

The Impact of Women's Participation in Credit Programs on the Demand for Quality Health Care  
in Rural Bangladesh

Priya Nanda<sup>1</sup>

Johns Hopkins School of Public Health and Hygiene

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## **1. Introduction**

### *1.1 Introduction*

Economic constraints and poverty limit individuals' well-being in terms of nutrition, disease, health seeking, and ability to pay for health care. Within poor households, women and children are often marginalized in terms of health-seeking, nutrition and education (Bruce 1989; Jacobson 1993; Dreze & Sen 1995). In addition, women, as mothers and caretakers, bear a greater burden of responsibility in meeting the health, nutritional and social needs of their families in many parts of the developing world (Bruce & Dwyer 1989; Guyer 1988; Mencher 1989; Thomas 1990; Blumberg 1991; Desai & Jain 1992). For these reasons development programs of this decade that have the overall goal of poverty alleviation and improvement of the health and nutrition of families view women as more "efficient" targets of their policies (Mayoux 1995).

Rural credit programs, like the Grameen Bank and Bangladesh Rural Advancement Committee in Bangladesh and Self Employed Women's Association in India, which give loans to poor women and enable them to set up income generating schemes are one such approach towards poverty alleviation. Within the spectrum of poverty alleviation programs, credit is outstanding in that it enables the beneficiaries to acquire means of production and forces them out of the dependency that may be created with other programs such as food for work or food supplementation. Credit programs such as the ones mentioned above provide both access to credit for the purchase of productive capital as well as non-credit services such as skill training, health services and education (Pitt & Khandker 1997). For poor people without access to formal banking facilities, these programs form a justifiable alternative to the often exploitative informal credit markets in the rural economies of developing countries.

Each of these above mentioned programs have attributes that are unique to their success but the underlying commonality is that they all primarily provide women access to productive capital and markets (Schuler et al 1997a). Credit programs with such a gender centered approach to development

have fueled an interest, among international development planners<sup>2</sup>, for credit not only as an instrument for poverty alleviation but also of women's empowerment as a means to improving their own and their families' health. With regards to empowerment, projects that address the economic needs of poor women are strongly justified on the grounds that they not only enhance income of the household but also improve women's power to make decisions and their self-confidence within the household by enhancing their perceived and actual contribution to the household (Sen 1990; Kishor 1994; Schuler and Hashemi 1995; Jejeebhoy 1996).

## 1.2 Objective

On the basis of these considerations it seems natural that women should be targeted through development programs. However, in order make sound policies, there is still a need to better understand the causal links and the benefits from these projects for different aspects of household and individual well-being. The relationships between socio-economic status of women and child health have been investigated by many studies hypothesizing different causal pathways of influence (Mosley & Chen 1984; Caldwell 1986; Behrman & Wolfe 1987). There is, however, a lacuna in research regarding the influence of improved socioeconomic status of women towards their own reproductive and other health needs (Piwoz & Viteri 1985; Goetz and Sen Gupta, 1994; Stein 1997).

The objective of this research, in addressing this lacuna, is located within the specific context of credit programs that address the gendered nature of poverty<sup>3</sup> in rural Bangladesh. The broad question is whether policies targeted towards women bring them benefits measured in terms of improvement in the decision making for their *own* needs. For the purposes of this paper, decision making is defined as

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The international focus on credit programs for women is reflected in the United Nations Fourth World Conference on Women in Beijing, 1995 and the Micro-credit Summit in Washington DC of 1997.

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Here, I refer to the acute poverty and deprivation faced by rural households coupled with structural constraints that marginalize women within those households.

women's demand for quality<sup>4</sup> health services in terms of using formal health services and use of trained birth attendants for deliveries which are mostly conducted at home and decision making for their purchase of personal clothing. This paper therefore looks at the impact of women's participation in rural group based credit programs in Bangladesh on the allocation of household resources towards an improvement in the decision making for women's own needs. It adds to the body of research on women's economic empowerment a focus on outcomes that are specific to the woman's own health and other needs as opposed to child health and mortality outcomes that have dominated the literature until recently.

This paper is divided into seven sections. The first section has provided the main objective of this paper as well as the background information to the study question. The second section provides a review of the literature conducted so far for women's participation in credit programs in Bangladesh. Section three presents the theoretical model. Section four highlights the estimation strategy used in this paper in order to control for some of the problems due to the selection bias from participation in credit programs. The fifth section describes the data and the study design. Section six presents the results and the section seven concludes the paper.

## **2. Review of Literature**

### **2.1 Women's Demand for Health Care**

Economic studies that look at utilization of health care by women, confirm that price is an important determinant even when health care is supposedly 'free'. These models use the basic full income constraints (Acton 1975) in which travel and waiting time are incorporated along with cash price as the shadow price of health care. Wong et al. (1987), in their study in Cebu province of the Philippines, found that accessibility to care, insurance coverage and the opportunity cost of women's time proxied by the number of children aged six and below in the household had an effect on the number of prenatal visits and choice of provider. Other factors that have been studied and deemed important are traveling time (Diop 1990; Gertler 1990; Hodgkin 1996); cash price of health care (Wong et al 1987); distance to the

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<sup>4</sup> Quality is determined in terms of its structural determinants following Donabedian (1988) and therefore formal care is defined as higher quality.

facility (Diop 1990). A study conducted in Malaysia (Heller 1982) demonstrated that household income had a significant impact on the use of prenatal care and on the type of obstetrical care used. Additionally, for households engaged in agriculture, obstetrical care was less likely to have been used compared with deliveries at home. Choice of prenatal care and obstetrical care was found to be significantly dependent on urban residence and mother's education in a study in Philippines (Akin et al 1985). These studies suggest that households undertake decisions to seek health care in response to economic constraints such as cash prices and travel time as well as income. Levin (1994) finds that women's unearned income proxied for bargaining has a positive effect on the demand for maternal care, obstetric and prenatal, in urban areas of Malaysia. Few studies within the economics literature have explored the effects of women's income on their demand for health care or fertility. The studies that are available have adhered to conventional price and income effects and assume unitary preferences for a household. Studies disaggregating male and female unearned income as a proxy for bargaining power have mostly concentrated on child nutrition, morbidity and anthropometric measures (Thomas and Chen 1994). Moving away from the economics literature there is less structure and therefore even less comparability.

## 2.2 Economic empowerment and women's participation in credit programs

Programs to empower women are now of increasing interest since they may enhance women's ability to take an active role in getting access to and utilizing services (Schuler and Hashemi 1994). Hammerslough (1991), for example, finds that women who belong to women's organizations are more likely to use contraception than those who do not. This has been tested in other studies, including in rural Bangladesh, where the possible association between membership in women's organizations through participation in credit schemes and fertility are explored (Schuler & Hashemi 1994; Gage 1994; Whitaker 1996). These studies find that rural credit programs empower women by strengthening their economic roles and empowerment is positively associated with the practice of contraception (Schuler & Hashemi 1994<sup>5</sup>; Rahman and DaVanzo 1997). Schuler and Hashemi do not control for the possible confounding effects that may make women who are targeted also more likely to use contraception to begin with. Rahman &

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<sup>5</sup> Schuler and Hashemi define level of empowerment by combining a group of variables such as mobility, economic security, decision on purchases, subjection to domination and violence and political and legal awareness.

DaVanzo (1997) use a retrospective discrete time hazard model using information before and after participation and hence methodologically control for the selection bias at the individual level. They find evidence of selection and diffusion effects of Grameen Bank participants on contraceptive use. The econometric studies carried out by Pitt et al (1997)<sup>6</sup> control for the unobservables at the individual and village level that confound the effect of participation on contraceptive use. Interestingly, the empirical evidence presented in their study provides no support for the hypothesis that female participation, suggested in this review as a measure of empowerment, has a positive effect on contraceptive use. They conclude that self-employment activities that are encouraged through credit schemes in Bangladesh are essentially different from wage labor market opportunities in that they do not necessarily raise the shadow cost of a child. The method of analysis adopted by Pitt et al (1995) is not comparable to other studies (Schuler et al 1997) that do not control for selection bias and find a positive impact of participation on contraceptive use. However, if there is a selection bias then the studies that ignore the problem will provide biased results. Pitt et. al. (1995) and Rahman & DaVanzo (1997) provide evidence of selection bias from their studies and therefore in controlling for the problem possibly present unbiased results.

### **3. Theoretical Framework**

#### *3.1 Introduction*

The theoretical model modifies the standard Grossman model for demand for health (Grossman 1972) to introduce the concept of women's agency through their empowerment in the specific context of this study i.e. women's participation in rural credit programs in Bangladesh. This theory links women's participation in credit programs to their empowerment and further to the outcomes of demand for quality health care and quality maternal care defined in terms of use of trained birth attendants. I use the demand for quality health care for the specification of this model. In presenting the theoretical model I will first define empowerment in the sense that is valid for the context of rural Bangladesh and the hypotheses of

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This study uses the same data set as used by Pitt et al (1995, 1997) in their various studies on impact of participation in credit programs on fertility, child schooling, nutritional outcomes and profits.

this research.

I hypothesize that participation in groups is a measure of their empowerment (Stein 1997). I also hypothesize that, through participation in group based credit programs, the more women are empowered the more likely they are to demand quality health care (Schuler and Hashemi 1994; Gage 1994; Whitaker 1996). Empowerment has been defined broadly as “the power to make decisions and to control one’s own life” (Stein 1997, 63). In providing the intuition for the relation between participation and empowerment, Zimmerman states, that participation in groups provides individuals with experiences in which they have control (Zimmerman 1990). He believes that this in turn provides individuals with a perception of that control. That perception of control provides individuals with a greater sense of confidence and future expectation of control. Empowerment, thus, is believed to be a dynamic process of change, self realization and impetus for further change. This happens in addition to the practical knowledge, skills and genuine opportunities that are attained from group participation (Staples 1990 in Stein 1997).

This definition posits that women’s participation in groups can be regarded as a measure of their empowerment. Using this rationalization the theoretical model, asserts that empowerment through participation in group based credit programs engenders women’s control over their household budget for expenditure on jointly consumed goods and their own health needs. The literature review on women’s empowerment provides ample justification for women’s control over resources as a critical determinant of their empowerment. It has been demonstrated that, where a woman has an independent share of income, the allocation of resources to family welfare such as child health and fertility improves. Whether she is able to allocate resources to her own needs, such as health care, is hypothesized to be determined by the degree of control she has over household resources (Schuler and Hashemi 1994; Amin 1996).

In this paper, I operationalize control over resources as women’s participation in programs interacted with their household budget. This is a key variable that will be tested empirically for both dependent variables. It is important to offer a caveat that participation alone is not a complete representation of empowerment. However, data used for this study does not shed light on all other aspects of a woman’s empowerment, such as, authority, decision making status and autonomy (Batliwala 1994; Balk 1994; Jejeebhoy 1996). Therefore, this model, assumes some of these other aspects of a woman’s

empowerment, which may potentially enhance her decision making within the household even prior to participation, as her preferences. Empirically, the confounding effect of this assumption is relaxed by allowing for the correlation between the unobservable preferences (Rosenzweig and Schultz 1987) that affect both the decisions to participate in a credit program and to demand quality health care. This is the issue of the selection bias that is dealt with in detail in the next section.

The model contends that women's participation in credit programs in rural Bangladesh enhances their self confidence, perceived sense of control and hence decision making abilities within the household through a process of empowerment. The ability to make independent decisions or participate in decisions acts as an impetus among other aspects of participation to demand quality health care and quality maternal care. The other aspects of participation in credit programs that enable improved health outcomes are greater mobility outside the household and greater information and knowledge and greater access to resources . *I hypothesize that together all these pathways through which women gain empowerment will enhance women's control over household resources.*

The contextual justification for this theory arises from the fact that in the context of rural Bangladesh, where women have traditionally faced restrictions due to institutions such as *pardah* (seclusion of women into a gender demarcated space) and patriarchy (system of entitlements and property rights conferred upon men in a society), an avenue that provides women to join groups to get credit and earn income in a manner that has some collective responsibility, will set them apart from other women by giving them a greater sense of self-esteem and confidence (Amin & Pebley 1990; Schuler & Hashemi 1994 ). Women are unable to seek care despite access due to cultural immobility, lack of adequate information and lack of independent cash resources. Participation in credit programs will decrease this dependence by giving them 1) the mobility 2) information 3) potential access to resources and 4) self confidence to enable them to make decisions to demand better health care for themselves acknowledging the cultural limitations that restrict women in these capacities (Schuler & Hashemi 1994). Therefore, I hypothesize that participation in credit programs brings about a process of empowerment through the above mentioned determinants and manifests in greater control over household resources for women.

## 2.2 Glossary of notation

- $H$  = Current health stock of the woman  
 $X$  = Jointly consumed marketed goods such as food, fuel, house repairs etc.  
 $\tau$  = Residual parameters of tastes and preferences which are assumed to be given  
 $Z$  = Program participation  
 $M$  = Vector of health care services provided by the credit programs  
 $m$  = Vector of health care services demanded by the woman from other providers outside of what is provided by the credit programs  
 $T$  = Vector of technology parameters that affect efficiency in production of  $H$  includes her education, information from the program itself  
 $P_x$  = Vector of price of consumed goods  $X$   
 $P_M$  = Price of medical services provided by the credit program  
 $P_Z$  = Price of loan provided i.e. rate of interest on savings  
 $\theta$  = Proportion of full household income that is under the woman's control  
 $Y_m$  =  $(w_m L_m)$  income accruing to men on account of wage labor  
 $P_m$  = Full price of medical care for the woman

### 2.3 *Specification of the theoretical model*

This model accommodates some of the concerns of the bargaining theory literature which are relevant to the social context of this research. One such concern is that the unitary household model ignores the intra household power dynamics that affect the allocation of resources within the household. In assuming unitary preferences and pooling of income it implies that the impact of policies are neutral to the gender of the beneficiary which may not be true. Using a non-unitary preference approach, this model focuses on the preferences of an individual woman within a household, in the reproductive age group, who may participate in credit programs in rural Bangladesh. The household welfare function is a weighted sum of the individual utilities of all members of the household.

A woman maximizes her own utility relative to the limited resources available in the household. Equation (1) shows that a woman attains utility from consumption of goods  $X$ , which include jointly consumed goods, and her own stock of health,  $H$ . Her preferences enter the utility function implicitly through the

parameter ' $\tau$ '. This also introduces a source of individual level heterogeneity into the model (Rosenzweig & Schultz 1987).

$$\text{Max } U_f = U_f ( H, X, \tau) \quad [1]$$

where,

The health production function given by equation (2) indicates that H is produced with two quality adjusted health inputs, M and m. M is the vector of health care services provided by the credit program planner and m is a vector of health care services that are used by the woman outside of whatever services are provided by the credit programs. The introduction of M is also important in light of policy implications of this study. Policy simulations of the results from this study are carried out with a larger question of whether credit programs can be viewed as a health intervention in terms of improving individual's demand for health care. The question addressed is if the credit program alternatively invested their capital on providing direct health inputs in the community, instead of giving loans to individual women, are the benefits for women's demand for health care comparable? The results from the simulations will be presented in the conclusions to this paper.

M and m are assumed to be perfect substitutes for the sake of creating simplicity in the analysis. This may be an unrealistic assumption because the quality of services may vary greatly between the options that are available to women, such as a rural health clinic, and the facilities set up by the credit program. Therefore, it is assumed that the credit program will set up a facility that has a structure (and using structure as a strong determinant of quality) which closely replicates a rural health clinic (most typically the choice that is available outside the traditional services).

The available technology, T, such as knowledge and information, influence the efficiency with which a woman produces health for herself.

$$H = H ( M + m, T) \quad [2]$$

Equation (3) specifies the proportion of household income under the control of the female,  $\theta$ , to be an increasing function of  $Z$ . This parameter captures the hypothesis that women may have greater control over household resources as a result of participation in credit programs,  $Z$ . The model assumes that if a woman has her own income through a self employment scheme she can exercise greater decision making power in getting a greater proportion of the total household budget for her own consumption, such as for 'm', and a predetermined proportion of the jointly consumed goods. This is a mechanism through which credit participation is assumed to affect women's demand for quality health care as *the proportion of the household budget under a woman's control is assumed to be a function of her participation status*.

$$\theta = \theta(Z) \quad 0 < \theta < 1 \quad [3]$$

A woman maximizes her utility subject to the constraints set by the budget constraint that she faces as is given by equation (4) below:

$$P_x X + P_m m = \theta(Z) * (Y) \quad [4]$$

$P_x$  = vector of price of consumed goods  $X$

$P_m$  = the full price of medical care

She faces a certain proportion of the household budget which comprises of expenditure on health inputs for herself and a pre-determined proportion of the jointly consumed goods and services. I ignore all individual level consumption other than the consumption of health care inputs for the purposes of this theoretical model. The proportion of total household income under her control, denoted by the parameter  $\theta$ , is the proportion of the household budget available to her for expenditure on her own health care and a pre-determined proportion of the jointly consumed goods. The full income of the household is made of unearned income,  $v$ , male wage market or labor income,  $Y_m$ , and her income from the sale of goods  $Z$  viz  $P_z Z$ . In equation (4) above  $Y = Y_m + v + P_z Z$ . Even though theoretically, as a result of setting up self-employment schemes, the household budget can be partitioned into a male and female component, it is not available in the data. Therefore, the theory and empirical specification uses total income and not gender differentiated sources of earned income as the household budget.

Control over income or  $\theta$ , is predicted from women's participation as depicted in equation (3). It is important to note that  $\theta$  is the control over income effect and not the income effect. The empirical model will test the effect of participation as a control over income effect. There is some literature that provides evidence for the fact that women who participate in credit schemes do have some control over the income they earn as they are liable to repay the loan in weekly installments (Gage 1994; Schuler and Hashemi 1994 ; Whitaker 1996 ). Goetz and Sengupta (1995) refute the claims of the above cited studies and propose that women who take loans have very little control over their earnings. However, the loan default rate is very low in these programs which is not only one of the outstanding successes of these schemes but also suggests that women do have some control over their earnings (Balk 1994). Even if the evidence may not be satisfactory in light of counter claims, it is still plausible that women who participate in programs have greater control over resources compared to non participants who have no access to cash resources given the non existent wage market for women in rural Bangladesh.

Maximizing  $U_i$  in equation (1) subject to the budget constraint in equation (4) we get the following Lagrangian:

$$\Lambda = U_f ( H (M m) X) - \lambda ( P_x X + P_m m - \theta (Z)^* (Y)) \quad [5]$$

$\lambda =$  is the marginal utility of money

The three choice variables are  $X$ ,  $m$ , and  $\lambda$ . Differentiating the equation (5) with respect to the three choice variables  $X$ ,  $m$  and  $\lambda$  yields the following three first order conditions:

First Order Conditions for jointly consumed goods, medical care and marginal utility of money respectively are given in equation (6) (7) and (8) below:

$$\frac{dU_f}{dH} = \lambda P_x \quad w.r.t. X \quad [6]$$

$$\frac{dU_f}{dH} \frac{dH}{dm} = \lambda P_m \quad w.r.t. m \quad [7]$$

$$\theta(Z)(Y) = P_x X + P_m m \quad \text{w.r.t } \lambda \quad [8]$$

Solving for the three first order conditions gives the derived demand for medical care,  $m$ , given by equation (9) below:

$$m = m(P_m, P_x, P_z, \theta(Z) * Y, Z) \quad [9]$$

Equation (9) indicates that  $m$  depends on prices of  $X$  and  $m$  as well as on women's participation in credit programs and women's control over income from participation,  $\theta(Z)$ . It can be shown that  $dm/dZ$  would be  $>0$  if  $m$  is a normal good and  $dm/dP_m < 0$ <sup>7</sup>. From a policy consideration there are two ways of improving the demand for quality adjusted health inputs,  $m$ . Either the price of  $m$  can be decreased by investing in health inputs directly into the community and hence decreasing the travel or waiting time as the shadow price of  $m$ . Alternatively,  $m$  can be increased by increasing  $Z$ . The theory suggest that participation in credit programs,  $Z$ , will have a positive impact of the demand for quality health care,  $m$ . These two choices will be posed at the end of this paper in terms of interpreting the results of this study for policy implications.

#### 4. Empirical Estimation and the Problem of Selection Bias

##### 4.1 Empirical model

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<sup>7</sup> The details of the derivation of  $dm/dZ$  are presented in "Impact of Women's Participation in Rural Credit Programs on Allocation of Resources Towards Their Own Health in Bangladesh", Doctoral Dissertation 1998. Johns Hopkins University.

The general objective for the empirical model is to study the effect of program participation on the demand for quality health care for adult women. Program participation is modeled as a binary decision variable which is a function of both household and village characteristics.

Consider the reduced form equation (10) for participation in a credit program:

$$C_{ij} = X_{ij} \beta_c + V_j \chi + Z_{ij} \pi + \varepsilon_{ij}^c \quad [10]$$

$C_{ij}$  is a dummy for credit program participation such that  $C_{ij}=1$  if an individual in the  $i$ -th household participates in any of the credit programs in village  $j$  and  $C_{ij}=0$  otherwise.  $X_{ij}$  is the vector of exogenous household characteristics (age, education of household),  $V_j$  is the vector of village  $j$ 's characteristics (prices, infrastructure),  $Z_{ij}$  is the set of household and village characteristics distinct from  $X$ 's and  $V$ 's in that they affect  $C_{ij}$  but do not affect the health behavior directly.

$$\varepsilon_{ij}^c = \mu_j + \eta_{ij} + \varepsilon_{ij}^c \quad [11]$$

$\mu_j$  is the unobserved village specific effect

$\eta_{ij}$  is the unobserved household specific effect

$\varepsilon_{ij}^c$  is the random component uncorrelated with the other error components or the regressors

The outcome of interest is censored since not all adults in the sample fall ill in the recall period under study (25% of the sample report illness or injury). Therefore, there is another selection constraint which selects sick individuals into the study. The variable  $H_{ij}$  is the probability of falling sick and the variable  $Y_{ij}$  is conditional on  $H_{ij}$  as well as  $C_{ij}$ .

$$H_{ij} = X_{ij} \beta_h + V_j \gamma_h + \varepsilon_{ij}^h \quad [12]$$

The household outcome of interest,  $Y_{ij}$ , depends on illness and the credit program participation and is as follows:

$$Y_{ij} = X_{ij} \beta_y + V_j \gamma_y + (C_{ij} * \text{income}) \delta + \pi_h H_{ij} + \varepsilon_{ij}^y \quad [13]$$

$$\varepsilon_{ij}^y = (\alpha \mu_j + \mu_j^y) + (\theta \eta_{ij} + \eta_{ij}^y) + e_{ij}^y \quad [14]$$

Equation (14) shows how the error for the credit equation is correlated with the error for  $Y_{ij}$  or the demand for health care.  $\alpha$  and  $\theta$  are the two correlation coefficients.  $\mu_j^y$  and  $\eta_{ij}^y$  are uncorrelated with  $\mu_j$  and  $\eta_{ij}$  respectively. If either  $\alpha$  or  $\theta$  are non zero, the two error terms for equation (10) and (13) are correlated with each other.

Equations, (10) and (13) will be estimated. The problems created due to not estimating equation (12) will be addressed in a following sub-section. Equation (13) follows directly from the theoretical model where the derived demand for health care was given by equation (9). This equation represents the reduced form demand for health care equation which was derived from the utility maximization of the female subject to the budget she faces. The theoretically derived equation (9) from the previous section was a function of prices, income interacted with a woman's control over resources,  $\theta$ , which is a function of her participation status. Empirically, these variables are specified as  $V_{ij}$  (prices and other infrastructure),  $X_{ij}$  (income and other household characteristics such as education that affects the technology of production of health) and interaction of  $\theta$  with income which is the term  $C_{ij}$  interacted with household income.

#### 4.2 *The Selection Problem*

The nature of social programs and their associated treatments are such that it is infeasible if not impossible to assign some individuals randomly to non program control groups and others to program treatment groups (Friedlander & Robins 1995). Self selection of individuals into these programs can occur because of systematic differences in preferences among those who choose to participate and those who do not. Non-participants, therefore, form a non-equivalent comparison group. In order to control the selection problem it is important to understand the source of preference endogeneity. The three possible sources of endogeneity in the context of this study are delineated as follows (Pitt & Khandeker 1995).

1. Non- random placement of credit programs across villages: programs may be placed non randomly in

villages that are more prone to floods or in poorer areas of the country (Pitt, Rosensweig & Gibbons, 1993). Alternatively, it is possible that programs are placed in villages that have more positive attitudes about women's roles and therefore women are more likely to see quality health care on account of less cultural restrictions placed upon them or in villages where women have greater exposure to information and therefore are more likely to seek quality health care for themselves.

2. Unmeasured village level factors that not only affect the demand for program participation but also the demand for quality health care,  $Y_{ij}$ . These can be factors such as prices, physical characteristics of the villages, access to an urban town, proclivity to floods, attitudes that affect not only individual's participation in credit programs to set up small scale activities but also women's ability/attitudes to seek quality health care for themselves. Even if the credit programs are placed randomly across villages, there is a bias that will be caused due to these unmeasured village level attributes which affect both the decision to participate and decision to seek health care in the event of an illness.

3. Unmeasured household attributes affect both credit demand and quality health care demand,  $Y_{ij}$ : These attributes,  $\eta$ 's, include innate health, ability and fecundity as well as differences in tastes and preferences. This was specified in the theory as tastes and preferences which actually account for the unobservable 'empowerment' variables. For example, women who have greater mobility outside the household, are more likely to participate in credit programs may also be more likely to seek quality health care for themselves (Amin 1990). This is critical in the context of rural Bangladesh where women's decision making and mobility is often defined by cultural norms such as the *pardah*.

If any of these potential sources of endogeneity are ignored, there can be bias due to the omission of unobserved relevant variables (Maddalla 1983; Moffitt 1991).

#### 4.3 *Controlling for Endogeneity*

In the absence of a cohort, pre-treatment data and the Heckman approach, the standard approach to deal

with endogenous regressors is to use *instrumental variables*<sup>8</sup> (Moffitt 1991). I use an instrumental variable approach in this study to control for endogeneity. The instruments used to identify the effect of participation on the outcomes are the dummy for land ownership rule, that qualifies households for eligibility for credit. A household which owns more than half an acre of land is not eligible for participation in a credit program<sup>9</sup>. According to Pitt and Khandker (1995), the effect of participation in a credit program on the outcome  $Y_{ij}$ , can be identified if the sample includes households in *villages with the programs that are excluded from making the choice by some random assignment or exogenous rule*, which is the exclusion of households owning more than 0.5 acres of land from any of the three credit programs (A test for exclusion restrictions suggested by Bollen et al 1995 will be used).<sup>10</sup> In order for landownership to be a valid instrument it should affect an individual's decision to participate, which it does as it is a criteria for qualifying for credit, but should not directly affect their demand for health care. The justification for the latter is that land is not a very liquid asset in rural Bangladesh where a market for land is virtually non-existent. Using a sample of Indian rural households, Rosenweig & Wolpin (1985) find that less than 1.75% of land holding households had sold land in the sample year. It is possible that landownership may affect demand for quality health care directly as it may typify attitudes and values of modernity. If this is the case the validity of the instruments is weaker. To check the

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<sup>8</sup> Often the price of the conditioned upon endogenous variable is used in demand theory as an instrument. In the case of endogeneity of credit program participation, the interest rate may be a valid instrument. It is likely that some of the variation in the interest rate would reflect the unobservables at the household level that are known to the lender, which would be a part of the  $\epsilon_{ij}$ , making it an invalid instrument (Pitt & Khandekar, 1996, 15).

<sup>9</sup>

38 households fell into the eligibility group even though they owned greater than the cut off of 0.5 acres of land. These households will be excluded for all the empirical analyses.

<sup>10</sup>

This test is based on a comparison of the likelihood value of the unrestricted estimation (include all but one of the exogenous exclusion restrictions used in the participation equation) of the reduced form equation for the decision to seek health with the likelihood from the second stage equation with the predicted value of participation as an exogenous regressor. The test statistic is the difference between the unrestricted and the restricted estimators. If this difference is significantly different from zero then the exclusion restrictions affect the outcome only through the endogenous regressor as is necessary for them to qualify as exclusion restrictions. The test is a chi square test of -2 times the difference of the two log likelihoods with the degree of freedom equal to the number of excluded exogenous variables minus one (Bollen et al 1995).

robustness of this landownership exclusion rule estimations of demand for quality health care will be conducted with and without land ownership as an independent covariate in the estimations of demand for quality health care. To identify  $\delta$ , the effect of participation on the outcomes, I also control for non-random program placement and endogeneity at the village level, by using village fixed effects estimation through inclusion of village dummies as covariates<sup>11</sup>.

#### 4.4 Estimation Strategy

In order to estimate the impact of participation on the demand for health care an Instrumental Variable approach is proposed. This method of estimation involves a comparison of  $Y_{ij}$  between households that have the choice to participate (eligibles) and those without it (non-eligibles), conditioning on all village effects and observed household and individual attributes, giving an estimate of the program's effect on that outcome. In the first stage, the decision to participate is estimated for all individuals who are targeted i.e. from those villages in which the program was present. The instrument, which is the land exclusion rule of 0.5 acres, is interacted with the village fixed effects in the first stage because over and above the eligibility to participate, an individual's decision to participate is modified by factors at the village level such as proximity to a market or attitudes related to women's status in village. The second stage includes the predicted probability to participate interacted with household income as an independent covariate. It is the coefficient of this term that is of interest for the hypotheses of this study.

The literature on women's empowerment unambiguously suggests that women's control over resources is an indicator of their power. The theoretical framework for this study suggests that women's participation in credit programs brings about a process of empowerment which can be captured by estimating the women's participation interacted with the household budget as a measure of their control over resources. To translate this into an empirically testable proposition, the empirical model suggests that the predicted

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Using village fixed effects have been known to create consistency problems. Heckman (1981) provides Monte Carlo evidence that with 8 or more observations per fixed effects unit, the inconsistency problem becomes relatively inconsequential. The use of village fixed effects in this analysis will not include villages for which there are less than 8 observations per village.

probability of participation from the first stage is interacted with the log of household expenditure. Household expenditure serves as a proxy for household income. This interaction term along with the actual log of household expenditure are used as regressors in the second stage. If the effect of this interaction term is significant and positive it may suggest that either women's participation in credit programs modifies the positive effect of income on demand for health care or alternatively, income modifies the effect of participation on the demand for health care or both. The former interpretation more closely personifies control over resources as is used in the empowerment literature. If the latter is true it implies that the effect of participation on demand for quality health care is higher at higher levels of income. Problems of collinearity do not allow the model to include predicted probability of participation as well as predicted probability of participation interacted with income together.

#### 4.5 *Choice based sampling*

The sample design is choice based as the program participants were purposively over sampled in this data-set. Not correcting for this choice based sample selection can lead to biased parameter estimates. Following Pitt & Khandker (1997) the weighted estimates or WESML estimates are obtained by maximizing a weighted log likelihood function where the weights for each choice equal the ratio of the population proportion to the sample proportion for that choice. The information required to construct these weights was measured directly from each of the surveyed villages. The sampling proportion varied across villages depending on village size and the size of each choice strata.

#### 4.6 *Standard error correction*

In the event that a two stage estimation procedure is used in the presence of valid instruments, the estimated coefficients of beta are consistent but they may not be not efficient. The bootstrapping method will be adopted to correct the second stage standard errors. Bootstrapping involves 'resampling' the data with replacements many times in order to generate an empirical estimate of the entire sampling distribution of a statistic (Mooney & Duval 1993).

#### 4.7 *Censoring due to illness*

Another selection problem arises due to the fact that  $Y_{ij}$  is also a censored distribution i.e. it is observed only for those individuals who report illness. The selection bias may occur because reporting illness or actual probability of illness may be correlated with other observables or unobservables that also affect women's decision to participate. If there is a selection bias due to reporting or actual illness then the estimation of the impact of participation on  $Y_{ij}$  will yield biased estimates. If such reporting bias is related to observables such as income then obtaining conditional estimates will not be biased. However, in most cases it is the unobservable factors that influence this reporting bias which are a cause of concern (Dow 1997). Dow suggests that using conditional estimates is an option where the sample is self reported so long as the estimates are interpreted only as short run elasticities. This is a limitation of this data and of the study in general if the unconditional estimates are found to be significantly different from the conditional short run estimates. Not having any instruments for health status this study cannot provide information on the unconditional estimates. Ideally, pooling the well population would have been useful in providing unconditional estimates. However, there is no guarantee that these estimates would be unbiased if the information on determinants of health status are missing from the data as is typical for survey data-sets from developing countries. In addition, long run estimates are noisy if the determinants of an individual's current health status are weak, even if they are available. The short run elasticities are useful, in the event that long run elasticities cannot be obtained, for policy planners, who do not have resources for comprehensive data collection, to allocate health care inputs in the short-run.

## 5. Data and Study Design

### 5.1 *Data and Study Design*

This study uses data collected by The World Bank, in 1991-92, under collaboration with the Bangladesh Institute of Development Studies (BIDS). This research uses the data from a multi purpose quasi-experimental household survey conducted in 87 villages of 29 thanas<sup>12</sup> in rural Bangladesh during 1991-

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<sup>12</sup> Some of the thanas may have more than one credit program in operation. However, no individual in the sample is member of more than one program simultaneously.

92. The survey's major focus was to analyze the credit and other input effects of three major credit programs and was designed to include both target (those qualified to participate) and non-target households from both program and non-program (i.e. control) areas. The sample is divided into program and non program villages. Of the 72 program villages out of a total of 87 villages, not all households are targeted. The targeted households are those that qualify as functionally landless based on the landownership rule of owning less than 0.5 acres (or 50 decimals) of land. The eligible households are thus the ones that are functionally landless. Of the eligibles, a lesser proportion end up participating in the program. This structure also forms the backbone of the analysis in terms of devising quasi experimental control groups to analyze the impact of program participation. The sample consists of 29 thanas (sub-districts) randomly drawn from 391 thanas in Bangladesh. Out of the 29 thanas selected for the study, 24 have at least one of the three credit programs in operation, while 5 thanas have none. The villages from these 5 thanas are referred to as non-program or control villages. The program thanas are distributed among the four regions in the following way: 8 thanas in *Khulna* region, 3 thanas in *Chittagong* region, 10 thanas in *Dhaka* region and 8 thanas in *Rajshahi* region. Three villages were selected from each program thana from a list, supplied by the program's local office, of villages in which the program had been operating for at least three years. Three villages in each non-program thana were randomly selected from the village census of the Government of Bangladesh. Table 1 provides the breakdown of the sample by the programs status of the selected villages. A census was conducted in each village selected for the study. The purpose of the census was to identify target and non target households, as well as to identify program participating and no-participating households among the target households in any village. From the village census lists of households, 20 were drawn from each program and non program village from both target and non-target households for in-depth survey. A random sampling technique was used to draw the 20 households in the ratio 17: 3 by target and non-target groups in program villages and 16:4 in non-program villages.

Data Category	BRAC	BRDB	Grameen	Eligible Non participating	Non Eligible	Non Program	Total
Villages	24	24	24	-	-	15	87

Table 1 Sample of Villages and households by program status							
Number of households	281	308	310	378	186	295	1758
The reason that the table shows 1758 households even though the original data set had 1798 households is because 40 households that owned greater than 500 acres of land were excluded as outliers.							

## 5.2 Dependent Variables

In the case of demand for quality health care, the survey question is “*Who did you consult in the event of an illness?*” and the choices ranged from one to twelve. The choices were first collapsed to five distinct categories. From these five categories they were further collapsed into two mutually exclusive categories from five. The Hausman & McFadden (1984) test for Independence of Irrelevant Alternatives (IIA) could not be accepted for this sample and therefore a multinomial logit regression analysis (mostly used when there are more than two categories) could not be conducted. Homeopathy, faith healing, local compounder (local pharmacist) are labeled as ‘informal’<sup>13</sup> and Government facilities, hospitals, private doctors, clinics are labeled as ‘non traditional’ or ‘formal’. The more formal health<sup>14</sup> services are hypothesized to be of higher technical quality following Donabedian (1988) who suggests that *structure* is one measure of assessing quality of care. Therefore, the effect for participation in credit programs on quality health services is hypothesized to be positive. The categories that are classified as lower quality are the traditional practitioners, healers and compounders and the higher quality comprises of formal services which are government and private doctors and facilities.

The second dependent variable of interest is the choice of who assists a woman during the delivery or

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<sup>13</sup> The DHS for Bangladesh reports that in poor rural areas of Bangladesh individuals seek health care from various sources that range from traditional providers, faith healers, compounder to government clinics, private doctors and private hospitals. Compounder, which could be a trained or untrained pharmacist selling medicines directly to the user without a prescription necessarily, is noted in this data as well as from DHS as a very popular category for health seeking. In this data, 42% of the sample sought care from a compounder while 30% sought care from a private doctor.

<sup>14</sup> The categorization into formal and informal follows the DHS classification for Bangladesh.

childbirth which was coded as a binary variable. The question in the instrument was: “*Who assisted you at birth?*”. The instrument gives 6 choices including the choice category “other”. The Independence of Irrelevant Alternatives test was rejected for this variable as well. The categories were collapsed into two categories where the variable takes the value 1 if the woman was assisted by midwife/Trained Birth Attendant (TBA) or a doctor and takes the value 0 if the woman is assisted by a female relative or an untrained *dai*. The reason for this categorization is that there is hypothesized to be no notable difference between the quality of care provided by an untrained *dai* or a female relative. Several studies have supported this claim (Tinker 1996). This dependent variable is limited to the choices of each woman’s last pregnancy. Only last pregnancies, for women who had a child in the last three years (since the program had been in effect for at least three years in all villages), are included in this sample so that each observation will be independent (inclusion of more than one pregnancy per woman would introduce non-independence) and after the entry of the program in a village. The choice of who assists a woman during childbirth is also highly correlated with the choice of where the delivery takes place. There is, however, very little variation in where the delivery took place therefore who assisted the woman during the delivery became a crucial aspect of this choice. The majority of deliveries are assisted by untrained dais (38%), female relatives (54%) and only 8% are assisted by medically trained personnel.

A third dependent variable for which the impact of participation is estimated does not fall under the purview of demand for health care. This is a binary variable that captures women’s self-reported decision making for the purchase of personal clothing. The variable takes the value 1 if a woman has all control or some control over the decision making for the purchase of a sari and 0 if that decision is made by her spouse or someone else in the household without her participation. In this sample 67% of women had some decision making for while 33% had no decision making the purchase of a sari. If the impact of participation in credit programs is positive on this variable then it will strengthen the hypothesis suggested through the theory that participation is a measure of women’s empowerment measured in terms of their control over resources.

Table 3 below shows the basic descriptive statistics of the main dependent variables in this study. From the descriptive statistics there is not much evidence of endogeneity for the demand for quality health care although the proportion of women who use any health care in the event of an illness vary for the groups

by participation status. The use of trained birth attendants varies weakly for the targeted non participants from the participants. Once the multi-variate analysis control for other confounding influences the differences may become small or insignificant.

## **6. Results**

The objective of this section is to present the estimation results for the effect of participation in credit programs on the dependent variables related to demand for quality health care for a sample of ill individuals, demand for trained birth attendants for married women who have had a child in the three years prior to the survey and lastly, women's decision making for purchase of their personal clothing. All these outcomes together comprise of women's decision making for this study. Section 6.1 presents the results for impact of women's participation on the demand for quality health care. Section 6.2 presents the second set of results for the impact of participation on women's demand for trained birth attendants. Section 6.3 presents the results of the impact of participation on women's decision making for purchase of a sari.

### *6.1 Demand for Quality Health Care*

#### *6.1.1 Impact of Participation on Demand for Quality Health Care*

The results are presented for two different set of samples: 1) impact of female participation in credit programs on their own demand for quality health care which is the main hypothesis of interest 2) impact of female participation in credit programs on the demand for quality health care of all adults in the household which suggests the presence of the maternal altruism hypothesis. The impact of male participation on their own demand for quality health care is also estimated to provide a comparison for the above two estimations of interest. All three sets of results are presented in Table 4.

Although the relevant estimation comes from the second stage in the two stage estimation approach it is important to note that the predictive power from the first stage regressions was fairly high (pseudo R-square was 0.32). This indicates that the instrumental variables are fairly effective in explaining the

exogenous variation in the decision to participate in credit programs. This is not a test of validity of the instrumental variables but an indication that the first stage does not suffer from weak predictive power which may have suggested finite sample bias and therefore low reliability of the first stage predicted probability in estimating the effect of participation on the demand for quality health care (Bound et al 1995).<sup>15</sup>

Although, the criteria for estimation that is laid out above assumes that participation in credit programs is endogenous to demand for health care, it is still important to test for endogeneity. The Bollen et al tests for endogeneity were used to test for the presence of endogeneity.<sup>16</sup> The test indicates endogeneity for the demand for quality care for women and for all adults but male participation is exogenous to their demand for quality health care. This theory specifically addresses that it is the determinants of empowerment through which women's program participation may be endogenous to their decision to use quality health care. These determinants may not be critical for men's demand for quality health care. Men's participation and their decision to seek quality seek care may be independent decisions or may be affected by observables such as their socio economic status that also affect their demand for quality health care.

Table 4 Columns I and III show the results of the baseline probit which are single stage probit where

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Bound et al (1995) draw attention to the fact that if instrumental variables are only weakly correlated with the endogenous explanatory variables, then even a weak correlation between the instruments and the error term in the health seeking equation can produce large inconsistency in the IV estimates. To test this they look at the partial R-square from the regression of the endogenous regressor on the identifying instruments (Bound et al 1995).

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Bollen et al (1995) propose a test that is asymptotically equivalent to the Hausman test. In this test the estimated error term from the participation equation is included with the actual dummy for participation in the stage two equation which is the equation for where health care is sought. A simple t test for significance of the coefficient of the estimated error term indicates the presence of endogeneity.

participation is naively assumed as exogenous. The effect of participation is insignificant for the demand for quality health care for the sample of women alone and for all adults. As is indicated in Table 4 Columns II and IV, after controlling for endogeneity, women's control over the household budget, i.e. predicted probability for participation interacted with the log of household expenditure, is *both positive and significant* for the sample of women alone and for the impact of women's participation on the demand for quality health care for all adults. In other words, women participants are more likely to demand quality health care than non participants expressed through their higher control over household resources, controlling for a direct income effect. If there is a female participant in a household then there is a positive effect on the utilization of quality health services for all adults. The resources controlled by women have a positive effect not only on their own demand for quality health care but also of other adults which includes the old, who may be otherwise incapacitated, and those who have less power to seek quality health care for themselves. There is no effect of male participation on their own demand for quality health care.

These are important results from the point of view of the hypotheses and the theory laid out in this study as well as from a policy perspective. The hypothesized pathway through which this effect occurs, i.e. through greater control over resources, is also enlightening in terms of credit programs that simultaneously strive for empowerment of their participants.

### 6.1.2 *Other Determinants of Demand for Quality Health Care*

Other than female participation, the only other significant effect for women's demand for quality health care, is the time spent away from work due to illness, as measured by the number of days that a woman does not carry out her usual activities due to her illness. This measures the opportunity cost of an illness. This effect is positive and very significant for all adults but only weakly significant for the women only sample. Results from the men's sample, column V, indicate that opportunity cost of illness may be more critical for men to seek quality health care than for women. In the context of rural Bangladesh, this is also probably due to the fact that women, even if they stop their usual activities, are not as incapacitated work wise as men since they are more likely to work in the domestic space even if they do run any small income generating schemes. Type of illness is not significant for the female sample. All adults and men

are more likely to demand quality care for injuries, other illness and TB than for the reference category of cough/flu or fever due to malaria or stomach ailments. This categorization follows the number of days a person is ill for given a certain illness. TB, other and injury have a reported number of days ill to be 11 days on the average. The reference category of flu and stomach ailments is 5 days on the average. This may again suggest that men are more likely to demand quality health care for the more severe illnesses than women from the all adults sample. In addition, women may tend to follow home treatment or traditional treatment and therefore not seek formal or quality health care for other illnesses (for women in this sample 85% report other illness from the category that include other illness, injury and TB for the type of illness). This may be because other illness for women may be the more culturally silent forms of illness such reproductive problems and therefore for reasons of lack of cultural acceptance as well as lack of recognition of symptoms women may not demand quality or formal health care for these problems.

The effect of household income is positive and significant for the women only sample as can be seen in column II. Both including and excluding land as a continuous non linear covariate from the second stage does not significantly change the estimates. The inclusion of land indicates the robustness of the results to the land exclusion rule instrument. Education is insignificant in all the samples possibly because there is not much variation in the education for this dependent variable or having primary education is not a significant determinant of demanding quality health care. Source of drinking water is stated to be a sensitive measure of socio economic status although it also controls for the physical environment and susceptibility to disease. This variable is significant for the sample all adults. It is surprising that these significant effects are not picked up for the sample of women. These results suggest that some of the household socio economic status characteristics, such as source of drinking water and toilet facilities, are not significant for the sample of women but are significant for the sample of men and all adults. However, household income and control over resources are significant for the sample of women. This reinforces the policies that improve women's own earning capacity rather than household wealth since the impact on women's own health needs seems to be more significantly affected by their participation status and control over resources than by the household's socio-economic status unlike the sample of men for whom variables associated with their socio-economics status have the strongest effect on their demand for quality health care.

Alternative bivariate probit models were also run on the same samples to validate the two-stage results. They used slightly different instruments than the two stage instrumental variable method. This is because the village fixed effects interacted with the land exclusion rule for program participation made the bivariate probit estimation very intractable and often these models did not converge. Therefore, simpler exclusion restrictions were used. The instruments used here are the distance to the closest bank and short term interest rate for three months. The results from these estimations were very close to the two stage results especially with regard to the main effect viz. the positive and significant impact of women's participation in credit programs on their own demand for quality health care and on all adults. For men's demand for quality health care there is no effect of their participation as was the case in the two stage estimations. The bivariate probit results, provide evidence of endogeneity for the sample of women and all adults but no endogeneity for the men as in the two stage estimations. The negative correlation coefficient offers insights into the selection process which is that women who are more likely to participate are also more likely to use lower quality health care services. This may be because the program, although targeted to all functionally poor households, selects in women who have preferences for lower quality services due to other unobserved factors such as their the social networks and attitudes of the other households in their *bari*, (a cluster of several households that live within a closer space or a compound). From the conceptual framework of this study it is also possible that the least well off are more likely to participate since the perceived need for credit is greatest amongst these women/households. It can, then be, intuitively rationalized that women who are more likely to join credit programs are less likely to use higher quality health services to begin with. Although the bivariate results are prone to suffer from specification bias possibly due to the assumption of joint normality as well as lack of adequate exclusion restrictions the results are very compatible with the main method of estimation which is the instrumental variable approach.

## 6.2 *Impact of Participation on the Use of Trained Birth Attendants*<sup>17</sup>

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The instruments used in the previous section did not reveal endogeneity. Using district fixed effects in the first stage and making use of certain village level variables such as distance to the closest bank and short terms interest rate as identifying instruments (as was done with the bivariate probits of the previous section), leaving the second stage specified exactly as before, provides evidence of endogeneity where the residual is significant at a 5% level of significance. Therefore the estimations here use district fixed

In cultural context of rural Bangladesh it is possible that pregnancy and childbirth are more affected by cultural proscriptions than demand for curative care. The process of childbirth in many parts of the developing world is regarded as a natural process not requiring outside medical intervention (Tinker 1996). There is also considerable fear that there is more harm than good that results out of treatment for medical conditions for pregnant women and therefore often home remedies are reverted to (Tinker 1996). The low use of medical services for childbirth may also reflect that perceived quality of care is very low for childbirth. In addition, the decision to seek maternal care may involve different decision makers such a mother in law and spouse or the same decision makers but giving them greater weight in the process of decision making. For all these possible reasons the use of trained birth attendants in this sample and in rural Bangladesh is very low. Given that most deliveries (95%) are conducted at home in rural Bangladesh the variability in the use of trained birth attendants makes it an attractive intervention for both policy and program planning especially if there is a positive impact of women's participation in credit programs on women's use of trained birth attendants.

#### *6.2.1 Impact of program participation on the use of trained birth attendants*

Table 5 Column I shows the results from the baseline probit where the actual value of participation is included as a covariate as if it were exogenous to the decision to seek assistance from a trained professional. Not controlling for endogeneity, there is no effect of participation on women's use of trained birth attendants. Table 5 Columns II and III show the results from the instrumental variable estimation which controls for endogeneity. The standard errors have been bootstrapped to correct for the fact that there is a predicted probability in the second stage. The impact of participation is tested through the predicted probability for participation interacted by the log of household expenditure. There is no effect of this variable on women's decision to seek trained birth attendants. Women's participation was proven to have a positive effect of their decision to seek quality care. We would conjecture that there would also be a positive impact of participation on their decision to seek quality maternal care in the

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effects in the first stage with a different set of instruments. Using these instruments does not change the results for the estimations for demand for quality health care from instruments that are currently used in those estimations.

form of trained birth attendants. Table 5 Column III presents results for the effect of predicted probability of participation on women's decisions to use trained birth attendants and not the interaction of predicted probability and log of income. The results show that there is positive and weakly significant effect of participation in credit programs on women's decision to seek trained birth attendants. Although the theory demands that the effect of participation is modified by income, as control over resources, the significance of predicted probability of participation it is still of interest to policy planners. It is possible that there is some direct and positive effect of participation on women's decision to seek trained birth attendants but it does not operate through women's control over resources. It probably operates through a greater awareness and knowledge and mobility that are enabled through participation. The lack of significance of the interacted participation may also be because of low prevalence of use of trained birth attendants in this sample.

#### *6.2.2 Other determinants of women's use of trained birth attendants*

There is a positive and strongly significant effect of women's education, as a binary variable, on their decision to seek medical assistance for childbirth. On the basis of other studies the effects of education was hypothesized to be positive (Caldwell 1982). Schooling is believed to provide an exposure to young girls about the outside world and provide them with the confidence to move out of the confines of the household or village (Tinker 1996). These positive effects are for primary levels of schooling since most of the sample of women do not go beyond primary levels of schooling. It is also possible that women who have had even primary level of schooling are married into households that are more likely to perceive care from trained medical professionals to be of better quality.

The positive and significant effect of the spousal age difference is contrary to expectations since it was hypothesized that a smaller age difference between spouses is indicative of greater decision making power for the women. Since the estimation controls for children ever born, it is possible that women who have relatively older spouses are more aware of the values of seeking assistance from trained medical birth attendants through the knowledge that their spouses bring to them. The effect of children ever born is negative. This suggests that older women or women with greater number of children are less likely to seek assistance from trained medical birth attendants as they may be more conditioned by the cultural

norms of seeking assistance from the traditional birth attendants but also have their own knowledge, inflexibility to modern values or confidence gained from previous births.

None of the determinants of a woman's socio-economic status are significant for her decision to seek trained medical assistance during childbirth. Unfortunately distance to a health facility and access related factors that are embedded in the village fixed effects cannot be interpreted from these results. However, village level status variables are significant in determining women's choice for this variable as can be seen from the F-test for the joint significance of the village level variables in Table 5.

### *6.3 Impact of Women's Participation on their Decision Making for Purchase of a Sari*

To test the hypothesis that participation does personify women's control over resources I test the impact of participation on women's decision making over purchase of a sari. A two stage estimation, as delineated above, of the impact of participation on women's decision making, as a measure of their control over household resources, is positive and significant. The results of this estimation are shown in Table 6. These results indicate that participation does embody within it a signal for women's empowerment through their control over resources. Needless to say, this is only one measure of women's control over resources. Had more data been available more analyses could be generated on different measures of women's control over resources. What is novel, however, is the hypothesis that participation in groups itself can be viewed as a measure of women's empowerment. This is supported through the results in this estimation. Since this hypothesis is not rejected on the basis of the above estimation it opens ground for further exploration given more data.

## **7. Conclusion**

### *7.1 Interpreting the magnitude of the results for policy*

Simulations were carried out with the results of the estimations from Table 4. The results of these simulations are presented in Table 7. The idea was to set up a hypothetical scenario where the results of the study can be extrapolated for policy, specifically the choice between giving credit and creating

infrastructure in the villages. The first simulation increases female participation by 20% and gives each woman a loan of 3,000 taka (average loan size in this data set). The baseline predicted probability of demand for quality health services is then compared to the predicted probability for the same sample but with 20% greater participation of eligible women. The simulations show that the predicted probability of the demand for quality health services increases by 3.7%. The second simulation provides the hypothetical scenario of spending the same total capital of the program as used to give loans to 20% more participants, on being able to set up clinics in 2 villages.<sup>18</sup> The simulation showed an increase in predicted probability of demand for quality health care to be 3.4%. Given that these options were of the same marginal cost the close similarity in their marginal benefits indicates that the benefits from these two options are comparable.

Acknowledging the fact that these simulations do not present definitive results (since the outcome is weak due to potential biases from a sample reporting illness and crude approximations are undertaken to construct a picture close to reality), an important policy implication that can be derived from them is that investing in loans and providing health inputs in the community are comparable options in terms of optimizing the impact demand for quality health care. These results provide support for credit programs as instruments of not just poverty alleviation but also improving the demand for quality health care which was stated to be one indicator of women's decision making for their own needs. These simulations bolster the results from the estimations that showed a strong and positive impact of women's participation, through their control over resources, on their own demand for quality health care and the demand for quality health care for all adults in their households.

## 7.2 *Conclusions*

Using a non-unitary preference approach the theoretical model highlighted women's empowerment in terms of their control over economic resources through the interaction between participation in credit

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The costs data are obtained from a study in Bangladesh by Barbara Janowitz which provided information on how many clinics could be set up with the exhaustible capital that the credit program had initially.

programs and household income. It proposed a distinctive way to examine, empirically, the impact of women's participation in credit programs on their own demand for quality health care. Other components of women's empowerment that were not measured were regarded as unobservables in the study. Therefore, the changes in women's preferences brought about through participation in credit programs, excluding what is controlled for in this study, are mostly embedded in the unobservables in this study. The correlation between these unobservables and the three outcomes was controlled for by the use of an instrumental variable approach.

Women's participation has a positive impact on their decision to seek quality health care. Women's participation also positively impacts the decision to seek quality health care for all adults. There was no impact of men's participation in credit programs on their demand for quality health care. These results suggest there is an effect of gender of the participant that mediates through a higher control over resources on the demand for quality health care. Women's control over resources measured by the interacted effect of predicted participation and household expenditure (as a proxy for income) is a positive determinant of not only their own demand for quality health services but also for all adults. Since adults also include older and weaker members of the household there is a potential unexpected gain, from women's participation, in reducing morbidity within the household. This may, alternatively, imply that the program is actually making the sample of men healthier vis-a-vis women. These results are conditional on self-reported illness and, given the available data, the estimation proposed in this study will not be able to determine the extent of any bias.

Women's use of trained birth attendants is an important determinant of their risk for maternal mortality and morbidity and, therefore, an important variable from a policy and program perspective. The impact of women's participation in credit programs on their decision to seek trained birth attendants does not operate through the theoretically proposed control over resources. However, there is a direct effect of women's participation in programs on their use of trained birth attendants. This suggests that participation enhanced other aspects of a woman's power, that do not necessarily increase her control over the household budget greatly, such as access to information and possibly mobility. These factors are more critical aspects of a woman's decision to use trained birth attendants than household income or

women's participation interacted with household income. The effect mediated through control over resources is possibly weak due to the low prevalence of the use of trained birth attendants in this sample. The positive and strongly significant role of primary education is also instructive to policy. It suggests that credit programs that create some level of functional literacy and provide health information have more beneficial effects on women's health than providing credit simply as a tool of creating access to resources.

Women's participation also has a significant and positive effect on their decision making for purchase of a sari. These results indicate that women's participation in credit programs embodies within it a signal for women's power through an improvement in their decision making for their personal needs. This result further reinforces the fact that participation itself can be viewed as a measure of women's empowerment.

The hypothesized pathway through a greater control over resources is not only a validation of the theory but also reinforces the role of women's empowerment strategies that have been integrated within the spectrum of these credit programs. However, whether women participating in credit programs are more likely to demand quality health care, maternal health care or have greater decision making over purchases, because they are now economically productive or empowered cannot be conceptually separated from the results of this study. Sustainability is an important issue that has not been addressed by this study due to the data's inability to capture the temporality of changes in women's lives. Data collected in the future should be able to provide not only better measures of women's decision making for their own needs but also changes in those indicators over time.<sup>19</sup> From a policy makers point of view these results indicate that more important than household income and socio-economic status, are factors such as women's own income, their involvement in participatory efforts that enhance their economic productivity, information and mobility, all of which are possible mechanisms for their empowerment within this context. This study provides evidence for the fact that economic empowerment through

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Using longitudinal data for a study of this nature would have provided more robust methods of estimations and estimates. However, due to weaker reliability of the data on some of the key variables of interest, in the second and third rounds, the panel nature of this data could not be exploited by this study.

improving women's access and control over resources can potentially alleviate their health problems and enhance their decision making within the household. The results also suggest the need to empower women through primary education. In affecting women's health and well-being in a significant way policy planners may enhance these empowerment strategies not only by an emphasis on economic empowerment but also by reducing women's social costs associated with attaining education and mobility.

Table 2 Descriptive Statistics for Female Participants and Non Participants - Weighted Means and Standard Deviations		
Name of the Variable	Participants n= 615	Non Participants n=1388
<i>Explanatory Variables</i>		
Total land owned (in decimals)	30.7 (60)	25 (54) **
Total household expenditure (in takas)	5927 (4397)	6142 (4873)
Ever educated: 1=any years of education 0 =none	0.32 (0.46)	0.33 (0.45)
Size of the household	5.1 (2.0)	5.6 ( 2.5)
Children ever born	4.6 (2.5)	4.2 (2.7) ***
Age in years	36 (11.5)	32 (13.7) ***
Have a child under six years: 1= yes 0= no	0.57 (0.49)	0.60 (0.48) *
Number of days did not return to usual activities because of illness	5.4 (6.8)	6.8 (7.4) *
Use contraception: 1 =yes 0 = no	0.51 (0.50)	0.42 (0.49) ***
Distance to Parents home (in kms.)	10.2 (30.5)	12.2 (35.6)
Wages of female (in takas)	15.7 (8.5)	16.2 (9.6) **
Distance to closest Bank (in kms.)	3.0 (2.6)	3.3 (2.8) *
Distance to the nearest Road (in kms.)	2.5 (3.5)	2.4 (3.2)
Distance to the nearest shop in the village (in kms.)	1.2 (1.7)	1.5 (2.0) ***

Table 2 Descriptive Statistics for Female Participants and Non Participants - Weighted Means and Standard Deviations
1. *** indicates significance at 1% level; ** at 5% level and * at 10% level of significance 2. Significance from t tests with the participating households as a reference category

Table 3 Descriptive Statistics for Women in Reproductive Ages for the Dependent Variables - Weighted Means and Standard Deviations			
	Women greater than 13 years from participating households n=1321	Women greater than 13 years from non participating targeted households n=880	Women greater than 13 years from non targeted households n=379
Proportion of women who reported illness in last four weeks: 1=yes 0=no	0.25 (0.43)	0.23 (0.42)	0.26 (0.44)
Proportion of women who sought care in the event of an illness: 1=yes 0= no	0.85 (0.35)	0.79 (0.39) *	0.92 (0.26) **
Proportion of women who sought “quality” care in the event of an illness : 1= formal services 0= traditional services	0.50 (0.50)	0.46 (0.50)	0.47 (0.50)
Who assisted at birth for their last child (1= trained professional including doctor and trained midwife and 0= Female relative /Dai)	0.09 (0.29)	0.06 (0.23) ***	0.10 (0.30)
1. *** indicates significance at 1% level; ** at 5% level and * at 10% level of significance 2. Significance from t tests with the participating households as a reference category			

Table 4 Weighted Instrumental Variable Probit Estimates with Village Fixed Effects: Impact of Participation in Credit Programs on the Demand for Quality Health Care					
Probability of attending government or private clinic (quality health care) if the person is a ---	Woman		Any adult		Man
Column I-IV looks at the impact of female participation while Column V looks at the impact of male participation	I Baseline Probit n=513	II IV Probit n= 513	III Baseline Probit n=893	IV IV Probit n=893	V Baseline Probit n=470
Actual value for participation	0.12 (0.21)	-	0.22 (0.20)	-	0.02 (0.03)
Predicted Probability interacted with log of household expenditure	-	0.16 (0.08) **	-	0.28 (0.08) ***	-
Type of illness: 1=other illness, injury or TB 0= cough/ flu stomach, GI tract (categorized according to severity proxied by number of days ill)	0.17 (0.18)	-0.02 (0.25)	0.23 (0.12) **	0.27 (0.12) **	0.34 (0.16) **
Number of days stopped usual activities	0.002 (0.01)	0.02 (0.01)*	0.01 (0.008)	0.02 (0.009) ***	0.03 (0.01) ***
Source of drinking water: 1=hand pump in the house 0= source outside the house	0.38 (0.21) *	0.16 (0.20)	0.50 (0.17) ***	0.45 (0.09) ***	0.60 (0.23) ***
Toilet Facilities: 1 = sanitary or <i>Katcha</i> 0= none	0.30 (0.25)	0.27 (0.25)	0.28 (0.15) *	0.24 (0.20)	0.60 (0.18) ***
Father's occupation: 1= small business, trade and 0 = agricultural	-0.50 (0.24) **	-0.25 (0.33)	-0.15 (0.17)	-0.13 (0.14)	0.05 (0.24)
Log land (decimals)	-0.005 (0.002) ***	0.0003 (0.001)	-0.008 (0.01)	-0.002 (0.003)	0.03 (0.018) *
Log of household expenditure (takas)	0.24 (0.17)	0.08 (0.03) ***	0.06 (0.13)	0.07 (0.11)	-0.12 (0.17)

Table 4					
Weighted Instrumental Variable Probit Estimates with Village Fixed Effects: Impact of Participation in Credit Programs on the Demand for Quality Health Care					
Relation to the household head: 1= head and 0 =spouse, child, or parent sibling	-0.22 (0.34)	-0.40 (0.24) *	-0.24 (0.13) *		-0.09 (0.21)
Child under six years of age: 1= yes 0= no	-0.23 (0.16)	-0.24 (0.19)	-0.04 (0.12)	-0.007 (0.09)	0.10 (0.19)
Education: 1=any and 0 =none	-0.17 (0.24)	0.05 (0.20)	-0.02 (0.13)	0.02 (0.15)	-0.13 (0.16)
Age of respondent (years)	-0.002 (0.002)	-0.002 (0.002)	-0.0007 (0.004)	-0.006 (0.003) **	-0.002 (0.006)
F test for Joint Significance of Village Fixed effects	-	5.18 (11,48) ***	-	62 (11,48) ***	5.8 (11,39) ***
Pseudo R square	0.22	0.23	0.21	0.22	0.24

1. \*\*\* indicates significance at 1 % level; \*\* significance at 5% level ; \* significance at 10% level
2. Weights correct for choice based sampling
3. Standard errors in parenthesis
4. Column I uses total land instead of log of land
5. Standard errors control for clustering at village level
6. Standard errors have been bootstrapped for columns II and IV due to the presence and control for endogeneity using 500 replications
7. Column I through IV look at the impact of women's participation and column V looks at impacts of men's participation on the outcome
8. Instrument used in columns II and IV are land eligibility rule interacted with village dummies

Table 5 Weighted Instrumental Variable Probit Estimates Using Village Fixed Effects: Impact of Married Women's Participation in Credit Programs on Seeking Assistance from Trained Birth Attendants			
Number of Observations	1028	1028	1028
Independent Variables	I Baseline Probits	II Women's decision to seek assistance from trained birth professionals	III Women's decision to seek assistance from trained birth professionals
Actual participation	-0.002 (0.22)	-	-
Predicted probability of participation interacted with income	-	0.009 (0.007)	-
Predicted probability of participation	-	-	0.085 (0.05) *
Education: 1= any 0= none	0.45 (0.18) ***	0.39 (0.20) **	0.39 (0.20) **
Log of total land owned by the household (in decimals)	0.03 (0.02)	0.03 (0.03)	0.03 (0.02)
Log of household expenditure (in <i>Takas</i> )	0.32 (0.13) **	0.16 (0.16)	0.16 (0.16)
Father's occupation: 1=small trade, service and business 0= agricultural	0.33 (0.19) *	0.15 (0.21)	0.15 (0.20)
Source of drinking water : 1= Hand pump in the house 0= source outside the home	- 0.37 (0.24)	0.09 (0.19)	0.09 (0.19)
Spousal age difference (age of male-age of female)	0.07 (0.02) ***	0.05 (0.02) ***	0.05 (0.02) ***
Distance to natal home (in kilometers)	0.002 (0.001) *	0.001 (0.002)	0.001 (0.002)
Children ever born	-0.08 (0.04) **	-0.08 (0.045) *	-0.08 (0.04) *
F test for joint significance of village fixed effects (degrees of freedom in parenthesis)	29.2 (17, 44) ***	33.2 (17, 44) ***	30.9 (17, 44) ***
Pseudo R square	0.34	0.35	0.35

Table 5  
Weighted Instrumental Variable Probit Estimates Using Village Fixed Effects: Impact of Married Women's  
Participation in Credit Programs on Seeking Assistance from Trained Birth Attendants

1. \*\*\* indicates significance at 1 % level; \*\* significance at 5% level ; \* significance at 10% level
2. Standard errors in parenthesis
3. Standard errors adjusted for clustering at village level
4. Weights correct for choice based sampling
5. Trained birth profession includes doctors, nurse and trained midwife. The reference category is if a woman was assisted by a female relative or a untrained birth attendant (*Dai*). 91% of the woman fell into the reference category.
6. Standard errors have been bootstrapped with 500 replications in Columns II and III

Table 6 Weighted Instrumental Variable Probit Estimates with Village Fixed Effects: Impact of Participation in Credit Programs on the Decision to Purchase Personal Clothing			
	n=1986	n=1986	n=1986
Independent variables	I Baseline Probits	II Decision to purchase a sari (1=woman has some or all say in the decision 0=spouse or other makes the decision)	III Decision to purchase a sari (1=woman has some or all say in the decision 0=spouse or other makes the decision)
Actual value of participation	0.23 (0.12)	-	-
Predicted probability of participation	-	-	0.78 (0.46) *
Predicted probability of participation interacted with log of income	-	0.09 (0.05) *	-
Log of household expenditure	0.13 (0.09)	0.12 (0.11)	0.13 (0.10)
Source of drinking water: 1=hand pump in the house and 0=source outside the house	-0.10 (0.15)	-0.19 (0.13)	-0.19 (0.13)
Toilet Facilities: 1 = sanitary or <i>Katcha</i> 0= none	0.39 (0.15) ***	0.23 (0.13) *	0.24 (0.14) *
Relation to the household head: 1= head and 0 =spouse, child, or parent sibling	0.29 (0.31)	0.08 (0.30)	0.08 (0.30)
Father's occupation: 1= small business, trade, services and 0= agricultural	0.24 (0.12) ***	0.28 (0.11) ***	0.29 (0.11) ***
Spousal age difference (age of male -age of female)	-0.01 (0.01)	-0.03 (0.01) **	-0.03 (0.01) **
Child under six years of age: 1= yes and 0= no	0.04 (0.10)	0.02 (0.11)	0.02 (0.11)
Education : 1=any and 0 =none	0.24 (0.14) *	0.25 (0.12) **	0.25 (0.12) **

Age of respondent (years)	-0.007 (0.004) *	-0.005 (0.003)	-0.005 (0.003)
Spouse lives in the Household : 1= yes and 0= no	-0.08 (0.19)	-0.02 (0.14)	-0.01 (0.14)
F test for joint significance of village fixed effects (degrees of freedom in the parenthesis)	37.6 (12,41) ***	43.4 (12,41) ***	45 (12,41) ***
Pseudo R square	0.13	0.15	0.15
Bollen test for endogeneity: significance of the residual		-0.18 (0.08) **	

1. \*\*\* indicates significance at 1 % level; \*\* significance at 5% level ; \* significance at 10% level
2. Weights correct for choice based sampling
3. Standard errors have been bootstrapped for columns I and I due to the presence and control for endogeneity using 500 replications
4. Standard errors in parenthesis
5. Column I uses total land value instead of log of land
6. Standard errors control for clustering at village level

These options are comparable in costs as they start with the same initial capital to be invested in alternative uses	Baseline value of predicted probability of demand for quality health care for all adults	Simulated predicted probability of demand for quality health care for all adults	Percentage Increase
<b>Option 1:</b> Increasing female participants by 20% and giving them 3,000 <i>takas</i> each of loan (women randomly drawn from the sample on non-participants)	0.4797	0.4974	3.7 %
<b>Option 2:</b> Setting up health infrastructure in 2 villages	0.4797	0.4957	3.4 %

### References

1. Acton, P. 1975. "Non-Monetary Factors in the Demand for Medical Service: Some Empirical Evidence". Journal of Political Economy. 83:595-614.
2. Akin, John., Charles C. Griffen, David Guilkey & Barry Popkin. 1985. *The Demand for Primary Health Services in the Third World*. Totawa: N.J.
3. Amin, Sajeda & Anne R. Pebley. 1990. "Gender Inequality Within Households: The Impact of Women's Development Program in 36 Bangladeshi Villages". Office of Population Research, Princeton University: Princeton, NJ.
4. Amin, Sajeda. 1996. "Family Structure and Change in Rural Bangladesh". Working paper No. 87. The Population Council: New York.
5. Angrist, J. D., Guido W. Imbens & Donald B. Rubin. 1996. "Identification of Causal Effects Using Instrumental Variables". Journals of American Statistical Association 91(434): 444-472.
6. Balk, Deborah. 1994. "Individual and Community Aspects of Women's Status and Fertility in Rural Bangladesh". Population Studies. 48:21-45.
7. Bang, R. & A. Bang. 1995. "Women's Perceptions of White Vaginal Discharge: Ethnographic Data from Rural Maharashtra". In Gittlesohn Joel et al. eds. *Listening to Women Talk About their Health. Issues and Evidence from India*. Har-Anand Publications: New Delhi, India.
8. Basu, A.M. 1990. "Cultural Influences on Health Care Use: Two Regional Groups in India". Studies in Family Planning 21(5):275-286.
9. Batliwala, S. 1994. "The Meaning of Women's Empowerment: New Concepts and Action" in Gita Sen, A. Germain and L. Chen (eds.) *Population Policies Reconsidered: Health Empowerment, and Rights*. Harvard University Press: Cambridge MA.
10. Becker, G. 1965. "A Theory of the Allocation of Time". Economic Journal. 75:493-517.
11. Behrman, Jere R. & Barabara L. Wolfe. 1987. How Does Mother's Schooling Affect Family Health, Nutrition, Medical Care Usage, and Household Sanitation?. In *Handook of Development Economics*. Vol 2. Elsevier Science Publishers: North Holland.
12. Blumberg, R.L. 1991. Income under Female versus Male Control: Hypotheses from a theory of gender stratification and data from the Third World. In *Gender, Family, and Economy*. ed. R. L. Blumberg. Newbury Park, Calif., USA: Sage.

13. Bound, J., David A. Jaeger & Regina M. Baker. 1995. "Problems With Instrumental Variables Estimation When the Correlation Between the Instrumental and the Endogenous Explanatory is Weak". Journal of the American Statistical Associations. 90(43): 443-451.
14. Bollen, Kenneth A., Guilkey, David K. & Thomas A. Mroz. 1995. "Binary Outcomes and Endogenous Explanatory Variables: Tests and Solutions with an Application to the Demand for Contraceptive Use in Tunisia". Demography. 32(1): 111-131.
15. Bruce, J. 1989. "Home Divided". World Development 17(7): 9979-91.
16. Bruce, J & D. Dwyer, 1989. *A Home Divided: Women and Income in The Third World*. Stanford University Press, CA.
17. Caldwell, J. 1982. "Education and Fertility: An Expanded Examination of the Evidence." in G.P. Kelly and C.M. Elliot eds. *Women's Education in the Third World: Comparative Perspectives*. SUNY Press: Albany, NY.
18. \_\_\_\_\_. 1986. "Routes to Low Mortality in Poor Countries". Population & Development Review. 12(2): 171-220.
19. Chen M. 1989. *A Quiet Revolution: Women in transition in Rural Bangladesh*. BRAC Prokashana, Dhaka, Bangladesh.
20. DasGupta, Monica. "Life Course Perspectives on Women's Autonomy and Health Outcomes" American Anthropologist 97(3): 481-491.
21. Desai, Sonalde & D. Jain. 1992. "Maternal Employment and Changes in Family Dynamics: The Social Context of Women's Work in Rural South India." International Center for Research on Women: Washington D.C.
22. Degraff Deborah S., Richard E. Bilsborrow, and David K. Guilkey. 1997. "Community-Level Determinants of Contraceptive Use in The Philippines: A Structural Analysis." Demography 34(3):385-398.
23. Diop, Francois. 1990. *Economic Determinants of Child Health and the Utilization of Health Services in Sub-Saharan Africa: The case of the Ivory Coast*. Dissertation, Johns Hopkins University: Baltimore, Maryland.
24. Dreze, J. & A .K. Sen. 1995. *India: Economic Development and Social Development*. Oxford University Press: Oxford U.K.
25. Donabedian. 1988. "The Quality of Care. How can it be Assessed." Journal of American Medical Association. 260(12).

26. Dyson, T. & M. Moore. 1983. "On Kinship Structure, Female Autonomy, and Demographic Behavior in India". Population & Development Review.9(1): 35-60.
27. Friedlander D. & Philip K. Robins. 1995. Evaluating Program Evaluations: New Evidence on Commonly Used non Experimental Methods. American Economic Review. Vol. 85 No.4.
28. Gage, A.J. 1994. "Women's Socioeconomic Position, Contraceptive Use and Fertility Preferences." Paper presented at the Population Association of America: Miami, Florida: 1-41.
29. Gertler, Paul & J. van der Gaag. 1990. "The Willingness to pay for Medical Care." The Johns Hopkins University press: Baltimore, Maryland.
30. Goetz A & Rina Sen Gupta. 1994. "Who Takes the Credit? Gender, Power and Control Over Loan Use in Rural Credit Programs in Bangladesh." Institute of Development Studies, Sussex UK.
31. Greene, W H. 1993. *Econometric Analysis*. Second Ed. Macmillan Publishing: New York.
32. Grossman, M. 1972. "On the Concept of Health Capital and the Demand for Health". Journal of Political Economy. 80:223-255.
33. Guyer, J. 1980. Household Budgets and Women's Income. African Studies Center Working Paper 28. Boston, Mass., USA: Boston University.
34. Hashemi, Syed M., Sidney R. Schuler & Ann P. Riley. 1995. "Rural Credit Programs and Women's Empowerment in Bangladesh". Mimeograp, John Snow Inc: Arlington.
35. Heckman James J. & Joseph V. Hotz. 1989. "Choosing Among Alternative Nonexperimental Methods for Estimating the Impact of Social Programs: The Case of Manpower Training." Journal of the American Statistical Association 84: 408.
36. Heckman James. 1990. "Selectivity Bias: New developments." American Economic Association papers and proceedings.
37. Heller, Peter. 1982. "A Model of the Demand for Medical and Health Services in Peninsular Malaysia". Social Science & Medicine 16: 267-284.
38. Hodgkin, Dominic. 1996. "Household Characteristics Affecting Where Mothers Deliver in Rural Kenya". Health Economics. 5:333-340.
39. Jacobson, J. 1993. "Women's Health. Price of Poverty" in Koblinsky, M., Judith Timyan & Jill Gay (eds.). 1993. *The Health of Women: A Global Perspective*. Westview Press: Boulder.

40. Jejeebhoy, S. 1996. "Women's Autonomy and Reproductive Behavior in India: Linkages and Influences of Sociocultural Context." Paper presented for the Seminar on Comparative Perspectives on Fertility Transition in South Asia: Islamabad, Pakistan.
41. Kabeer, N. 1995. *Reversed Realities: Gender Hierarchies in Development Thought*. London, U.K: Verso.
42. Khandker, Shahidur R., Zahed Khan & Baqui Khailly. 1994. "Sustainability of a Government-Targeted Credit Program: The Bangladesh Rural Development Board Rural Development 12 Project in Bangladesh." Mimeograph. The World Bank: Washington D.C.
43. Khandker, S and M. Abdul Latif 1996. "The Role of Family Planning and Targeted Credit Programs in Demographic Change in Bangladesh." World Bank Discussion paper # 337. The World Bank: Washington D.C.
44. Kishor, S. 1995. "Autonomy and Egyptian Women: Findings from the 1988 Egypt Demographic and Health Survey". Macro International Inc.: Calverton, Maryland.
45. Kloos, H., A. Etea, A. Degefa, H. Aga, B. Solomon, K Abera, A. Abegaz, & G.Belemo. 1987. "Illness and Health Behavior in Addis Ababa And Rural Central Ethiopia." Social Science & Medicine. 25(9): 1003-1019.
46. Koblinsky, M., Judith Timyan & Jill Gay (eds.). 1993. *The Health of Women: A Global Perspective*. Westview Press: Boulder.
47. Kroeger, Axel. "Anthropological and Socio-Medical Health Care Research in Developing Countries". Social Science & Medicine. 17(3): 147-161.
48. Levin, Ann. 1994. "The Effects of Differential Preferences in the Household on the Demand for Maternal Health Care". Doctoral Dissertation, Johns Hopkins University.
49. Maddalla, G.S. 1994. *Limited Dependent and Qualitative Variables in Econometrics*. (First Published in 1983). Cambridge University press, Cambridge.
50. Mahmud, S. 1991. "Current Contraception Among Programme Beneficiaries." *Bangladesh Institute of Development Studies* 13(3): Dhaka, Bangladesh.
51. Mahmud, S & Anne M. Johnson. 1994. "Women's Status, Empowerment, and Reproductive Outcomes" in Gita Sen, A. Germain and L. Chen (eds.) *Population Policies Reconsidered: Health Empowerment, and Rights*. Harvard University Press, Cambridge MA.
52. Mahmud, S. & Samiha Huda 1997. "Group Characteristics and Individual Behavior: Data from the BRAC-ICDDR project in Matlab, Bangladesh." Paper presented at a seminar hosted by The Population Council, New York, 15<sup>th</sup> December.

53. Mason, Karen O. 1986. "The Status of Women: Conceptual and Methodological Issues in Demographic Studies." Sociological Forum 1 (2): 284-300.
54. Mayoux, L. 1995. "From Vicious to Virtuous Circles? Gender and Micro-Enterprise Development." United Nations Research Institute for Social Development: Geneva.
55. Mencher, J. 1989. Women's Work and Poverty: "Women's Contribution to Household Maintenance in South India" in Daisy Dwyer and Judith Bruce (eds.), *A Home Divided: Women and Income in The Third World*. Stanford University Press, CA.
56. Moffitt, Robert. 1991. "Program evaluation with non-experimental data." Evaluation Review. Vol. 15 No. 3: 291-314.
57. Mooney C. Z. & Robert D. Duval. 1993. *Bootstrapping: A Non Parametric Approach to Statistical Inference*. Sage University Press. London.
58. Mosley W.H. and L. Chen. 1984. "An Analytic Framework for the Study of Child Survival" . Population & Development Review. 10:3-24.
59. Pitt, M., M. Rosenzweig, and M.D. Hassan. 1990. Productivity, Health, and Inequality in the Intrahousehold Distribution of Food in Low Income Countries. American Economic Review 80:1139-1156.
60. Pitt, Mark M. & Shahidur Khandker. 1997. "The Impact of Group Based Credit Programs in Poor Households in Bangladesh: Does the Credit of the Participant Matter?". Paper presented at a seminar at The Population Council, New York, 15<sup>th</sup> December.
61. Pitt, Mark M. & Shahidur Khandker, Signe-Mary McKernan & M. Abdul Latif. 1995. "Credit Programs for the Poor and Reproductive Behavior in Low Income Countries: Are the Reported Causal Relationships the Result of Heterogeneity Bias?". PSTC Working Paper Series #95-04, Brown University, Rhode Island.
62. Piwoz, E. G. & Fernando E.Viteri. 1985. "Studying Health and Nutrition Behavior by Examining Household Decision-Making, Intra-Household Resource Distribution, and the Role of Women in the Processes". Food and Nutrition Bulletin 7(4): 1-30.
63. Rahman, M. & Julie DaVanzo. 1997. "Influence of the Grameen Bank on Contraceptive Use in Bangladesh". Draft paper presented at a seminar hosted by The Population Council, New York, 15<sup>th</sup> December.
64. Rahman, R. I. 1986. "Impact of Grameen Bank on the Situation of Rural Poor Women". Working Paper #3, Grameen Bank Evaluation Project. Bangladesh Institute of Development Studies: Dhaka, Bangladesh.

65. Rosenzweig, Mark R. & T. Paul Schultz. 1982. "Market Opportunities, Genetic Endowments, and Intrafamily Resource Distribution: Child Survival in Rural India". American Economic Review. 72(4): 803-815.
66. Rosensweig, Mark R. 1986. "Program Interventions, Intrahousehold Distribution and the Welfare of Individuals: Modeling Household Behavior". World Development. 14(2): 233-243.
67. Rosenzweig, Mark R. & T. Paul Schultz. 1987. "Fertility and Investments in Human capital".
68. Schuler, Sidney R. & Syed Hashemi. 1994. "Credit Programs, Women's Empowerment, and Contraceptive Use in Rural Bangladesh". Studies in Family Planning 25(2): 65-76.
69. Schuler, Sidney R., Syed Hashemi & Ann P. Riley. 1997. "The Influence of Women's Changing Roles and Status in Bangladesh's Fertility Transition: Evidence from a Study of Credit Programs and Contraceptive Use". World Development. 25(4): 563-575.
70. Schuler, Sidney R., Syed Hashemi & Ann P. Riley. 1997. "Men's Violence Against Women in Rural Bangladesh: Undermined or Exacerbated by Microcredit Programs?" Paper presented at the 1997 Population Association of America Annual Meetings: Washington D.C.
71. Schultz, T. Paul. 1990. Testing the Neoclassical Model of Family Labor Supply and Fertility. Journal of Human Resources. 25 (4): 599-634.
72. Sen, A.K. 1990. Gender and Cooperative Conflicts. In *Persistent Inequalities: Women and World Development*, ed. I. Tinker. New York, Oxford University Press.
73. Strauss, J. and Duncan Thomas. 1994. Human Resources: Empirical Modeling of Household and Family Decisions. Labor and Population Program. RAND Working Paper 94-07.
74. Stein, J. 1997. Empowerment and Women's Health: Theory, Methods, and Practice. London: Zed Books.
75. Thaddeus, S. & D. Maine. 1994. "Too far to Walk: Maternal Mortality in Context". Social Science & Medicine. 38(8): 1091-1110.
76. Thomas, D. 1990. Intra-household Resource Allocation: An Inferential approach. Journal of Human Resources. 25 (4): 635-664.
77. Thomas, D. and Lincoln Chen. 1994. "Income Shares and Shares of Income: Empirical tests of models of household resource allocation." RAND Working Paper 94-08.
78. Thomas, D. and John Strauss. 1995. Health, Wealth and Wages of Men and Women in Urban Brazil. Labor and Population Program. RAND Working Paper Series 95-11.

79. Tinker, Anne. 1996. "Improving Women's Health in India." The World Bank: Washington D.C.
80. Tinker, Irene. 1990. "The Making of a Field and for the Book". In *Persistent Inequalities. Women and World Development*, ed. I. Tinker: 27-53. Oxford: Oxford University Press.
81. Whitaker, C. 1996. The Impact of Women's Participation in an Income Generating Project in South Western Tanzania. Dissertation, Johns Hopkins University: Baltimore, Maryland.
82. Wong, E. L., Barry Popkin, David Guilkey & John Akin. 1987. "Accessibility, Quality of Care and Prenatal Care in the Philippines". Social Science & Medicine. 24(11): 927-944.
83. Wallerstein, N. 1992. Powerlessness, Empowerment and Health: Implications for Health Promotion Programs. Behavior Change 6(3):197-205.
84. Yunus, Muhammad. 1984. "On reaching the Poor". Paper presented at the IFAD Project Implementation Workshop, New Delhi: April.
85. Zimmerman, M.A. 1990. "Toward a Theory of Learned Hopefulness: A Structural Model Analysis of Participation and Empowerment". Journal of Research in Personality. 24:71-86.