

THE RELATIONSHIP OF EDUCATION TO FERTILITY IN TURKEY

Koray Tanfer

*Institute for Survey Research, Temple University,
Philadelphia, Pennsylvania, U.S.A.*

Résumé — En général on cite l'éducation comme un déterminant important de fécondité; un déterminant qui se prêterait à l'intervention des politiques. On a démontré qu'elle a une forte influence sur la fécondité, mais le degré et la direction de la relation éducation-fécondité varient largement parmi les sociétés. Dans cette étude, on examine cette relation comme l'effet de l'éducation sur la fécondité par une série de variables intervenantes qui sont elles-mêmes directement apparentées au comportement procréateur. Nous notons que l'effet négatif de l'éducation sur la fécondité fonctionne à travers les relations directes entre l'éducation et l'âge au premier mariage, la connaissance de la contraception et l'usage de la contraception et à travers la relation inverse entre l'éducation et le nombre d'enfants désiré.

Abstract — Education is commonly cited as an important determinant of fertility — one which would lend itself to policy intervention. It has been shown to have strong influence on fertility, but the degree and the direction of the education-fertility association widely vary among societies. In this paper, this relationship is viewed as the effect of education on fertility through a set of intervening variables which are themselves directly related to reproductive behaviour. We note that the negative effect of education on fertility operates through the direct associations between education and age at first marriage, contraceptive knowledge and contraceptive use, and through the inverse relationship between education and desired family size.

Key Words — education, fertility, Turkey

Introduction

Social scientists have focused increasing attention on the socioeconomic factors related to the fertility behaviour of women in order to determine and understand the forces that cause variations in fertility with the view that once the relationship between the factors which affect fertility and the fertility itself are explicated, then strategies and policies can be devised to manipulate these forces either to induce a fertility decline or to accelerate it in areas where a decline has already begun. Among the many factors commonly cited and stressed as being important — and one which would lend itself to policy intervention — is education. An overwhelming body of empirical evidence indicates an inverse relationship between education and fertility (Cochrane, 1979). Numerous studies in the United States have shown that, of these factors, education has the strongest influence on fertility (Grabill *et al.*, 1958; Kiser *et al.*, 1968; Ryder and Westoff, 1971). Similar relationships have also been observed in developing countries (Bouvier and Macisco, 1968; Goldstein, 1972; Khalifa, 1973, 1976; Kirk, 1971; Rodriguez and Cleland, 1980; Stycos, 1965). Despite the general consensus among scholars regarding the education-fertility relationship, both the degree and the direction of this association have been found to vary among countries at different levels of social and economic development, as well as among subpopulations within countries (United Nations, 1980). The belief in the universal and invariant nature of this relationship, however, has elevated education (that is, formal schooling) as the most promising social institution amenable to policy manipulation that can ultimately help solve the problem of rapid population growth in under-developed countries. Even if the education-fertility relationship is accepted without further argument on the stability and universality of the relation, there is still a need to determine the precise pattern of this association, that is, what causes the two to interact in the manner they do. Despite an abundance of studies which show negative correlations between education and fertility, the causal mechanisms that link the two have not been adequately tested.

We view the relationship between education and fertility as an indirect one in which the effect of education operates through a set of intervening variables which are themselves directly related to reproductive performance. Hence, any explanation of the education-fertility association — and of the variations in this association — is contingent upon a

full understanding of the factors which determine fertility and of their relation to education.

Fertility, Intervening Variables and Education: An Overview

Economic models of fertility hypothesize that fertility is determined by demand and supply factors and that the demand for and the supply of children is balanced through fertility regulation. The biological supply of children — that is, the potential number of births — for a woman depends on her fecundity which in turn depends on biological and behavioural factors such as age, health, birth interval and mortality. The actual stock of children and the demand factors determine whether or not another child is desired. Fecundity and/or fertility regulation determine whether an additional birth occurs. Education — operating through the various intermediate or proximate variables (Bongaarts and Potter, 1983; Davis and Blake, 1956) — influences the biological supply of children, the demand for children and fertility regulation. Some insight into which intervening variables should be investigated in a given environment is provided by an examination of factors which have been demonstrated to have significant influence on fertility in previous studies. Even then, however, it is a rare occasion when the student finds empirical data on all variables shown to be significant.

Age at marriage, desired family size and contraceptive knowledge and use — representing supply, demand and regulation factors, respectively — have been selected to test the relationship between fertility and education, using recent data from the Turkish fertility survey. All these variables have been found, in previous research, to be related to both fertility and education.

Wife's age at marriage is a supply factor affecting fertility. If we view the completed family size as a function of the years of marital fertility and the spacing of births during those years, then wife's age at marriage determines her total number of childbearing years. Older ages at first marriage result in shorter periods of exposure to pregnancy (within marriage) and thus reduce the potential biological supply of children. Despite some irregularities in the patterns, the bulk of the research indicates that age at marriage increases with rising levels of education, and delay of marriage has been found to reduce the number of children ever born (Husain, 1970; Stycos and Weller, 1967).

Education may influence the wife's age at marriage in various ways. For instance, formal schooling (beyond elementary education) conflicts directly with early marriage, since married women in less developed countries generally do not continue their education. In most countries, higher education is associated with higher wage rates and increased access to better jobs, which makes market work more attractive than early motherhood. In fact, in Turkey, education is the most powerful predictor of urban women's labour force participation, and fertility is inversely associated with gainful employment, especially among the relatively better-educated women (Tanfer, 1975:97-99, 109-115). Finally, education may make women more selective in terms of potential marriage partners and thus lengthen the waiting time for the "right" person.

On the demand side, there are two considerations: the initial desired family size and the demand for an additional child to adjust the existing stock of children. While the desired family size may be determined by the preferences of each spouse (which may not coincide), the demand for an additional child is presumably shaped by the cost and benefit margins. Moreover, the ability to afford a given number of children — or the perception of that ability — depends on family income and the "price" of children, both of which are a function of a host of variables such as wages, labour supply, non-labour income and monetary and non-monetary expenditures on children.

Education has been found to reduce the desirability of large families by increasing the aspirations for upward mobility (Holsinger, 1974), by enhancing the prospects for gainful employment outside the home — which competes with childbearing and childrearing (Blake, 1965; Kasarda, 1971) — and by reducing the perceived economic utility of children and, thus, the demand of parents for them (Becker, 1960; Friedlander and Silver, 1967; Mueller, 1972). On the other hand, rising levels of education are likely to increase the level of income which might, in turn, make children more affordable and thus positively affect the desired number. In addition to these indirect effects on family size preferences, education has also been found to have a substantial direct effect on individuals' attitudes, values and beliefs toward small family size (Caldwell, 1968; Carleton, 1967).

The general impact of education on the demand for children, however, is negative. Both the ideal family size — which generally reflects the family size preferences without any constraints added by personal economic considerations — and the desired family size have been shown to be inversely related to educational attainment (Freedman and

Coombs, 1974; Knodel and Pitaktesombati, 1973; Nepal, 1977; Speare *et al.*, 1973; Thailand, 1977; Ware, 1974).

When additional births are desired, the supply factors operate; if an additional birth is not wanted, or is wanted at a later time, then there is a potential for fertility control. Whether or not this potential is used and fertility is actually regulated depends on other factors such as the knowledge and availability of contraceptive methods, as well as access to and the cost of fertility regulation. Education increases exposure to information concerning family planning and either directly provides or facilitates the acquisition of information on contraceptive devices and methods and their use. Schooling — especially beyond primary grades — exposes young women and men to material often not available through familial channels; it promotes attitudes favourable to lower fertility, and it affects communication between spouses with respect to family planning.

The relationship between these factors — knowledge, attitude, access — and completed fertility is negative (Mason *et al.*, 1971; Schultz, 1972). The effects of education on the fertility regulation factors are generally positive. A number of studies have shown a positive relationship between schooling and favourable attitudes toward birth control (Dow, 1971; Freedman *et al.*, 1963; Morgan, 1975; Williamson, 1970). In developing countries, knowledge and practice of contraception have been found to be closely linked to the educational level of husbands and wives (Cleland *et al.*, 1979; Dandekar, 1967; Miro and Rath, 1965). The American fertility studies have also demonstrated the importance of educational attainment in successful family planning (Freedman *et al.*, 1959; Westoff and Ryder, 1977).

The relationship between education and fertility in Turkey has been examined by others, although not with the model tested in this paper. Their findings also indicate an overall negative relationship between the two (Karadayi, 1971; Ozbay, 1979, 1981; Timur, 1978).

Based on the theoretical relationships discussed above and on the existing evidence from earlier works, the hypothesized effects of education on fertility through the three intervening variables are shown below. These are the relationships we will explore in this paper.

Data, Definitions and Limitations

Data examined in this paper are from the 1978 Turkish Fertility Survey (TFS) carried out in co-operation with the World Fertility Survey

	Relation to fertility	Relation to education	Effect of education on fertility through these
Age at marriage	inverse (-)	direct (+)	negative (-)
Desired family size	direct (+)	inverse (-)	negative (-)
Contraceptive knowledge and use	inverse (-)	direct (+)	negative (-)

(WFS). The variables used in the analysis included current age, age at first marriage, education, years since first marriage, desired family size, knowledge and use of contraceptives, number of children ever born and number of surviving children. The mean number of children ever born and the mean number of children surviving are two of the most commonly used measures in fertility analysis. The former measure indicates completed or current parity and is simply the number of live births per woman as of the survey date. The latter measure indicates the current family size and equals the number of live births minus the number of children who have died as of the survey date. Both measures are indicators of the "quantity" of fertility and give no indications of the tempo of fertility.¹ Past experience indicates that data on fertility and on variables related to fertility which are obtained through a retrospective survey are vulnerable to errors of various forms, such as the coverage of fertility-related events and misreporting of age and durations. Another form of bias (truncation bias) is introduced when the sample excludes women over age 50; the longer marriage duration cohorts selectively include those women who have married at younger ages. The incorrect reporting of age and preference for certain digits is also a common problem observed in censuses and surveys.

It must also be pointed out that the women interviewed in each age group are the survivors of their respective cohorts, and in the analysis of fertility, one assumes that the fertility of the survivors does not differ from that of the women who have died. While this may not pose a great

problem for the younger cohorts, it does introduce some distortion for the older age groups.

The education variable combines women's literacy status with the level of schooling completed at the time of the survey. Literacy is defined as the ability to read, on the basis of a direct question to the respondent. Those unable to read have been classified as "illiterate"; women who claimed to be able to read, but who had not finished primary school were classified as literate. The "primary" and the "secondary or higher" categories refer to the highest level *completed* — five and eight or more years of schooling, respectively. This has some drawbacks in assessing the actual number of years of schooling a woman has had, since additional years of education which did not culminate in a degree or formal certification are ignored. For instance, women who went to school for seven years are included with those who were in school for only five years, rather than with those who have completed eight years.

As a dependent variable, current or past use of any contraceptive method or of a specific group of methods (for example, "modern" methods) has its limitations. It does not take into account length of use prior to the interview, probability of continuation or probable efficacy. Moreover, by itself, current or past use reveals nothing about motivation; in particular, whether use of a method (other than sterilization) is intended to terminate childbearing or to postpone the next birth is not known without further information on intentions.

Finally, the analysis in the following section is primarily a bivariate analysis, using the standard First Country Report. However, it is typical of fertility analyses that the dependent variable, the controls and the predictor or explanatory variables are all intricately related. Bivariate analysis is only a simplified exposition of a complex system. Multivariate techniques would have been more suitable to decompose the zero-order correlations between education and fertility into net effects by way of each intervening variable. This can only be undertaken with the individual level data, which is not possible if the WFS data tapes are unavailable, as is the case for Turkey. Although this is one limitation on WFS research, it is not necessary for researchers to completely give up; as illustrated here, some descriptive modeling is still possible with standard First Country Reports. However, relationships observed through a bivariate analysis with aggregate-level data should be interpreted with caution.

Evidence

Table 1 shows the average number of children ever born to ever married women by current age and educational attainment of women. At each age group, cumulative fertility declines consistently with increasing education. For women who are assumed to have completed their childbearing (ages 45-49), cumulative fertility of literate women is 18 per cent lower than that of illiterate women; women with primary education have had 33 per cent fewer births than women who are literate but have not completed primary education. While at younger ages greatest reductions appear to be brought by post-elementary education,² at relatively older ages elementary schooling is associated with larger reduction in the average number of births per woman. However, for all women in childbearing years (ages 15-49), the decrease in cumulative fertility at each successive level of educational attainment is larger once the age distribution (of each educational group) is standardized. Controlling for age, mere literacy reduces fertility by about 21 per cent (over illiterate women); five years of education reduces fertility by another 23 per cent

TABLE 1. MEAN NUMBER OF CHILDREN EVER BORN TO
EVER-MARRIED WOMEN BY AGE AND EDUCATION,
TURKEY, 1978.

Age	Education					N
	Illiterate	Literate	Primary	Secondary or higher	All levels	
Under 25	1.86	1.53	1.27	0.97	1.47	1,156
25-34	4.48	3.49	2.88	1.72	3.57	1,522
35-44	6.67	5.17	3.91	2.76	5.71	1,255
45-49	7.13	5.85	3.92	3.13	6.30	498
Total, under 50	5.19	3.91	2.45	1.82	3.94	4,431
Total (age standardized)	4.71	3.72	2.87	1.97	3.81	
N	2,183	551	1,348	349	4,431	

Source: Turkish Fertility Survey, 1978: First Report, Volume II, Statistical Tables (Hacettepe Institute of Population Studies, Ankara, 1980).

(over literate women); and eight years or more of schooling reduces fertility by 31 per cent over women with elementary education. Although there appears to be an accelerating decline in fertility as level of education increases, if we examine the cumulative decrease, controlling for age, literacy brings the largest reductions, followed by post-elementary education — 21 and 19 per cent, respectively.

There is clearly an inverse relationship between education and fertility among women who have completed their childbearing, as well as among those who have just started their childbearing. At ages when childbearing ceases, illiterate women have had more than twice as many births as women with eight years or more education. Data indicate that women with lower educational attainment start having children younger and continue at a faster pace at later years of childbearing, while better-educated women not only start later, but are also more successful in spacing their births.

It has been stated in some of the earlier work (Timur, 1974) that most of the effects of education operate through place of residence and that the reductions in fertility by increasing education are not the same in rural and urban areas. Moreover, education is believed to act as a proxy for all rural-urban differences. The educational differentials in the fertility of 15-49-year-old ever-married women, controlling for residence, are shown in Table 2. First, we note that, irrespective of community type, the number of children ever born declines with education; secondly, more substantial reductions are observed at lower levels of education in urban and metropolitan areas, while in rural areas, only higher levels of education seem to bring sharp decreases in fertility. Finally, community type also has an effect on fertility, independent of education or age structure, which seems to favour urban settings. Controlling for age, fertility declines with the size of community within each category of educational attainment.

The initial and most recent fertility of women who have been continuously married during the specified periods are shown in Tables 3 and 4. There are fairly marked differences by level of education in the number of children born during the first five years of marriage, especially among those who, at the time of the survey, had been married less than 20 years.³ For instance, among women who have been first married 10-19 years ago, illiterate women have had about 25 per cent more births — or 0.5 child more per woman — in the first five years of their marriage than women with secondary or higher education. Initial fertility steadily declines by increased schooling.

TABLE 2. MEAN NUMBER OF CHILDREN EVER BORN TO
15-49 YEARS OLD EVER-MARRIED WOMEN
BY EDUCATION AND TYPE OF RESIDENCE, TURKEY, 1970.

	Rural		Urban		Metropolitan	
	Actual	Age standardized	Actual	Age standardized	Actual	Age standardized
Education						
Illiterate	4.37	4.24	4.17	3.97	4.07	3.74
Literate	3.70	3.90	3.49	3.46	2.96	3.11
Primary	2.69	3.37	2.99	3.11	2.36	2.39
Secondary or higher	1.42 ^a	1.50 ^a	1.79	1.80	1.62	1.59
All levels	4.08	4.13	3.64	3.58	2.82	2.77
N	3,783		1,546		695	

^a

Base less than 25.

Source: Population Census of Turkey, 1970, 1/1000 public use sample.

TABLE 3. INITIAL FERTILITY OF WOMEN WHO FIRST MARRIED AT
LEAST FIVE YEARS BEFORE THE SURVEY: MEAN NUMBER OF
CHILDREN BORN BEFORE OR WITHIN THE FIRST FIVE YEARS OF
FIRST MARRIAGE BY EDUCATION AND YEARS SINCE FIRST
MARRIAGE, TURKEY, 1978.

	Education					N
	Illiterate	Literate	Primary	Secondary or higher	All levels	
Years since first marriage						
5-9	2.17	1.94	1.73	1.46	1.91	867
10-19	2.07	1.97	1.86	1.57	1.97	1,275
20 or more	1.77	1.79	1.58	1.76	1.74	1,399
Total, 5 or more	1.94	1.89	1.74	1.58	1.86	3,541

Source: Same as for Table 1.

The Relationship of Education to Fertility in Turkey

TABLE 4. RECENT FERTILITY OF WOMEN WHO HAVE BEEN CONTINUOUSLY MARRIED DURING THE FIVE YEARS PRECEDING THE SURVEY: MEAN NUMBER OF CHILDREN BORN DURING THE FIVE YEARS BEFORE THE SURVEY, BY EDUCATION AND YEARS SINCE FIRST MARRIAGE, TURKEY, 1978.

	Education					N
	Illiterate	Literate	Primary	Secondary or higher	All levels	
Years since first marriage						
5-9	1.78	1.61	1.38	1.03	1.54	844
10-19	1.31	0.91	0.69	0.39	1.01	1,231
20 or more	0.47	0.25	0.18	0.09	0.38	1,301
Total, 5 or more	1.00	0.78	0.83	0.55	0.90	3,376

Source: Same as for Table 1.

The educational differences in fertility are more marked if we look at the recent fertility of the same group of women (first married 10-19 years ago). Those with eight or more years of schooling have had 70 per cent fewer births (or an average of one child per woman) than illiterate women. Again, mere literacy is associated with a five per cent reduction in the initial fertility, and a 30 per cent reduction in the recent fertility of women who have been first married 10-19 years ago and have been continuously married during the first five years following their marriage, as well as in the five years preceding the survey. Hence, the data seem to indicate educational differentials in the timing and spacing of births, which ultimately result in differences in cumulative fertility levels.

Now turning to the factors through which education affects fertility, Table 5 shows the mean age at first marriage by educational attainment of various birth cohorts. Since the sample is confined to ever-married women, it selectively excludes the relatively late-marrying women in the younger age groups — 15-19 and 20-24 years — who were not married at the time of the interview, but will marry later. To partially control for this bias, a pivotal age (here, 25) is selected, and women under that age — as well as women who were not married by that age — are excluded. There are two disadvantages of this exclusion: it does not allow an ex-

TABLE 5. MEAN AGE AT FIRST MARRIAGE FOR WOMEN WHO FIRST MARRIED BEFORE AGE 25, ACCORDING TO CURRENT AGE AND EDUCATION, TURKEY, 1978.

	Education					N
	Illiterate	Literate	Primary	Secondary or higher	All levels	
Current age						
25-29	17.6	17.7	18.6	20.3	18.1	813
30-34	16.7	17.8	18.7	20.8	17.7	654
35-39	16.6	18.0	18.1	20.0	17.3	628
40-44	17.2	18.0	18.5	19.2	17.6	589
45-49	17.3	17.3	18.9	19.0	17.6	475
Total 25 and over	17.1	17.8	18.5	20.1	17.7	3,159
N	1,760	421	784	194	3,159	

Source: Same as for Table 1.

amination of the differentials for more recent cohorts, among whom most of the recent marriages take place; and, by excluding some of the late-marrying women, the age at marriage is slightly underestimated (especially for the educated women who tend to marry later), by about three- to four-tenths of a year.⁴ Nevertheless, women with lower educational attainment marry younger; the mean age at first marriage for illiterate women is three years younger than that for women with secondary schooling. The more pronounced increases in age at first marriage seem to occur after elementary school (that is, for those who continue their education at least three more years after primary school), especially among the younger cohorts. Although the mean age of marriage is rather low for all women irrespective of education, women with less education end up with a longer reproductive period: for the 30-34 year age group, illiterate women have four more years than women with a secondary school education, two years more than those with primary school, and one more year than women who are literate but have not finished any school. Considering that one-half of the women of reproductive age are

illiterate (56 per cent of those who married before age 25), the one-year difference in age at marriage between illiterate and literate women could be very important in reducing overall fertility in the country.

The relationship between age at marriage and fertility is inverse, as shown in Table 6. Within each education category, women who marry later have lower cumulative fertility than those who marry earlier. However, the data seem to indicate that increasing education is more effective than increasing age at first marriage in curtailing fertility. For instance, it would take approximately one year of schooling to learn how to read and to write skillfully, which could decrease the fertility of women who first got married under age 15 by about 23 per cent, from 6.04 to 4.65 children ever born. On the other hand, the age at marriage needs to be raised (first marriage postponed) by more than four years to achieve the same level of fertility without changing the educational attainment of these women.

Desired family size — which is a summary measure reflecting the end result of the interaction of several factors discussed earlier — is directly

TABLE 6. MEAN NUMBER OF CHILDREN EVER BORN TO
EVER-MARRIED WOMEN UNDER AGE 50 BY AGE AT FIRST
MARRIAGE AND EDUCATION, TURKEY, 1978.

Age at first marriage	Education					N
	Illiterate	Literate	Primary	Secondary or higher	All levels	
Under 15	6.04	4.65	3.18	2.60	5.33	723
15-17	5.27	4.17	2.55	2.08	4.18	1,819
18-19	4.62	3.68	2.31	2.08	3.42	926
20-21	4.82	3.49	2.23	1.74	3.25	549
22-24	3.81	2.66	2.12	1.51	2.57	298
25 or over	3.51	2.00 ^a	1.50 ^a	1.35	2.27	116
All ages	5.19	3.91	2.45	1.82	3.94	4,431

^a

Base less than 25.

Source: Same as for Table 1.

related to completed fertility. Although the appropriate measure of this association would be the desired number of children *before* childbearing begins, desired and actual fertility almost always move in the same direction. The upper portion (panel A) of Table 7 shows the desired family size by age and education of currently married women. It is notable that the variation by education in desired family size is much smaller than the variation in actual fertility (CEB); the difference between the uneducated and the most educated groups of women under 50 years of age barely exceeds one child per woman, which is further reduced after adjusting for the age differentials. The desired mean number of children steadily declines as education increases for almost all cohorts. Women with eight or more years of schooling reportedly want to have only 30 per cent fewer children than the illiterate women. For each of the birth cohorts, the largest reductions seem to occur by literacy. Not only are the variations in the family size preferences by education very small, but also there appear to be virtually no differences among the birth cohorts represented (the small declines are probably within the margin of sampling errors), and these are not significant when education is held constant.

The actual family size (measured by the number of children alive) of currently married women who have more or less completed their childbearing is directly associated with desired family size and inversely related to educational attainment. The comparison of actual family size with desired number of children yields a rough estimate of excess or unwanted fertility, as shown in the middle portion (panel B) of Table 7. The estimates of excess fertility for women who have completed or are near the end of their childbearing (ages 45-49) vary inversely with educational attainment. The actual family size exceeds the desired number by nearly two children per illiterate woman, by slightly over one child per literate woman and by 0.3 child for women who have had at least five (but less than eight) years of schooling. It appears that women with eight years or more of schooling fall slightly short of their target number of children. While the reported preferences of older women (ages 45-49) may be subject to more distortion than women who have not yet finished their childbearing, the same pattern is observed for women aged 35-44 years. Excess fertility steadily declines by higher levels of schooling, and it appears that highly educated women are more successful in attaining exactly the number of children they want.

At the end of their reproductive ages, illiterate women end up with about 50 per cent more children than they reportedly wanted and literate women with about 30 per cent more (panel C, Table 7). While the relative

The Relationship of Education to Fertility in Turkey

TABLE 7. DESIRED AVERAGE FAMILY SIZE AND ITS COMPARISON WITH THE ACTUAL FAMILY SIZE FOR MARRIED WOMEN UNDER AGE 50, BY CURRENT AGE AND EDUCATION, TURKEY, 1978.

Current age	Education				
	Illiterate	Literate	Primary	Secondary or higher	All levels
A. Desired family size (mean number of children per woman)					
Under 25	3.26	2.92	2.58	2.29	2.81
25-34	3.42	2.93	2.68	2.35	3.01
35-44	3.52	2.96	2.59	2.39	3.21
45-49	3.36	3.40	2.76	3.10	3.25
Under 50	3.43	2.99	2.63	2.39	3.03
Under 50 (std.)	3.08	2.98	2.63	2.43	2.87
B. Excess of actual over desired family size (children per woman)					
Under 25	-1.38	-1.42	-1.20	-1.19	-1.28
25-34	+0.30	+0.09	-0.16	-0.63	+0.02
35-44	+1.45	+0.87	+0.67	+0.06	+1.12
45-49	+1.88	+1.16	+0.34	-0.30	+1.41
Under 50	+0.59	+0.12	-0.43	-0.63	+0.10
Under 50 (std.)	+0.65	+0.00	-0.16	-0.57	+0.21
C. Ratio of desired to actual family size (excess fertility)					
Under 25	0.58	0.51	0.53	0.48	0.54
25-34	1.09	1.03	0.94	0.73	1.01
35-44	1.41	1.29	1.26	1.03	1.35
45-49	1.56	1.34	1.12	0.90	1.43
Under 50	1.17	1.04	0.84	0.74	1.03
Under 50 (std.)	1.21	1.00	0.94	0.77	1.07
N	1,867	501	1,269	333	3,970

Note: The estimates of excess fertility include the effects of differential infant and child mortality. If the number of children ever born is compared with number of children desired the excess fertility of the less educated women is much higher compared to that for educated women.

Source: Same as for Table 1.

success of the educated women may be due to successful contraception, the uneducated women are more likely to overcompensate for infant and child mortality. Since infant and child mortality is strongly associated with socioeconomic attainment, drastic reductions in infant and child mortality would benefit the lower socioeconomic groups, and put extra pressure on these couples for effective family planning (assuming the reported family size preferences are accurate and stable). Furthermore, the relatively less-educated women seem to reach their desired level of family size at younger ages (25-34 years) than the more educated women, and they therefore have a longer period of childbearing years remaining, during which effective family planning must be practiced to avoid exceeding the desired number of children. Yet, in general, the uneducated are also the least effective users of contraception. Thus, not only are the education of the women and the number of children desired inversely related, but women with more schooling are more successful in spacing their births and in attaining the desired family size. Although a little education seems to help reduce excess fertility, only women with at least eight years of schooling are successful in avoiding unwanted fertility, again assuming that the reported desired family size is a reliable measure.

In the WFS standard questionnaire, the contraceptive knowledge of respondents is measured by directly asking whether they have "heard of ways or methods that people can use to avoid having children when they do not want them." First, the specific methods mentioned by the respondent without interviewer aid are recorded; then methods not mentioned by the respondent are asked specifically after a brief description of the method; finally, respondents are asked whether or not they have ever used each of the methods mentioned as "heard of." The results from the Turkish Fertility Survey are shown in Table 8. A great majority of the women in the sample — three-quarters or more — have heard of at least one contraceptive method. The most noteworthy increases in contraceptive knowledge are brought by literacy. Among literates, more than nine out of 10 women (93.6 per cent) and almost all women with at least eight years of schooling have heard of a method of family planning. The proportion of women who have ever used an efficient contraceptive or any contraceptive method also steadily increases with rising levels of education, irrespective of the age of women. Literacy, however, again plays the most important role in increasing contraceptive use. Formal schooling at the primary education level seems to bring only marginal increases in contraceptive use, while only secondary or higher education promotes substantial gains in the proportion who have ever used a "modern"

The Relationship of Education to Fertility in Turkey

TABLE 8. CONTRACEPTIVE KNOWLEDGE AND USE AMONG
EVER-MARRIED WOMEN BY CURRENT AGE
AND EDUCATION, TURKEY, 1978.

Current age	Education				All levels
	Illiterate	Literate	Primary	Secondary or higher	
A. Percent who have heard of a contraceptive method ¹					
Under 25	74.1	93.6	94.1	99.0	87.7
25-34	85.2	93.0	97.3	100.0	91.5
35-44	80.8	94.0	96.6	100.0	86.8
45-49	77.9	95.0	97.4	100.0 ^a	83.9
Under 50	80.5	93.6	95.8	99.7	88.3
B. Percent who have ever used a contraceptive method					
Under 25	23.8	46.8	51.3	58.6	42.2
25-34	46.5	64.0	76.1	92.8	62.8
35-44	48.4	73.6	82.8	93.2	61.1
45-49	35.1	63.3	71.1	87.0	46.6
Under 50	41.4	63.7	66.7	82.8	55.1
C. Percent who have ever used an "efficient" contraceptive method ²					
Under 25	12.3	22.9	29.0	44.4	24.1
25-34	29.7	44.0	51.1	69.9	42.4
35-44	27.3	44.0	48.9	68.9	36.2
45-49	18.6	35.0	44.7	69.6	26.9
Under 50	24.0	38.8	41.2	62.5	34.1
N	2,183	551	1,348	349	4,431

¹

Methods specified include: IUD, pill, douche, condom, rhythm, withdrawal, abstinence, injection, sterilization (male and female), intrauterine folk methods, other medical female methods such as diaphragm, foam, jelly, etc.

²

Efficient methods include: IUD, pill, diaphragm, foam, jelly, condom, injection, and sterilization.

Source: Same as for Table 1.

method. The turning points, then, are literacy in both knowledge and use of contraception, and eight or more years of formal schooling in the use of "efficient" methods.

Since contraceptive use is a function of the desirability of an additional child, the current contraceptive use status of women is a better measure of the educational differentials. World Fertility Survey First Reports typically present contraceptive use rates based on women exposed to risk of pregnancy at the time of the survey, rather than based on all currently married women of reproductive age. This introduces a bias which tends to blot out differentials in contraceptive practice among population subgroups. When fertility is high in a group, more women are excluded by current pregnancy from the base population (that is, not exposed to the risk), thus increasing the apparent rate of contraceptive practice for that group as compared with other groups of lower fertility (Kangas, 1982). For example, proportionately more women with lower education are pregnant at a given time than women with higher education. Excluding currently pregnant women from the base tends to artificially increase the contraceptive use rate in the low education/high fertility group and therefore to smooth out the differences in contraceptive use compared with that of the high education/low fertility group.

Using the data available in the TFS First Report (Hacettepe Institute of Population Studies, 1980), we calculated contraceptive use rates based on *all* women of reproductive age who were married at the survey date. These are presented in Table 9. The current use of both the traditional and the modern methods increases markedly by rising levels of education. Literacy appears to produce the most pronounced change in the use of all methods, and primary education seems to have a relatively lesser effect on current use. At postprimary education levels, further substantial increases are noted, especially in the use of "efficient" methods. The influence of education on levels of contraceptive use is more noticeable among younger women, particularly with respect to "modern" methods.

In Table 10, a final refinement is introduced into our attempts to delineate the educational differentials in family size preferences and means of achieving the preferred size. Panel A shows the proportions of women who want no more children, by educational attainment, controlling for the number of living children. Within the first two parity-specific categories, the per cent of fecund women who want to terminate childbearing increases sharply with literacy and with postprimary education. The lack of any significant change between primary education and mere literacy is noteworthy. In the one- or two-living-children category,

The Relationship of Education to Fertility in Turkey

TABLE 9. CONTRACEPTIVE USE AMONG MARRIED WOMEN
BY CURRENT AGE AND EDUCATION, TURKEY, 1978.

Current Age	Education				
	Illiterate	Literate	Primary	Secondary or higher	All levels
A. Percent currently using a method ¹					
Under 25	15.8	29.2	34.0	42.6	28.4
25-34	32.5	52.2	62.9	79.1	49.8
35-44	37.4	59.5	64.8	76.1	48.7
45-49	19.9	36.0	41.8	35.0 ^a	26.6
Under 50	29.5	48.0	50.0	65.8	41.4
B. Percent currently using an "efficient" method ²					
Under 25	4.9	9.4	13.7	25.5	11.5
25-34	13.0	18.7	23.3	35.1	19.4
35-44	12.1	19.0	19.3	28.2	15.6
45-49	4.8	6.0	17.9	10.0 ^a	7.5
Under 50	10.1	15.4	18.3	29.4	15.0
N	1,867	501	1,269	333	3,970

^aBase less than 25.

¹See note 1, Table 8.

²See note 2, Table 8.

Source: Same as for Table 1.

this may be a result of the preponderance of young women (with only one living child) who have not yet achieved their desired family size. Among women who want no more children, the use of efficient contraceptive methods is related directly to education (Table 10, panel B). The use of modern methods increases sharply with postprimary education for women who have one or two living children, and with literacy among those who have three or four children.

The most notable situation revealed by the figures in Table 10 is the low level of use of effective contraceptive methods, even among those

TABLE 10. FAMILY SIZE PREFERENCES AND
CONTRACEPTIVE USE AMONG MARRIED WOMEN,
UNDER AGE 50 BY NUMBER OF LIVING CHILDREN
AND EDUCATION, TURKEY, 1978.

Number of living 1 children	Education				
	Illiterate	Literate	Primary	Secondary or higher	All levels
A. Percent who want no more children among fecund women					
1-2	26.6	36.7	34.5	44.6	34.1
3-4	70.4	80.5	83.5	92.1	77.2
5 or more	84.0	93.0	93.7	a	85.7
1 or more	65.3	67.2	54.5	55.7	61.3
N	1,648	438	1,105	289	3,480
B. Percent using an "efficient" contraceptive method among women exposed to risk of pregnancy and want no more children					
1-2	24.7	27.5	26.8	36.0	27.8
3-4	16.3	24.5	27.7	29.1	22.3
5 or more	14.5	15.4	21.2	a	15.2
1 or more	16.1	21.8	26.7	33.1	21.2
N	932	257	517	145	1,851

1
Includes current pregnancy, if any, for women in panel A.

a
Base too small to calculate meaningful statistics.

Source: Same as for Table 1.

who want no more children. Although more than three-quarters of the women who have three or four children want to cease having children, only one in five of these women has a good chance of successfully terminating childbearing.

Summary and Discussion

The nature of the relationship between education and fertility has been examined in a context where education is treated as an undifferentiated mass, the influence of which is known and assumed to be similar across all levels and situations. Even at this crude level of conceptualization and measurement, quantity of education attained by women seems to be a fair indicator of their fertility, desired family size, and knowledge and use of contraception. Although it appears that the relationship between education and the intermediate factors which directly affect fertility is not always linear, a few years of schooling or even mere literacy have pronounced effects on the marital fertility of Turkish women. Data examined here indicate a steep negative gradient in actual fertility with rising levels of wives' education.⁵ The desired family size is also inversely related to education, although the changes with increasing education are not as distinct. Furthermore, despite evidence to the contrary elsewhere in the literature, the education-fertility relationship holds in both rural and urban areas. Women with higher educational attainment marry later, want smaller families and seem to regulate their fertility more efficiently than women with less or no education. Even though contraceptive knowledge seems to be fairly widespread among women of all educational levels, contraceptive use — especially the use of efficient methods — is relatively more prevalent among the better-educated. In both instances, it seems to make little difference whether or not a woman has finished elementary school: mere literacy or a few years of schooling is nearly as effective in increasing knowledge and use of contraceptive devices and practices. Beyond literacy, only higher levels of schooling appear to have any sizeable effect on fertility regulation, past or present.

In sum, the significance of education in fertility variations is obvious. Education appears to be a major factor behind fertility reduction; it is a force which seems to operate, through the various intermediate variables directly related to fertility. If this is true, the next step is to discover what aspect of rising schooling or mere literacy is most strongly related to lower fertility so that social policies can be designed and implemented to replicate these effects on a large scale in order to hasten fertility decline. It is beyond the scope of this paper to provide a detailed account of this. However, there are some obvious implications for both policy and further research which need to be mentioned.

There are three major areas where public policy can be most influen-

tial in directly or indirectly affecting fertility: public schooling, age of marriage and family planning programmes.

The overall level of literacy in Turkey is not high: only 62 per cent of the population aged six and over was literate in 1975. More importantly, female literacy (48 per cent) lagged considerably behind male literacy (75 per cent) despite the impressive progress during the last several decades (Turkey, 1977). School attendance is also very low: 55 per cent of the school-age males and 34 per cent of the females have ever completed any level of formal schooling. High sex ratios in school enrollment and school completion are clear signs of the sex differentials in education. In 1975, the sex ratio in primary school enrollment was 125, and it was higher in rural areas (132) than in urban areas (116). The sex ratios in both areas were higher for completion than enrollment, which indicates that a smaller proportion of the enrolled females than males graduate. This seems to be more prevalent in the rural areas where fertility is also higher. Beyond elementary school, gradually increasingly more males are found in each successive level of education. In 1973, the sex ratio at graduation was 213 in high schools and 400 in colleges (Turkey, 1977).

When cohort data are examined, a distant trend in the reduction of the educational gap between males and females is observed. However, undoubtedly there is ample room for further improvements. In view of the evidence which suggests that greater exposure to schooling or informal education produces a notable depression in fertility and that females lag considerably behind males in terms of schooling, the pressing needs and the avenues of policy intervention seem to be more obvious. First of all, in most of the less developed countries, it is common to observe an unequal distribution of educational facilities (as well as others, such as health centres) favouring urban areas. Beyond the fact that this might be a result of the political reality in educational policy, which militates against improvement of educational facilities in areas remote from urban centres, there seems to be no reason why such inequalities cannot be gradually remedied, when the social benefits in the long run clearly outweigh the short-term political gains.

Secondly, primary education in Turkey is free and has been compulsory for over half a century, but enrollment and attendance rules have obviously not been enforced efficiently. While compulsory education may not be a practical solution in all developing countries, in a society where it was promulgated 50 years ago, attendance could be encouraged and compelled more vigorously. For instance, the option of providing incentives for parents to enroll their daughters and to keep them in school

should be considered vis-à-vis the so-far ineffective public sanctions. In addition, a special effort could be made to provide more opportunities for women to attend school by providing attractive alternatives to early marriage and motherhood, for example, by increasing opportunities for gainful employment outside the household and by reducing or eliminating discrimination in recruitment, promotion and wage policies. This will not necessarily immediately emancipate the women from their traditional roles, but will be a strong factor in the enhancement of the general status of women which will lead to a decline in the birth rates.

Thirdly, we have observed a salient relation between literacy and fertility. Adult literacy programmes and increasing the opportunity for women to attend adult education programmes could be extremely efficacious in obtaining the desired results among women who have not had any formal schooling and are too old to return to school. Along with instruction on reading and writing, general family planning themes and contraceptive information could also be provided at the same time. The benefits of increasing functional literacy among women will not be confined solely to reducing fertility.

Finally, there is the complete absence of population-related matters in public school curricula. Population education could be incorporated into the instructional programmes of the schools, at least to increase the awareness of global population issues and possibly to present the inter-connections between population growth and such areas as natural resources, health, nutrition and societal development. Such instructional programmes could create a favourable climate for a shift in the family size preferences toward lower fertility.

Lesthaeghe (1971) has shown that it will not be possible to achieve a replacement level of fertility, in most developing countries, by increasing (within the range of plausibility) the level of fertility regulation alone; age at marriage and/or the proportion who never marry would have to rise as well. More recently, Trussell *et al.* (1982) have examined the impact of nuptiality on fertility and concluded that nuptiality can influence strongly the level of fertility. We have observed, above, the negative relation of age at marriage to cumulative fertility. The singulate mean age of marriage reportedly has been rising in Turkey, and the proportions married at early ages have been declining. It has been estimated that the decline in proportions married resulted in a reduction of about seven per cent in the crude birth rate between 1960 and 1975 (Ozbay *et al.*, 1979). Nevertheless, a sizeable proportion of the women in Turkey still marry at a relatively young age: nearly one-third of the women in the 1954-58

birth cohorts were married before age 17, and slightly less than one-fifth before age 16 (Hacettepe Institute of Population Studies, 1980). In Turkey, where the minimum legal age at marriage is set by the government, young women could be discouraged from early marriage either by raising the minimum legal age and allowing fewer exemptions than currently is the case, or by instigating delay of marriage through increased alternatives to familial activities.

Lastly, the government could implement its population policy diligently and efficiently to avoid the relapses it has suffered in carrying out the various programmes adopted in the five-year development plans since the early 1960s. The gap between the desired and actual family sizes, the failure to use a modern, efficient method of contraception by large proportions of women who do not want more children, and the high rate of discontinuation of use of contraception are indicators of problems in the supply and availability of contraceptive and other family planning services. As the infant and child mortality rates — which are still higher than the level of development would suggest — begin to decline drastically, the demand for effective fertility regulation will increase considerably. Hence, there is an urgent need to extend the family planning services and supplies throughout the country, but especially to those who need it the most: uneducated women in general, and women in rural, backward, remote parts of the country, in particular. Clearly, the required conditions and restrictions on the availability of contraceptives and abortion and sterilization-on-demand can be relaxed or, better yet, can be entirely removed to facilitate easy access. It also appears that functional literacy will play an important role in the success of fertility regulation if greater emphasis is placed on dissemination of family planning information through the mass media.

Future research in this area should be directed toward examining the indirect effects of education on fertility through the intermediate variables not discussed here, as well as toward delineating those features of "schooling" which seem to account for its ability to affect fertility. The crucial issue for policy research is to determine the relative importance of each type of effect and to estimate the parameters of change needed in education, as well as in the intermediate variables, to produce a given amount of change in fertility. The evidence strongly argues that education, whether mere functional literacy or formal schooling, is surely one of the most powerful means of depressing fertility in Turkey, as well as in many of the developing countries.

The Relationship of Education to Fertility in Turkey

Acknowledgments

This is a revised version of the paper presented at the annual meeting of the Population Association of America held in Washington, D.C., 25-28 March 1981. I wish to thank the anonymous reviewers and Marjorie C. Horn for their valuable comments and suggestions.

Footnotes

1. The timing and spacing of births should be examined using birth interval data. In the absence of birth interval data, an indication of the tempo of fertility can be obtained from the number of children ever born to each age group in the reproductive period, assuming that the tempo has stayed relatively stable. This may not be a strong assumption for cross-cultural comparisons, but for within-country comparisons it may be useful, for the tempo within subgroups of a population can be assumed to be less volatile.
2. The terms "elementary" and "primary" education are used interchangeably.
3. The lack of variation among women who have been married 20 or more years is possibly due to (a) underreporting by older women due to recall errors and (b) selectivity bias in the sample due to restricting the upper age limit to 49, which favours those women who married early in the 20-years-or-more marriage duration category.
4. Obtained by comparing the mean age at first marriage for women who married by age 25 to that for all ever-married women by current age.
5. The relation between the husbands' education and marital fertility is also reciprocal, but the association is generally weaker (data not shown).

References

- Becker, G. 1960. An Economic Analysis of Fertility. In *Demographic and Economic Change in Developed Countries*. Princeton, New Jersey: National Bureau of Economic Research.
- Blake, J. 1965. Demographic science and the redirection of population policy. *Journal of Chronic Diseases* 18:1181-2000.
- Bongaarts, J. and R.G. Potter. 1983. *Fertility, Biology and Behavior: An Analysis of the Proximate Determinants*. New York: Academic Press.

- Bouvier, L.F. and J.J. Macisco. 1968. Education of husband and wife and fertility in Puerto Rico: 1960. *Social and Economic Studies* 17:49-59.
- Caldwell, J.C. 1968. *Population Growth and Family Change in Africa: The New Urban Elite in Ghana*. New York: Humanities Press.
- Carleton, R.O. 1967. The Effect of Educational Improvement on Fertility Trends in Latin America. In *Proceedings of the World Population Conference, Belgrade, 1965*, vol. 4, pp. 141-145. New York: United Nations.
- Cleland, J.G., R.J.A. Little and P. Pitakrongsombati. 1979. *Illustrative Analysis: Socio-Economic Determinants of Contraceptive Use in Thailand*. World Fertility Survey, Scientific Reports, no. 5.
- Cochrane, S.H. 1979. *Fertility and Education: What Do We Really Know?* World Bank Staff Occasional Papers, no. 26. Baltimore, Maryland: The Johns Hopkins University Press.
- Dandekar, K. 1967. Effect of Education on Fertility. In *Proceedings of the World Population Conference, Belgrade, 1965*, vol. 4, pp. 146-149. New York: United Nations.
- Davis, K. and J. Blake. 1956. Social structure and fertility: An analytical framework. *Economic Development and Cultural Change* 4:211-235.
- Dow, T.E. 1971. Fertility and family planning in Sierra Leone. *Studies in Family Planning* 2:153-165.
- Freedman, R., P.K. Whelpton and A.A. Campbell. 1959. *Family Planning, Sterility and Population Growth*. New York: McGraw Hill.
- _____, J.Y. Peng, Y. Takeshita and T.H. Sun. 1963. Fertility trends in Taiwan: Transition and change. *Population Studies* 16:219-236.
- _____ and L. Coombs. 1974. *Cross-Cultural Comparisons: Data on Two Factors in Fertility Behavior*. New York: The Population Council.
- Friedlander, S. and M. Silver. 1967. A quantitative study of the determinants of fertility behavior. *Demography* 4:30-70.
- Goldstein, S. 1972. The influence of labour force participation and education on fertility in Thailand. *Population Studies* 26:419-436.
- Grabill, W.H., C. Kiser and P.K. Whelpton. 1958. *The Fertility of American Women*. New York: John Wiley and Sons.
- Hacettepe Institute of Population Studies. 1980. *Turkish Fertility Survey, 1978: First Report*, volumes 1 and 2. Ankara, Turkey.
- Holsinger, D.B. 1974. The elementary school as a modernizer. In A. Inkeles and D.B. Holsinger (eds.), *Education and Individual Modernity in Developing Countries*. Leiden, Netherlands: E.J. Brill.

The Relationship of Education to Fertility in Turkey

- Husain, I.Z. 1970. Educational status and differential fertility in India. *Social Biology* 17:132-139.
- Kangas, L.W. 1982. A note on the 1978 Turkish Fertility Survey: A problem defining contraceptive prevalence and consequent confusion. *Turkish Journal of Population Studies* 4:55-63.
- Karadayi, F. 1971. Socio-Economic Correlates of Fertility Behavior and Attitudes in Turkey. M.A. Thesis. Hacettepe University, Ankara, Turkey.
- Kasarda, J.D. 1971. Economic structure and fertility: A comparative analysis. *Demography* 8:307-317.
- Khalifa, A. 1973. A proposed explanation of the fertility gap differentials by socio-economic status and modernity: The case of Egypt. *Population Studies* 27:431-442.
- _____. 1976. The influence of wife's education on fertility in rural Egypt. *Journal of Biosocial Science* 8:53-60.
- Kirk, D. 1971. A New Demographic Transition? In U.S. National Academy of Sciences, *Rapid Population Growth: Consequences and Policy Implications*, volume 2. Baltimore, Maryland: Johns Hopkins University Press.
- Kiser, C., W.H. Grabill and A.A. Campbell. 1968. *Trends and Variations in Fertility in the United States*. Cambridge, Massachusetts: Harvard University Press.
- Knodel, J. and P. Pitaketsombati. 1973. Thailand: Fertility and family planning among rural and urban women. *Studies in Family Planning* 4:229-255.
- Lesthaeghe, R. 1971. Nuptiality and population growth. *Population Studies* 25:415-433.
- Mason, K., D. Abraham, E. Gerstel, Q. Lindsey and M. Rulison. 1971. *Social and Economic Correlates of Family Fertility: A Survey of the Evidence*. Research Triangle Park, North Carolina: Research Triangle Institute.
- Miro, C.A. and F. Rath. 1965. Preliminary findings of comparative fertility surveys in three Latin American cities. *Milbank Memorial Fund Quarterly* 43:36-68.
- Morgan, R.W. 1975. Fertility levels and fertility change. In J.C. Caldwell, N.O. Addo, S.K. Gaisie, A. Igun and P.O. Olusanya (eds.), *Population Growth and Socioeconomic Change in West Africa*. New York: Columbia University Press.
- Mueller, E. 1972. Economic motives for family limitation: A study conducted in Taiwan. *Population Studies* 27:383-403.
- Nepal, Ministry of Health, Nepal FP/MCH Project. 1977. *Nepal Fertility Survey 1976, First Report*. Kathmandu, Nepal.

- Ozbay, F. 1979. Education and Fertility in Rural Turkey. Studies in Development. METU Publication, no. 22/23, Ankara, Turkey: Middle East Technical University.
- . 1981. The Impact of Education on Women in Rural and Urban Turkey. In Nermin Abadan-Unat (ed.), *Women in Turkish Society*. Leiden, Netherlands: E.J. Brill.
- , F. Shorter and S. Yener. 1979. Accounting for the Trend of Fertility in Turkey. In United Nations Department of International Economic and Social Affairs, *Demographic Transition and Socio-Economic Development*. Population Studies no. 65, pp. 125-134. New York: United Nations.
- Rodriguez, G. and J. Cleland. 1980. Socio-Economic Determinants of Marital Fertility in Twenty Countries: A Multivariate Analysis. Paper presented at the World Fertility Survey Conference, London, England, 7-11 July 1980.
- Ryder, N.B. and C.F. Westoff. 1971. *Reproduction in the United States, 1965*. Princeton, New Jersey: Princeton University Press.
- Schultz, T.P. 1972. Fertility patterns and their determinants in the Arab Middle East. In C.A. Cooper and S. Alexander (eds.), *Economic Development and Population Growth in the Middle East*. New York: Elsevier.
- Speare, A. Jr., M.C. Speare and H.-S. Lin. 1973. Urbanization, non-familial work, education and fertility in Taiwan. *Population Studies* 27:323-334.
- Stycos, J.M. 1965. Female employment and fertility in Lima, Peru. *Milbank Memorial Fund Quarterly* 43:42-54.
- and R. Weller. 1967. Female working roles and fertility. *Demography* 4:210-217.
- Tanfer, K. 1975. Working women: A study of female labour force and determinants of participation in six large cities of Turkey, 1970. Unpublished Ph.D. Dissertation. University of Pennsylvania, Philadelphia, Pennsylvania.
- Thailand, Population Survey Division, National Statistical Office and Institute of Population Studies, Chulalongkorn University. 1977. *The Survey of Fertility in Thailand: Country Report, Volume I*. Bangkok, Thailand.
- Timur, S. 1974. Fertility. In F. Karadayi, S. Timur, M. Macura, S. Yener, H. Cillov, H. Tezmen, S. Uner and H.A. Kisnisci, *The Population of Turkey C.I.C.R.E.D. Series*. Ankara, Turkey: Hacettepe Institute of Population Studies.
- . 1978. Socioeconomic determinants of differential fertility in Turkey. In J. Allman (ed.), *Women's Status and Fertility in the Muslim World*. New York: Praeger Publishers.

The Relationship of Education to Fertility in Turkey

- Trussell, J., J. Menken and A.J. Coale. 1982. A General Model for Analyzing the Effect of Nuptiality on Fertility. In L.T. Ruzicka (ed.), *Nuptiality and Fertility: Proceedings of a Seminar held in Bruges (Belgium), 8-11 January 1979*. Liege, Belgium: Ordina Editions.
- Turkey. State Institute of Statistics. 1977. *Statistical Yearbook of Turkey, 1977*. Ankara, Turkey. Publication no. 825.
- United Nations. 1980. *Selected Factors Affecting Fertility and Fertility Preferences in Developing Countries: Evidence From the First Fifteen WFS Country Reports*. Paper presented at the World Fertility Survey Conference, London, England, 7-11 July 1980.
- Ware, H. 1974. *Ideal Family Size*. World Fertility Survey, Occasional Paper no. 13.
- Westoff, C.F. and N.B. Ryder. 1977. *The Contraceptive Revolution*. Princeton, New Jersey: Princeton University Press.
- Williamson, J.B. 1970. Subjective efficiency and ideal family size as predictors of favourability toward birth control. *Demography* 7:329-339.

Received April, 1982; revised December, 1983.

