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Outline of the Paper

Family size and children's education in Matlab, Bangladesh

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Summary:

The study examined the relationship between family size and children's education in the Treatment and Comparison areas of Maltab using data from the Health and Demographic Surveillance System of the International Centre for Diarrhoeal Disease Research, Bangladesh. Such relationship was examined for two periods, those differ in level of fertility. Children of aged 9-17 years were selected from households where mother was aged 30-49 years and father, head. The children's education was measured in terms of completed years of schooling: at least class 1 (aged 9-12 yrs), at least class 5 (aged 12-17 yrs) and at least class 7 (aged 15-17 yrs). During the high fertility period, family size was not associated with children's education but it was negatively associated at the time of low fertility situation. Boys had more education than girls during the high fertility period but such difference disappeared during the low fertility period. Food for education program at the primary school level had eliminated village level difference in education and poor child benefited more than the well-off. Children of educated mother, educated father and those from the well-off households had higher education in both the periods compared to their counter parts. The study supports the argument that with the decline in fertility in Bangladesh, children's education would increase along with elimination of sex differential.

Introduction

Over the last few decades, family planning program has been adopted by many government of the Third world countries with the expectation that reduced rate of population growth would be beneficial not only to the nation as a whole but also for the household members. Among the benefits of small family size, children's education is expected to improve. The primary mechanism through which benefit of fertility decline effect education has been referred as the dilution effect: as number of children increases, resources available to an individual child decrease. However, others argue why a positive rather than a negative relationship might exist between family size and children's education in rural population at early stages of development.

Studies relating family size with children's education in the developing countries are few, however, results are not conclusive. Studies those undertaken in the past in the developing regions such as Taiwan (Arnold 1976) and Guatemala (Clark 1979) found no association between family size and children's education. Later studies such as Thailand (Knodel, Havanon & Sittitrai 1990; Knodel

& Wongsith 1991) and Taiwan (Hermalin, Seltzerad 1982; Parrish & Willis 1990) show increasing negative relationships. However, the extent to which family-level mechanism of family size and children's education operates in a particular society is conditioned by the specific cultural, political and socioeconomic setting (Lioyd 1994).

Family planning program in Bangladesh is considered a successful one because fertility has declined here in an unfavorable socioeconomic condition. In half of the Matlab demographic surveillance area (Treatment), where fertility decline was much earlier and rapid than the national level, fertility declined mainly due to the family planning intervention of the International Centre for Diarrhoeal Disease Research, Bangladesh. In other half of the Matlab demographic surveillance area (Comparison), where fertility decline was delay and slow, government family planning program is in operation. To improve children's education at the primary school level, some of the surveillance villages have been brought under the food for education program since 1993. As fertility has been declining for long particularly in the Treatment area, it is now possible to get sufficient number of women aged 30-49 years with small family size. The study is unique because of the study design and would reflect future of Bangladesh in terms of family size-education relationship.

Methods and Materials:

Data for this study has come from the Matlab area, where ICDDR,B has been maintaining a Demographic Surveillance System (DSS) since 1966. Matlab is rural area located about 70 km south-east of Dhaka. The area is low-lying and economy is largely based on agriculture (see Ruzicka & Chowdhury 1978).

The Matlab study area consists of both the Treatment and Comparison area. The Treatment area was exposed to a contraceptive distribution program during 1975-77 and has been exposed to the Maternal Child Health and Family Planning services since October

1977. In the Comparison area, services have been limited to those received through the conventional government program (Bhatia et al. 1980). In both the areas, contraceptive use was relatively low in 1975. In the Treatment area, however, it increased from 12.6% in 1977 to 31.1% in 1978 after the introduction of the intensive family planning program. It remained at this level until 1982. Between 1982 and 1990, contraceptive use rose from 31.1% to 60.6%. In the Comparison area, contraceptive use is much lower than in the Treatment area but has also been increasing: from 4.7% in 1977 to 16.5% in 1984 and 27.2% in 1990.

Since introduction of the intensive family planning program in 1977, a remarkable decline in fertility has been observed in the Treatment area. The total fertility rate declined from 6.9 in 1976 to 5.1 in 1980, 4.1 in 1987 to 2.9 in 1995 while the total fertility rate in the Comparison area declined from 7.2 in 1976 to 6.7 in 1980 and 5.2 in 1987 to 3.6 in 1995. The desired family size, however, declined from 4.3 in 1975 to 3.2 in 1990 but remained the same in the two areas (Razzaque, 1994).

The socioeconomic census of 1982 and socioeconomic census of 1996 were two major data sets used in this study. In these censuses data were collected both at the household level as well as at the individual level. Education data were collected for those aged 6 years and over but occupation data for those aged 8 years and over. In both the censuses completed years of schooling were recorded using the same definition and such data were collected for those children who were currently at school and those were not. The pregnancy history data (number of living children) were added to the file from the DSS database.

The study collected individual-level data of those individuals who were resident according to DSS definition. In fact, DSS definition allows one to be resident if he/she visits the house once in a month and stay overnight. So, it is unlikely that a large group of children would be excluded from this analysis due to such definition of resident. Moreover, the analyses were restricted on young children (aged 9-17 years), those usually stay with the parents. However, it is likely that some girls would be married by this age and would move to the husband’s house. As mean age at marriage has increased over the period, such number would not affect our results.

Children were selected from mother's those were currently married (aged 30-49 years) and father was the household head. Such categories of households were selected because our purpose was to study children of those mother who completed childbearing and father was the head of the household. Such household represents about xx% in the study area. The relationship between family size and children's education is expected to be strong in this category of households.

Three education levels were analysed (completed class 1, completed class 5 and completed class 7) considering the government's program to increase education level. In fact, education up to the primary level is free for all in Bangladesh. Moreover, some village were brought under the food for education program (wheat distribution among the poor) to improve education level of the poor. To keep the girls at the secondary school, tuition fees were waved along with provision of stipend and allowance for purchasing books.

Both bivariate and multivariate analyses are employed. In the multivariate analysis, logistic regressions are used. The three dependent variables were: a) whether completed at least class 1 among aged 9-12 years, b) whether completed at least class 5 among aged 12-17 years and, c) whether completed at least class 7 among aged 15-17 years. The dependent variable took the value of 1 if the child had attended the specific level of schooling and 0 otherwise. The independent variables used in this analysis are: family size (number of living children), sex of the child, mother's education, father's education, household wealth, study area, whether the village was under the food for education program, distance from primary school, distance from secondary school and distance from the college. Except sex of the children, villages under food for education program and study area, all independent variables were treated as continuous.

Bivariate analysis:

Table 1 shows total fertility rate, fertility intention, contraceptives use and desired education for children. By 1990, TFR became 35% lower in the Treatment area than in the Comparison area and it was about 25% lower in 1980, however, TFR was similar in these areas before initiation of the family planning intervention in mid-1970s.

For both young and old women, desired education was similar indicating women usually do not control their fertility with the consideration of their children's education.

For our study we restricted children of mother those were at the end of reproductive period (aged 30-49 years) because interest was to examine the relationship between ultimate family size and children's education. As expected, over 80% of these women reported that they wanted no more children in each area and about 70% were using contraception in the Treatment area compared 40% in the Comparison area.

Table 2 shows distribution of study children by family size and years. In 1982, less than 10% children in each area belonged to the family size category of 1-3 and it increased to about 30% in the Treatment area and 16% in the Comparison area in 1996. Children from large family size category (7 or more) declined dramatically, from 28% to 9% in the Treatment area and from 31% to 18% in the Comparison area.

Figure 1 shows percent of children completed schooling (at least class 1, class 5 and class 7) by year. Level of children improved substantially over the study period: from about 35% to 70% among aged 9-12 years, 15% to 40% among aged 12-17 years and 10% to 25% among aged 15-17 years.

Table 3 shows percent of children completed certain level of schooling by family size and year. For all three categories of children (9-12 years, 12-17 years and 15-17 years) education increased with the increase in family size in 1982 but such pattern was reversed in 1996, higher education usually among those who were from small family size. Such negative relationship between family size and children's education in 1996 was stronger in aged 12-17 years and aged 15-17 years than in aged 9-12 years.

Table 4 shows percent of children completed certain level of schooling by socioeconomic variables and year. For children aged 9-12 (1982), level of education (completed at least class 1) increased with increase in father's education, mother's education and possession of household items; the highest category had 3-5 times more education than the lowest category. Children's education decreased with increase in distance of house from the education institution, 0.10-0.25 times lower for those children lived long distance compared to those lived short distance. Girls had 0.20 times lower education than the boys. Those villages went under food for education program in 1993 had lower education than those did not; children of comparison area had lower education than children in the treatment area. In 1996 the relationship of socioeconomic status and children's education was similar to those in 1982 except for sex, food for education program and study area; education difference disappeared by sex, food-non-food village and study area.

For children aged 12-17 (1982), level of education (completed at least class 5) increased with increase in father's education, mother's education and possession of household items; the highest category had 7-17 times more education than the lowest category. Children's education decreased with increase in distance of the house from the education institution, 0.20-0.35 times lower for those children lived long distance compared to those lived short distance. Girls had 0.35 times lower education than the boys. Those villages went under food for education program in 1993 had lower education than those did not; children of comparison area had lower education than children in the treatment area. In 1996 the relationship of socioeconomic status and children's education was similar to those in 1982 except for sex; education difference disappeared by sex.

For children aged 15-17 (1982), level of education (completed at least class 7) increased with increase in father's education, mother's education and possession of household items; the highest category had 28-51 times more education than the lowest category. Children's education decreased with increase in distance of the house from the education institution, about 8 times lower for those children lived long distance compared to those lived short distance. Girls had 0.55 times lower education than the boys. Those villages went under food for education program in 1993 had lower education than those did not; children of comparison area had lower education than children in the treatment area. In 1996 the relationship of socioeconomic status and children's education was similar to those in 1982 except for sex; education difference disappeared by sex.

Table 5 shows percent completed at least class 1 (aged 9-12 years) by village under food for education program and items owned by the household. Before food for education (primary) program starts (pre-1993), village level difference in primary education existed irrespective of wealth category, higher education for non-food program villages. But after introduction of the food for education program, village level difference reversed, higher education for those villages under food for primary education program.

Multivariate analysis:

In the bivariate situation, children's education increased with the increase in family size in 1982 but such relationship was reversed in 1996 for all three age categories. However, estimation of net effect requires multivariate analysis. Logistic regression models are fitted for those completed at least class 1 (for aged 9-12 years), those completed at least class 5 (for aged 12-17 years) and those completed at least class 7 (for aged 15-17 years).

Results of regression models of completion of at least class 1 among aged 9-12 years are shown in Table 6. After controlling all the variables in the model, family size was not associated with children's education in 1982 but it was negatively associated with

children's education in 1996. In both the periods, children of educated mother and children of educated father and those from the wealthier household had better education compared to illiterate mother and illiterate father and those from the poor household. Boys had higher education than girls in 1982 but the difference disappeared in 1996. Distance of house from the educational institution had negative effect on children's education. Children of the Treatment area had better education than those of the Comparison area in 1982 but such difference disappeared in 1996. Those villages fall under the food for primary education program in 1993 had lower education in 1982 but the pattern was reversed in 1996 when food for primary education program was well under way.

Results of regression models of completion of at least class 5 among aged 12-17 years are shown in Table 7. After controlling all the variables in the model, family size was not associated with children's education in 1982 but it was negatively associated with children's education in 1996. In both the periods, children of educated mother and children of educated father and those from the wealthier household had better education compared to illiterate mother, illiterate father and those from the poor household. Boys had higher education than girls in 1982 but the difference disappeared in 1996. Distance of house from the educational institution had negative effect on children's education. Children of the Treatment area had higher education in 1982 than those of the Comparison area but the difference disappeared in 1996. Those villages fall under the food for primary education program in 1993 had similar education in both the periods.

Results of regression models of completion of at least class 7 among aged 15-17 years are shown in Table 8. After controlling all the variables in the model, family size was not associated with children's education in 1982 but it was negatively associated with children's education in 1996. In both the periods, children of educated mother and children of educated father and those from the wealthier household had higher education compared to illiterate mother and illiterate father and those from the poor household. Boys had higher education than girls in 1982 but the difference disappeared in 1996. Distance of house from the educational institution had

negative effect on children's education. Children of the Treatment area had higher education than those of the Comparison area in both the periods. Those villages fall under the food for primary education program in 1993 had similar education in both the periods.

Discussion:

The study examines family size-education relationship of two periods: at the start of fertility transition and at the period when fertility transition was well under way. During this period both actual fertility and desired fertility declined remarkably and motivation for achieving family size desire became much stronger than the motivation in the past. The Value of Children Studies those undertaken before introduction of fertility decline documented social, economic and religious condition favored many children (Ref) but KAP studies of the same period reported smaller family size desire than the actual fertility (Ref). Subsequent studies, however, reported that increase in direct economic cost of children (food, clothing and education) is mainly responsible for decline in family size desire (Ref).

The study documented inverse relationship between family size and children's education during the low fertility period but such relationship was absent when fertility was relatively high. In the past education was usually not considered essential by the rural people, however, the situation has changed particularly since after independence of the country in 1971. In these days parents usually prefer to have fewer children of good quality rather than many of bad. According to dilution hypothesis, while lesser resource is available per child, family size becomes an important determinant of schooling, but the study confirmed that family size-education relationship depends on broader socioeconomic condition of the society in which the family belongs. In fact, family size-education relationship is expected to be weak where either extended family shares the cost of children's education and/or state provides subsidy for education. In Bangladesh, cost of children's education is usually bared by the parents, however, the government has undertaken several programs to improve education level of the general people and that might under state the family size-education relationship.

Food for primary education program has eliminated village level difference in education and the poor are found to be benefited more than the well-off. This is expected because education program of the government has been targeted the poor to encourage their children's education. Such findings demonstrates that the government can play a critical role in mitigating family-level process affecting children's education by making resources available that can influence family-level decisions.

The sex differential in education disappeared in recent years but boys had higher education than the girls in the past. In fact, education differential disappeared at the secondary school level probably due to the government stipend program for the girls while at the primary level education is free for all and has increased equally for boys and girls. Preference for son over daughter exists in Bangladesh and has documented that female child are discriminated over the male in relation to food distribution and provision of health care services and such discrimination is expected to reduce as level of education improves.

Table 1

Total fertility rate, childbearing intention, contraceptive use and desired education for children, 1990

Area	Wanted no more children (%)		Contraceptive use (%)		Desired education for children[+]		TFR		
	<30	30-49	<30	30-49	<30	30-49	1980	1985	1990
Treatment	21.9	83.3	51.3	73.5			5.1	4.5	3.4
Comparison	24.4	87.1	22.4	40.7			6.7	6.0	5.0

Note: [+]Mean education

Table 2

Percentage distribution of children[1] by family size and year, Treatment and Comparison area

Family size	Treatment		Comparison	
	1982	1996	1982	1996
1-3	8.7	29.5	8.0	15.7
4-6	62.7	61.4	60.5	66.4
7+	28.6	9.1	31.5	17.9
N	15,061	16,697	14,198	17,869

Note: [1]Father was household head and mother aged 30-49 years

Table 3

Percent completed certain level of schooling by family size and year, aged 9-12, 12-17 and 15-17 years

Family size	Aged 9-12 (at least class 1)		Aged 12-17 (at least class 5)		Aged 15-17 (at least class 7)	
	1982	1996	1982	1996	1982	1996
1-3	32.2	77.1	12.3	43.6	6.9	36.0
4-6	34.4	71.1	14.0	36.2	7.8	24.0
7+	37.6	66.7	17.1	32.2	10.1	19.3

Table 4

Percent of children completed certain level of schooling by socioeconomic status and year, aged 9-12, 12-17 and 15-17 years

Variables	Aged 9-12 (at least class 1)		Aged 12-17 (at least class 5)		Aged 15-17 (at least class 7)	
	1982	1996	1982	1996	1982	1996

Mother's education						
0	25.7	63.9	8.4	25.3	3.3	12.8
1-5	63.3	83.8	32.8	50.8	22.7	38.1
6+	83.3	94.5	61.6	76.0	51.1	69.5
Father's education						
0	18.6	61.5	4.9	21.8	1.7	10.3
15	41.5	75.7	16.0	37.7	7.2	22.1
6+	67.3	87.6	39.9	62.6	29.2	53.2
Possession of items						
None	13.2	66.7	2.3	29.3	0.9	19.6
1-3	36.7	72.6	15.0	37.1	7.8	24.1
4+	69.3	85.7	39.4	59.4	28.1	48.8
Sex						
Male	39.3	72.4	17.9	37.2	10.8	25.3
Female	31.0	71.5	11.7	37.0	5.9	25.8
Primary school[†]						
<0.25	39.5	74.2	18.2	42.3	10.9	32.1
0.25-0.74	34.7	72.0	14.6	36.9	8.3	24.5
0.75+	33.4	69.3	13.8	32.1	7.7	21.7
Secondary school[†]						
<0.75	38.1	75.3	18.8	43.3	11.7	30.9
0.75-1.4	35.5	71.8	14.2	35.5	7.6	24.2
1.5+	32.8	68.9	13.2	33.6	7.5	22.3
College[†]						
<3.0	40.9	77.8	19.2	44.0	12.8	32.8
3.0-5.0	39.4	72.6	13.0	34.1	6.6	22.3
6.0+	30.9	69.0	14.9	36.2	8.4	24.6
Food for education						
No	37.7	71.3	15.7	38.4	9.1	27.0
Yes	26.5	73.7	12.6	33.3	6.7	21.1
Study area						
Treatment	40.7	73.6	17.4	39.9	10.4	29.1
Comparison	29.7	70.4	12.5	34.5	6.6	21.9

[†]distance (in km.) between educational institutions and place of residences

Table 5

Percent completed at least class 1 (aged 9-12 years) by food for education program and items owned, 1982 and 1996

Villages	Items owned (1982)			Items owned (1996)		
	None	1-3	4+	None	1-3	4+
1: Food program	7.7	29.3	60.6	71.0	73.9	86.8
2: Non-food	15.3	38.6	71.1	64.8	72.2	85.4
2:1	2.0	1.3	1.2	0.91	0.97	0.98

Table 6

Logistic regression model (coefficient) of completion of at least class 1 among aged 9-12 years, 1982 and 1996

Characteristics	1982	1996
Age	0.520***	0.687***
Sex	- 0.548***	- 0.027
No. of living children		
1-2	-	-
3	- 0.063	- 0.001
4	- 0.123	- 0.147
5	- 0.036	- 0.408***
6	- 0.201	- 0.439***
7+	- 0.249	- 0.531***
Mother's education	0.211***	0.189***
Father's education	0.158***	0.106***
Possession of items	0.520***	0.178***
Distance of primary school	- 0.228**	- 0.344***
Distance of secondary school	0.016	- 0.163***
Distance of college	- 0.051***	- 0.049***
Study area	- 0.280***	- 0.058
Food for education	- 0.357***	0.448***
Constant	- 6.618	- 6.025
-2 log likelihood (df)	10952.937(15)	13047.241(15)

*p<0.05; **p<0.01 and ***p<0.001

Table 7

Logistic regression model (coefficient) of completion of at least class 5 among aged 12-17 years, 1982 and 1996

Characteristics	1982	1996
Age	0.605***	0.699***
Sex	- 0.715***	0.061
No. of living children		
1-2	-	-
3	- 0.174	- 0.216**
4	- 0.260	- 0.439***
5	- 0.269	- 0.556***
6	- 0.338	- 0.699***
7+	- 0.456**	- 0.813***
Mother's education	0.208***	0.193***
Father's education	0.193***	0.137***
Possession of items	0.471***	0.203***
Distance of primary school	- 0.286**	- 0.535***
Distance of secondary school	- 0.110*	- 0.129***
Distance of college	0.003	- 0.025***
Study area	- 0.277***	- 0.038
Food for education	0.106	0.063
Constant	- 11.650	- 10.882
-2 log likelihood (df)	9135.424(15)	17428.108(15)

*p<0.05; **p<0.01 and ***p<0.001

Table 8

Logistic regression model (coefficient) of completion of at least class 7 among aged 15-17 years, 1982 and 1996

Characteristics	1982	1996
Age	0.705***	0.751***
Sex	- 0.917***	0.014
No. of living children		
1-2	-	-
3	- 0.261	- 0.066
4	- 0.619	- 0.327*
5	- 0.557	- 0.584***
6	- 0.618	- 0.717***
7+	- 0.690	- 0.815***
Mother's education	0.254***	0.199***
Father's education	0.210***	0.161***
Possession of items	0.439***	0.171***
Distance of primary school	- 0.165	- 0.509***
Distance of secondary school	- 0.239**	- 0.108*
Distance of college	- 0.006	- 0.022**
Study area	- 0.250**	- 0.161**
Food for education	0.103	0.062
Constant	- 14.620	-13.561
-2 log likelihood (df)	2805.363(15)	7388.868(15)

*p<0.05; **p<0.01 and ***p<0.001