regular wage work, and casual wage work and log annual hours supplied in each type.	Level of education, literacy Region of residence, headship, marital status, number of children, presence of other females ages 12-64	**Context:** In urban areas, a small increase in participation at primary & preparatory levels and a big jump at secondary plus; in rural areas, participation declines with education up to preparatory level but increases at secondary plus. Probability of being in non-wage agricultural work, casual wage work, and non-wage work outside agriculture declines with education. Education has no effect on hours until secondary education level.

Study and Location	Sample and Design	Outcome of interest and how measured	Independent Variables	Findings
Cameron, Dowling, and Worsick. 2001 Indonesia, Korea, the Philippines, Sri Lanka, Thailand	1975-76 World Fertility Survey data of 30,518 married women 15-49 years old.	Labor market participation. Measured as whether wife participates in labor force.	Levels of education (none, primary, intermediate, secondary, post-secondary) Age, rural, literacy, number of children born in past 5 years, spousal demographic characteristics	Women's tertiary education increases the probability of being in the labor force, while primary education has no or harmful effects. **Context:** The beneficial effects of lower education levels are stronger in Indonesia than in Thailand.
Khan, Chowdhury, Ahmed, and Bhuiya. 1996 Bangladesh	Survey of 9,853 currently married women less than 50 years old in Matlab. Sample was divided into BRAC (n=6,144) and non-BRAC (n=3,543) eligible women	Employment. Measured as whether the woman was involved in any wage earning activity at time of survey	Levels of education (none, 1-5, 6+ year) Age, living children (by age), religion, husband living with wife, household credit, savings, area	**Context:** In BRAC sample, 1-5 years of education associated with lower involvement in wage-earning activities, with no impact of 6+ years of education. In non-BRAC sample, education is positively associated with employment.
Malhotra and DeGraff. 2000 Sri Lanka	1992 survey of 1,460 women aged 18-33	Women's work status	11+years of schooling Ownership of consumer durables, age, work experience, household membership by sex and generation, urban, religion, husband's occupation	10+years of education increases probability that married women are in paid work but is insignificant for single women.

Study and Location	Sample and Design	Outcome of interest and how measured	Independent Variables	Findings
Malhotra and DeGraff. 1997 Sri Lanka	1992 household survey of 812 women aged 18-33 in the Kalutara district.	Employment status. Measured as not in labor force, in the labor force and unemployed, and in the labor force and employed.	11+ years of education versus less Age, urban residence, ethnicity, birth order, consumer durables, household composition	While better educated women are more likely to be in labor force, higher education leads to a lower probability of being employed once in the labor force.
Mammen and Paxson. 2000 India and Thailand	1993-94 India NSS and 1981-96 Thailand Socioeconomic Surveys (of between 12,000 – 25,000 households per year)	Labor force participation and type of employment. Measured as whether woman works as an employee, is self-employed, a family worker or unemployed.	Levels of education (completed secondary, completed post-secondary) Spouse's age and schooling, age, year (for Thailand)	Post-secondary schooling strongly associated with participation in the labor force. More educated women are more likely to work as "employees" in non-manual jobs. **Context:** Secondary education has a stronger effect in India than in Thailand.

LABOR FORCE PARTICIPATION AND EARNINGS

Study and Location	Sample and Design	Outcome of interest and how measured	Independent Variables	Findings
Birdsall and Behrman. 1991 Brazil	1970 Brazilian census Public Use sample of 4,310 men and women between ages of 15-65.	Labor force participation and job sector. Measured as formal, informal, domestic service. Log earnings	Years of schooling Potential experience, marital status, spouse income, other household income, headship, resides with parents, presence of children under age 6, and interactions	Education increases probability that will women work. For formal sector, coefficients on schooling and experience are significantly more positive for females than for males. For informal sector, coefficients on the schooling variables are negative for both men and women. Impact of schooling on earnings is positive and significant for females in the formal sector, but not in the informal and domestic sectors.

Study and Location	Sample and Design	Outcome of interest and how measured	Independent Variables	Findings
Deolalikar. 1993 Indonesia	1987 National Socioeconomic Survey (SUSENAS) of 250,000 individuals and Village Potential (Potensi Desa) module of the 1986 Economic Census.	Labor force participation Log earnings	Level of education (below primary, primary, lower secondary, vocational lower secondary, general higher secondary, vocational higher secondary, diploma 1 or 2, diploma 3, university) Age, spouse's age, monthly salary, headship, marital status, household non-labor income	Up to lower secondary level, schooling reduces paid labor force participation among women, but completion of higher secondary and tertiary school increases women's returns more so than men's.
Duraisamy. 2002 India	NSS employment surveys of 66,651 male and 21,444 female wage earners in 1983 and 63,507 male and 20,393 female wage earners in 1993-94 aged 15-59.	Wage work participation. Log of the daily wage.	Level of education (primary, middle, secondary, higher secondary, graduate), technical diploma Potential experience, residence in rural areas, non-labor income	Graduate and above education increases probability of women entering regular salaried government or private sector wage work. Returns to women's education are higher than to men's education at the middle, secondary and higher secondary levels. Between 1983 and 1993/4 returns to middle level schooling declined for both sexes but the change is stronger for women.

Study and Location	Sample and Design	Outcome of interest and how measured	Independent Variables	Findings
Fussell. 2000 Mexico	1993 Labor Trajectories Survey of 214 male and 198 women workers, age 12 and older, in Tijuana. (Non-representative sample)	Log hourly wages Log of months in current job	Level of education Sector of employment (commerce, self-employment, services, maquiladora), interactions of education and sector, age, marital status, children	Education does not affect wages among maquiladora workers, but it is positively related to wages within services, commerce, and self-employment.
Glick and Sahn. 1997 Guinea	1990 survey data from Conakry of 3,566 men and 3,306 women 15+ years of age.	Gender difference in employment status, earnings, and private and public sector employment.	Level of education (primary, secondary, tertiary) Age, marital status, children, unearned income, migration, ethnicity, electricity, season, residence	Increases in schooling positively associated with all outcomes, but secondary schooling and above has less incremental benefit.
Jakubson and Psacharopoulos. 1992 Ecuador	8,899 husbands and wives and 977 female household heads from 1987 Ecuador Household Survey in Quito, Cuenca, and Guayaquil	Labor force participation and market work Log average hourly earnings.	Years of schooling Age, experience, number of children in household, husband's work status	Education is a marginally significant determinant of female labor force participation, a significant determinant of labor market work, and earnings.
Kingdon and Unni. 1998 India	1987/88 NSS survey data on urban Madhya Pradesh (9,093 individuals aged 15-64) and Tamil Nadu (11,966 individuals aged 15-64)	Labor force participation, by regular, casual wage, or salaried employment. Log earnings	Years of education, levels of education (primary, middle, secondary, and graduate), literacy Children below age 14, marital status, head of household, age, caste, religion, land ownership, experience (in earnings equation)	Probability of participation in wage work increases with post secondary education, less so with lower levels of education.

Study and Location	Sample and Design	Outcome of interest and how measured	Independent Variables	Findings
Kingdon. 1998 India	1995 sample survey of 993 households in Urban Lucknow, Uttar Pradesh (UP).	Labor force participation, by salaried and self-employment. Log earnings	Level of education (primary, junior, secondary, bachelor, masters, professional degree) Age, experience, mother's work experience, father's education, SES, ever married, household structure, distance from home to Lucknow, health status, religion, caste	Education has U-shaped relationship with participation in paid employment. Education is positively associated with earnings. **Context:** Women's returns to education are more sensitive to family background than men's.
Olmsted. 2001 Bethlehem	Random sample of 262 households in three villages, two towns, and one refugee camp in Bethlehem.	Labor force participation Earnings (log hourly wages) Occupational segregation	Years of schooling and schooling squared, dummies for having post-high school degree and still studying Age, religion, marital status, number of dependent children, migrants, proxies for wealth	Women with very low and very high levels of education are most likely to work. Increased education is associated with increased wages. Additional education lessens the chance that women will suffer from a wage gap for professional women but not for women in textiles.
Tansel. 1993 Turkey	1987 household income and expenditure survey of 2593 urban women (and 290 men) ages 15-64 with only 1 job	Probability of being a wage earner Log earnings. Measured by cash and in-kind payments.	Level of education (non-graduate, primary, middle school, high school, vocational high school, university) Experience, unearned income, unearned household income, age	Primary school has no effect on earnings for women; effects of higher levels of schooling are significant and increase with level of education.

Study and Location	Sample and Design	Outcome of interest and how measured	Independent Variables	Findings
Appleton, Hoddinott, and Krishnan. 1999 Ethiopia, Uganda, Cote d'Ivoire	1990 Survey of Adolescent Fertility, Reproductive Behavior and Employment Status of the Youth Population in Urban Ethiopia (1,252 women and 733 men). 1985-87 data from LSS for Cote d' Ivoire (3,216 women and 2,551 men.) 1992 Integrated Survey for Uganda (3,381 women and 2,869 men).	Log earnings.	Level of education (completed primary, junior secondary, senior secondary) Potential experience, marital status, foreign nationals (in the Ivorian sample), area of residence, time of survey	Education associated with better earnings for women in all three countries. Effect varies by level of education in each country and by public or private sector.
Aromolaran. 2002 Nigeria	93,999 individuals aged 15-64 surveyed by the Nigerian General Household Survey, 1996-1999.	Log hourly earnings.	Number of years of each school level Potential experience, year dummies	Returns to school for both men and women increase with each level of education and are higher for women than for men.
Behrman and Deolalikar. 1995 Indonesia	1986 Indonesia Labor Force Survey (SAKERNAS) of 30, 227 individuals over the age of 10 who received wages as paid employees, 30 % of which are female.	Semilog wages (total wage received during previous week/hours worked). Semilog earnings.	Level of education (some primary through university) Age, number of household members over 10 and under 10 years of age.	Education is positively associated with both earnings and wage rates, more so for females than males, and at higher than lower education levels.
Birdsall and Fox. 1991 Brazil	1970 Brazil census sample of 5,870 female and 718 male schoolteachers.	Natural log of income	Years of study completed Proxy for experience, hours worked per week, headship, location characteristics	At least 74 percent of the gender wage differential (F/M=50%) is explained by non-discriminatory causes such as education , training.

Study and Location	Sample and Design	Outcome of interest and how measured	Independent Variables	Findings
Esim. 2001 Turkey	Survey of self-employed (235 men, 470 women in seven provinces (Mugla, Corum, Denizli, Ankara, Istanbul, Gaziantep, Urfa).	Log earnings	Level of education Age, experience, marital status, rural/urban, eastern-western Turkey, home-based, occupational type	Education has positive effect on earnings of both female and male self-employed but impact on men's earnings is greater.
Gannicott. 1986 Taiwan	1982 Official Labor Force Survey of 6,156 women (and 10,970 men)	Gender differentials in log wages	Level of education (literacy, primary, high school), types of vocation training, college Firm experience, previous work experience, marital status, work hours, firm size, type of work	Even in the absence of discrimination, women earn only 85 percent of what men earn because men have more education. Women earn on average only two-thirds of men's salary.
Kao, Polachek, and Wunnava. 1994 Taiwan	1989 micro wage data for 13,246 women (and 19,318 men) ages 20-60	Gender gap in log wages.	Years of schooling Market experience, work sector, type of industry work, region, firm size	Human capital measures (including education) explain 84 percent of observed gender wage differentials. Human capital investment is crucially dependent on expected lifetime labor force participation.
Montenegro. 2001 Chile	Nation-wide household surveys (CASEN) for years 1990 (n=21,838),1992 (n=30,919), 1994 (n=34,935), 1996 (n=28,942), and 1998 (n=41,653) of workers who worked at least 35 hours/week and were not self-employed.	Wages. Measured as log of hourly wage.	Years of schooling Prior work experience, age	For lower starting wages, women have higher returns to education than men. At higher wages, women and men have similar returns to education.