JOURNAL OF ECONOMIC DEVELOPMENT
Volume 12, Number 1, June 1987

Women's Role in Household Productive Activities and Fertility in Bangladesh

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Female status may not be directly observable, although its various indicators are. However, the distinction between the endogenously and exogenously determined indicators of female status is important. When female labor force participation is an indicator of female status, simple correlations between female status and fertility should not be interpreted as causal. Both are choice variables; hence we do not know what causes what. However, if female status is predetermined by variables such as woman's education, the association between woman's education and fertility may indicate causality between woman's status and fertility.

In a rural setting where women are involved in a variety of productive activities both inside and outside home, women's time-use patterns in general may be good indicators of women's status both in terms of women's participatory role in household decision-making and the extent of their control over economic resources. However, the linkage from time-use to fertility through female status is not causal, but is jointly determined by a common set of exogenous variables.

An analysis of data from Bangladesh suggests that there are normal effects of assets, income, and prices on a woman's time allocation and her fertility decisions, thereby suggesting that these outcomes are not totally preordained by society but are affected by economic constraints on the individual household. Human capital variables, such as woman's education, have a strong effect on woman's fertility and work decisions, and are, therefore, potentially important policy instruments. Market interventions which raise wages, however, appear to have little immediate effect on fertility decisions, although they raise the return to education, which may effect female status over a longer time horizon.

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members for agrarian economies (Evenson), no study to my knowledge has yet explored women's time-use patterns, fertility and female status in the same framework.

The paper is organized in the following order. Section II briefly discusses the possible linkages between female status, fertility, and time-use patterns of women in a developing country, such as Bangladesh. Section III briefly reviews the literature concerning the hypotheses discussed in section II. Section IV examines data that have recently been collected from Bangladesh which will be used to test empirically the hypotheses of this paper. Section V outlines the economic framework that will be utilized to test the hypotheses. Section VI reports the results of econometric estimates of the model. Finally, the policy prescriptions inferred from the empirical results are discussed in the concluding part of the paper.

II. Relationship between Female Status, Fertility, and Time-Use Pattern: A Conceptual Framework

The paper argues that female time-use patterns may be a manifestations of women's status in the family and society, since the allocation of time to different activities is an indication of how women are involved in a hierarchy of productive activities, which in turn may imply their participatory role in household decision-making and control over economic resources. The contention is that since there are many ambiguities involved in defining "female status" (Mason), measures such as housewife's time-use patterns and the character of her productive role in the family may be reasonable proxies for female status in society. Moreover, observed fertility may be considered another manifestation of woman's status in the family, one that is influenced by her ability to plan and control her childbearing.

Time-use and fertility, although two different dimensions of women's status, are likely to be interrelated and perhaps linked to a common set of exogenous constraints that characterize the environment and endowments of the family and community. In other words, if the time-use pattern of a housewife is determined by background characteristics such as landholding, schooling, and household composition, then her fertility, another dimension

variables (Mason). One such intermediate determinant is woman's age at marriage. Evidence suggests that in many developing countries women's age at first marriage is inversely correlated to completed fertility, presumably because it reduces women's exposure to the risk of pregnancy (Caldwell 1983; Chaudhury and Ahmed). Most studies suggest that "women's opportunities for economic self-support," which are influenced by women's education, are important in the determination of women's age at marriage. Although female education may be an endowment, there are community factors such as schooling facilities and non-familial income earning opportunities which also influence women's opportunities for economic self-support.

Among other intermediate determinants of fertility, factors such as costs of children, value of children, and sex preferences, are important, because they may also be influenced by a number of socio-economic constraints that directly or indirectly have implications for female status (Mason).

In rural Bangladesh where the roles of women are mostly domestic and may be determined by social customs, religion, and above all "patriarchal structure," the opportunity costs of children in terms of female wage income forgone are negligible. Direct costs, however, are not. Evidence suggests that the economic value of children, particularly male children, in terms of their return to the family as adults tends to offset the cumulative costs incurred by parents in raising them (Cain 1977). This suggests that it is not the costs of children *per se* but the value of children as perceived by parents that is important for the demand for children. Husband and wife, however, may not demand children for the same reasons but for reasons that may promote his or her self-interest.

In rural Bangladesh, "male dominance is grounded in control of material resources and supported by interlocking and reinforcing elements of the kinship, political, religious, and economic systems" and "powerful norms of seclusion extend to labor markets, severely limiting women's opportunities for independent income generation" (Cain 1984, p. 26). Women's economic dependence on men is the ultimate consequence of what Cain coined "patriarchal structure." In such a setting, a woman may demand children for reasons related to her economic dependence on men, something in turn related to her status in the family and

duction that has no apparent market value by referring to wages received by women in similar activities outside home. However, market wages observed for women working in non-familial activities may be poor indicators of why other women predominantly work in the home in what have been called expenditure-saving activities. The reason for this is that sex segregation may exist in the labor market which may depress women's wages so that women will devote an inefficiently large amount of time to home production (Buvinic). Thus, patriarchy[6], which sets a high cultural value on housework in many traditional societies, may be the determining factor for women's time allocation (Hartmann; Cain, et al.). This suggests that a woman's time allocation is determined not by her choice but by the choices of her husband and the society.

The above argument need not be a universal one when even in rural Bangladesh there are cross-sectional variations in time-use patterns of women involved in productive activities[7]. I assume that patterns of women's work in terms of their time allocation to different productive activities (including housework) can be categorized into several "occupational" groups which may be indicative of their status. I argue that women's time allocation to productive activities is not entirely determined by the society nor alone by market forces such as women's wages, but by a variety of factors, including (1) woman's own endowments, such as education and earning potential, (2) family endowments, and (3) local markets and community-level variables. Thus, the hypothesis is that both fertility and women's time allocation, which are two dimensions of female status in the family, may be jointly explained by the same individual, household, market, and community factors. The idea behind this hypothesis is that human capital as well as community variables can explain cross-sectional variations in women's time-use patterns and fertility in Bangladesh. Having discussed the motivation that has led to this paper, let me turn now to the data that will be utilized to empirically test these hypotheses.

6 Cain, et al. (1979, p. 406) define "patriarchy" as a set of social relations that "describe a distribution of power and resources within families such that men maintain power and control of resources, and women are powerless and dependent on men."

7 In fact, sex segregation patterns in labor markets that are cultural in origin may break down in the face of changes in labor market demand (Youssef, et al.). Thus, many developing countries women are increasingly found to participate in market-oriented activities as development proceeds. Data collected recently from rural Bangladesh and used in this paper show such a trend in women's work patterns.

children who, however, mostly work in family enterprises or enterprises owned by others (BIDS).[10] Thus, as a follow-up, the "Women's Entreprenurial Development Project" (WEDP) was implemented in 1982-83 by the Bangladesh Small and Cottage Industries Corporation and funded by the Bangladesh *Krishi* (agricultural) Bank and USAID, Dhaka, to promote women's entrepreneurship in non-farm activities, initially in eight Upazilas of Bangladesh. I have sampled from three of these eight Upazilas exposed to the WEDP programme, including 149 households who were chosen randomly but selected because both household head and housewife were available and willing to be interviewed by the interviewers during a single data collection period. From the remaining three Upazilas, which were not exposed to WEDP, 105 households were sampled randomly, again on the basis that both husband and housewife were willing to be interviewed during the interview period. The distribution of sample households by Upazila is shown in Table 1.

Table 1

DISTRIBUTION OF HOUSEHOLDS BY UPAZILA AND DISTRICT

District	Upazila	No. of Unions	Old samples	New samples	Total
Dhaka	Baidyerbazar (Non-WEDP)	2	91	8	99
Tangail	Ghatail (Non-WEDP)	1	145	2	147
Rangpur	Kownia (WEDP)	2	0	25	25
Jamalpur	Sherpur (WEDP)	6	0	96	96
Comilla	Laksam (WEDP)	2	0	28	28
Rangpur	Kotwali (Non-WEDP)	3	0	50	50
Pabna	Ishardi (Non-WEDP)	2	0	28	28
Bogra	Gabtali (Non-WEDP)	2	0	27	27
Total	8 Upazilas	20	236	264	500

[10] The Bangladesh Institute of Development Studies (BIDS) conducted this study which reported that more than one-third of all workers in the rural industries were found to be women, of which about 84 percent were unpaid family helpers (BIDS).

Table 2

DISTRIBUTION OF WOMEN ACCORDING TO TIME ALLOCATION PATTERNS

Primary role	Secondary role							Total obs
	House-work	Family-farming	Self-emp. business	Handi-crafts	Poultry-raising	Non-agr. wage	Sewing	
Housework	26	251	8	34	6	15	2	342
Self-employed business	3	0	0	0	0	0	0	3
Salaried services	92	0	0	2	0	0	1	95
Handicrafts	30	2	0	0	0	0	0	32
Teaching	21	0	0	0	0	0	0	21
Non-agricultural casual wage work	3	0	0	0	0	0	0	3
Rice husking*	1	0	0	0	0	0	0	1
Sewing*	1	0	0	0	0	0	0	1
Total obs.	177	253	8	36	6	15	3	498

* Rice husking and sewing can be part of housework women do for their families; however, these are treated as separate income-generating activities when women do them on a commercial basis for earning income.

family farm, not necessarily in the field, but possibly in operations done at home after harvesting, such as threshing, drying, winnowing, and sifting paddy. This work falls under the rubric of food processing, food preservation, and storing and is considered to be unpaid productive work. These activities may also include kitchen gardening, tending domestic animals or raising poultry on a commercial basis. *Family non-farming* includes those activities done primarily by the family at home where a woman can work as a partner or an unpaid family worker, such as self-employed in a family business, sewing, handicrafts, or rice husking. Finally, *non-agricultural work outside the home* or simply *market work for cash* include those activities that require women to work outside the home, such as teaching, non-agricultural casual wage work, and other salaried services available because of rural development programmes.

The time-use data in Table 2 may be classified under these

Under the assumption that housework and work outside home for cash may be incompatible, I retain the fifth category. Thus, there are three categories of women's time-use patterns as compared to five categories initially classified. I assume that these three categories of time-use patterns are the relevant time-use patterns of women that I am going to analyse in the context of fertility and female status.[12] Moreover, I assume that while female status is not directly observable, it is reflected in the time-use patterns which underlie these three categories of women's work in rural Bangladesh.[13]

Table 3 also shows that birth rates and women's economic activity have negative partial correlations. However, as indicated in the beginning of this paper, this simple association does not indicate causality. Since both female economic activity and fertility are choice variables, one need to formulate the problem in a framework where both these variables are jointly determined by a common set of exogenous variables. The household production model employed in the analysis of fertility and related investment behavior can provide such a framework.[14]

V. The Model and its Specifications

The model developed, for instance, in Ben-Porath (1973) and Willis (1973) can be adopted to examine the relationship between female economic activity and fertility for housewives in rural

[12] Separate regressions for five categories of time-use patterns were run which showed that the data can be aggregated across activity groups along these lines without loss of explanatory power.

[13] The time-use patterns organized in this way may imply some form of female status in terms of woman's control over economic resources and hence less economic dependence on man as she moves from complete unpaid family farm work (income generated therein mostly goes for family consumption) to more market-oriented activities. This pattern may also imply some degree of incompatibility between work and on-job childcaring.

[14] The household production model approach has been criticized on the ground that it bypasses the problem of defining female status in the household by assuming that husbands and wives reach decisions without any conflict and that the wife's earned income is a component of family's budget irrespective of whether or not she has any control over the family's resources (Mason). The mere existence of family units is itself an indication that husbands and wives at least avoid confrontation in household decision-making so that the household model may be applicable.

similar reaons, husband's education and amount of resources he brought to the marriage may affect woman's current time-use pattern. In addition to education and resources brought to marriage, I include woman's age to see if this demographic characteristic has any effect on women's time-use patterns in Bangladesh.

Household variables affecting women's time use include the household's one income — earning asset — livestock.[15] This important factor of agricultural production may or may not be jointly controlled by husband and wife. This variable may act as a proxy for an asset effect or non-labor income effect on women's time-use as well as fertility in rural Bangladesh.

Market and community factors include wages and other prices determined by market forces or community characteristics. The latter include household's proximity to community services (schooling, health, and banking services) on the assumption that access to these services and community markets determines implicit prices of many goods and services the household uses for home production and consumption. However, these prices should be measured at a level of aggregation above the household to ensure that they are exogenous to the household's behavioral outcomes (Schultz). Market-determined prices in my study are community wage rates of three categories of labor: adult male, adult female, and child labor.[16] Household residential characteristics that represent household accessibility to private and public services will proxy price variation that may be considered exogenous to the household. The data in this category primarily consist of household distance(s) to the nearest health center and family planning unit, educational institution, and financial institution (bank). Women's time use patterns and fertility are thus assumed

15 One may prefer to use land instead of livestock as a measure of non-labor income. However, to the extent that both these resources tend to be highly correlated, the effect of any of these measures will indicate the anticipated effect of this asset variable.

16 An alternative technique is to estimate earnings for the subsample of women working in the modern sector and on this basis predict a wage offer for women not working in the modern sector. This is precisely the Heckman type selection problem in estimating female labor supply to market activities (Heckman 1974, 1979). This method will generate inconsistent parameter estimates if the two subsamples differ in unmeasured characteristics. Using community wage rates bypasses the selectivity problem by assuming that every woman faces these wage rates irrespective of her ability, education, and experience, thereby implying that the rate of return on human capital investment is zero.

E_m = years of completed schooling of the husband
R_m = premarriage assets of the husband
D = dowry to husband from the wife's parents
I = Non-labor income (value of livestock)
S = distance to school
H = distance to health center
B = distance to bank
W_m = community-level agricultural wage for adult male labor
W_w = community-level agricultural wage for adult female labor
W_c = community-level agricultural wage for child labor
a_{ij} = coefficients to be estimated, $i = 1 \ldots 4; j = 0.1, \ldots 12$
e_i = relevant error terms, $i = 1 \ldots, 4$

The effects of these exogenous variables on time allocation and fertility are a priori ambiguous (i.e., in which direction they affect the choice variables), because the substitution and income effects produced therein often tend to work against each other. For example, an increase in women's market wage rate may lead to an increase in time allocation of housewife to market income-earning activity if the positive income effect dominates the negative substitution effect. Its effect on the desired number of children, however, depends on the intensity of wife's time in child services relative to other commodity services. This has a number of implications for LDC context studies in terms of the compatibility between market work and childcare (McCabe and Rosenzweig 1976). In particular, an increase in women's market wage may lead to an increase in female participation in the market work without any or even with positive effect on fertility, because of the possibility that market employment and childcare may be compatible.[18] Having specified the model, the next stage is to implement the framework.

18 The extent of compatibility between childcare and work for market income depends on a number of factors such as possibility of rearing children by older children and or relatives, or by mother's surrogates such as maidservant, and possibility of occupation that renders some degree of compatibility between on-job childcare and work without any adverse effects on market productivity.

efficient estimates for time-use equations.[19] The results of the multiple logit technique for the three time-use equations and the OLS estimates of fertility equation are reported in the Table 5.

Table 5 shows that many of the explanatory variables in the time-use regressions have significant power in predicting the probability of a woman being in a particular group with the specified characteristics, although fewer of them have significant effects on fertility. I will discuss these estimates one by one in the following paragraphs.

The woman's age is significant in predicting that relatively younger woman is more likely to be involved in income-producing activity at home, while relatively older woman does either mostly housework or participate in market work for cash income. Participation of relatively older women in market work may indicate that there is a social taboo against relatively younger women working outside home for cash income in rural Bangladesh. Of course, there may be other explanations, such as labor market queuing, for this differences in age-specific job patterns.

Potentially the most important factor causing variation in women's status, as many social scientists have emphasized, is education level. Table 5 confirms that women's education plays an important role in determining participation in market work relative to family farm work and also to family non-farm work. In other words, the higher the education of a woman, the more likely it is that she will work outside her home for income. At the same time, education's negative effect on fertility is also notable. An increase of one year education of woman will reduce the age-adjusted fertility by 3.1 percent. The effect of education is to reduce family size, perhaps because it increases the probability of participating in work outside the home and it enables woman to plan and control her childbearing.

[19] Statistical analysis of models in which the endogenous variables are qualitative is viewed as a problem of predicting probabilities for the possible responses of the qualitative dependent variables (Maddala). When the possible responses for the qualitative variable assume multiple values, the OLS method if applied will produce estimates that suffer from two possible errors: one is heteroskedasticity and the other is the probability that the predicted probabilities of falling into these multiple groups will be negative or greater than one. Thus, the econometric method required to estimate such multinomial functions where the responses are more than two, and the explanatory variables are continuous, is the maximum likelihood method as discussed in Nerlove and Press.

Conversely, the effect of husband's education has a negative effect on woman's work outside her home and a positive effect on fertility. These results show that the higher the level of husband's education, the more likely that the woman will work only at family farming and housework and the less likely that she will engage in income-producing non-farming activities, either at home or outside home. However, the negative husband's education effect on wife's participation in market work, relative to family non-farm work, is not significant. Its positive effect on fertility is also not significant. The effect of husband's education may reflect the effect of husband's earnings on woman's time-use patterns, and hence the results are consistent with other findings (Gronau). The effect of the husband's premarriage assets on wife's time-use patterns has similar implications, although the effects are significant and positive for fertility. Since assets in rural Bangladesh are mostly land, its effect on women's time-use patterns is to increase the productivity of home production activities relative to off-farm activities. The effect of (land) assets on fertility is positive, implying that husbands who bring greater assets to their marriage have a larger family in rural Bangladesh. This can be interpreted as an income effect; if children are costly to rear, higher income increases the ability to raise more of them. It could also be a price effect: more family land and productive assests increase the marginal product of own children in a regime where child labor is not readily exchanged and monitored beyond the family farm.

To the extent that wife's dowry represents the social prestige of the bride's father in the society, it may partially measure the power of the wife to control her husband's actions later in married life or her influence in household decision-making. According to these estimates, a larger dowry increases the probability of working at home and on the farm and reduces the probability of market work. Thus, it operates as a wealth effect — women with large dowries are less likely to engage in non-familial market activities. Its effect on fertility decision, although positive, is not conclusive.

The effect of a household asset such as livestock is clear-cut. Livestock, which includes both draft (bullocks) and non-draft (cows, goats, sheep) animals, increases the probability of women engaging in housework and family farming. This may be explain-

fants without inducing a corresponding decline in birth rates (which is possible if rural households do not know how to regulate fertility or there are incentives not to do so), thereby increased the completed fertility of most rural women. This interpretation is supported by the positive (although not significant) effect of health services on fertility. In this case, woman will be preoccupied with child care as more children survive and will consequently display a higher probability of working in the home and in family enterprises, or activities that do not interfere with taking care of her children and, on the other hand, may provide employment opportunities for her young children. Thus, joint production of market income and child services is possible.

The effects of financial institutions in terms of financing rural income-generating activities in which women can participate seem to increase the probability of working in non-farm activities either at home or outside home relative to family farm work, although these effects are not significant. The effect of banks on fertility is also not conclusive, although the positive (insignificant) effect on births seems consistent with this pattern of women's work.

I turn next to the community wage regressors of three categories of agricultural laborers.[20] The wage data in my regression is the union-level average for each type of labor. The differences between the three categories of wage rates as documented in Table 4 suggests that age-sex differences exists in the rural labor market which is also consistent with other findings (Cain 1977), However, the wage rates of female and child labors in agriculture will be influenced by the movement in male wage rate, to the extent that they are partial substitutes for each other in production. With knowledge of the risk of multicollinearity among these three wage measures, let me propose a tentative explanation of the wage effects.

The effects of adult male wage rate are to increase the probability of women undertaking more family farming activity than

20 Only agricultural wages and not non-agricultural wages are included on the assumption that both these wages move in the same direction. In fact, one study showed that agricultural and non-agricultural wages move in the same direction but with a lag (Papanek). Alternatively, one may use predicted wages based on the estimated wage offers for women working outside home. This approach may also be inconsistent, given my data characteristics (see footnote 16).

status and fertility cannot be viewed as causal, unless the measure of status is predetermined. Thus, when female status is defined in terms of women's time-use patterns, it is important to recognize that female status and fertility are not independently determined but rather jointly determined by a common set of explanatory variables.

The Bangladesh data show that there are normal effects of assets, income, and prices on a woman's time allocation and her fertility decisions: these outcomes appear not to be totally preordained by society, but are affected by economic constraints on the individual household. In particular, the effects of female education and women's wage on fertility deserve special attention, because concrete policy implications may follow from their influence on fertility and women's time-use patterns.

The results in Table 5 show that female participation in more formalized economic activities, which is facilitated by an increase in female education level, has a significant negative effect on fertility. But participation made possible by increased opportunities for women's gainful employment in economic activities, due to changes in labor market demand conditions, may or may not reduce fertility. The juxtaposition of these two causal effects on fertility may be understood in this way. Female education may help women participate in more formalized economic activities as well as enable them to plan and control their childbearing, while participation due to changes in labor market demand, with no gain in formal education, may not reduce fertility because it may not provide them with required control over their childbearing decisions. Moreover, female participation in market-oriented activities due to increases in market wages may occur mostly in family non-farm enterprises, activities that do not interfere with woman's childbearing role nor with her housework role. Non-farm enterprises may also permit gainful involvement of young children, which may increase incentives for higher fertility. These will be more clear if we examine the results reported in Table 6.

A one year increase of women's education from its mean value of 3.86 years reduces the probability of being in family farm by 6 percent and in family enterprise by 1 percent, while increasing the probability of being in non-familial market work by 7 percent. The same increase in education also reduces fertility by 3.1 percent. Thus, an increase in woman's educational level has signifi-

struments. Holding education constant, however, and simply increasing women's wages, has the effect of drawing women into familial non-farm enterprises, which although they may raise women's status and economic position are compatible with (and may actually encourage) higher fertility. Therefore, market interventions which raise women's wages appear to have little immediate effect on fertility decisions, although they rasie returns to education, which may affect fertility and female status over a longer time horizon.

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