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A STUDY OF THE SOCIO-ECONOMIC DETERMINANTS OF FERTILITY IN TURKEY

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# I.  INTRODUCTION

Population growth in underdeveloped countries reached unprecedented
levels during the last two decades as a result of a rapid decline in mor-
tality rates.  The present trend of domographic transition in these coun-
tries is different from the industrialized countries when they were at
similar stages of development, where the decline in mortality rates more
or less coincided with a reduction in natality. Also, the decline in
mortality was much slower than what the underdeveloped countries are ex-
periencing.  In underdeveloped countries, the crude birth rates have re-
mained around forty per thousand, while slightly higher in Africa and the
Middle East.  During the last two decades the death rates have rapidly
declined to around fifteen per thousand, resulting in an average annual
population growth rate of 2.5 percent.

At the same time, the present annual rate of population growth in
industrialized countries is less than half of the population growth rate
of the underdeveloped countries. The difference in population growth has
become so prominent between these two groups of countries that it is often
used as a criterium in order to distinguish the level of economic develop-
ment. Dudley Kirk drawing attention to the sharp dichotomy between the
natality in developed and underdeveloped countries suggests that "natality

is itself perhaps the best single socio-economic variable distinguishing developed and less developed countries".[1]  J. Spengler also points out that gross reproduction rate /is below 2 in all developed countries, and above 2 in all the underdeveloped world which includes nearly all African, Asian and Latin American countries.[2]

The rapid population increase in the underdeveloped countries has caused widespread concern. For example the Pearson Commission Report states that:

"No other phenomenon casts a darker shadow over the prospect for international development than the staggering growth of population. It is evident that it is a major cause of the discrepancy between rates of economic improvement in rich and poor countries"[3]

The high rate of population growth presents a serious challenge to policy makers and planners in the underdeveloped countries.  While the problem is more acute in high-density countries, the rapid increase in population claims the modest gains in output everywhere and slows down the

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1.  D. Kirk, "Natality in the Developing Countries:  Recent Trends and Prospects", in S. J. Behrman et al., eds., Fertility and Family Planning:  A World View. (Ann Arbor: Univ. of Michigan, 1963), p. 76.

2.  J. J. Spengler, "The Economist and the Population Question", AER, March 1966, p. 15.

3.  Partners in Development,  Report of the Commission on International Development, (New York:  Praeger Publishers, 1969) p. 55.

potential improvements in per capita incomes. During the last two decades
the gross domestic product in underdeveloped countries increased by
5 percent annually, but because of the 2.5 percent population growth the
per capita income increase was limited to around 2.5 percent, a level
well below the 3.6 percent per capita income increase in the industrialized
countries.[4] Also, it is broadly accepted that high rates of population
growth impede development by adversely affecting the level of domestic
savings, the composition of output, and the already severe unemployment.
It is small wonder that the governments in no less than 30 countries have
launched family planning programs in order to reduce the pressures origi-
nating from high fertility.

Concern over the so-called "population explosion" is also evident in
the more developed countries. Even though the population grows at a much
slower rate and the pressures of population on resources is felt with
much less intensity, the "world crisis in population" also concerns the
public in developed countries. The legitimate outcry of the environmenta-
list certainly does not represent the total source of concern. Presently
some 70 percent of the world population lives in the underdeveloped coun-
tries, and given the present rates of population growth, this ratio will be
no less than 75 percent by the turn of the century. If high fertility
proves to be detrimental to the improvement of existing living standards,
it may present a serious challenge to the social and political stability

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4.  <u>Ibid</u>, p. 55.

in the world. The policy makers in countries with higher material stan-
dards are concerned about the potential problems that may arise in a
world community whose members are getting relatively poorer. This kind of
consideration urged the governments of these countries and the inter-
national bodies where the rich countries are dominant to mobilize their
resources in curbing the rapid population growth in poor countries.

Despite this understandable concern over the population issue, present
knowledge of the causes of differential fertility is still in its infancy.
It is only during the last ten or fifteen years that economists have shown
genuine interest in the interaction between the socio-economic and demo-
graphic factors. However, in a relatively short period of time an im-
pressive list of studies has been compiled in the West exploring the im-
pact of such variables as income, urbanization and education on the fer-
tility behavior of families. The studies on this subject have basically
covered the more developed countries. Insufficient data has discouraged
similar studies in underdeveloped countries where the need is actually
greater.

The purpose of this paper is to explore the relationship between
various socio-economic variables and fertility in Turkey. Total fertility
and child-woman ratios have been taken as the dependent variables and
their relationship with the level of income, education, urbanization and
industrialization have been explored. It would be appropriate here to
outline briefly the state of our knowledge on the question we are dealing
with before going into the detailed discussion of the methodology employed
and the findings of the study.

## II.  A SUMMARY SURVEY OF THE ECONOMICS OF POPULATION

Malthus' views on population influenced the economic thinking on the role of the population throughout the nineteenth and twentieth centuries. This is not to say that those who wrote on population during this period always agreed with Malthus' prediction that the world population increasing geometrically would outstrip food supplies which increase only by addition. But the economists centered their arguments around the issue of whether the fixed supply of land was a limiting factor particularly in view of the impressive increases in yields as a result of technological improvements, or whether the notion of optimum population (which suggests that there is an optimum combination of land and resources after which the returns to labor would diminish) was relevant or not.

It was after 1930, according to J. J. Spengler, that the body of economic thinking on the population issue was diverted from its Malthusian base.[5]  In the 1930's economists became concerned with the issue of whether the populations in the Western countries would become stationary or even decline. The idea that rapid population growth would be conducive to economic growth via increased demand for consumption and/or investments was popularized in this era by the stagnationist authors. Meanwhile, the so-called "Malthusian traps" seemed to be losing its appeal on account of an observable decrease in the estimated share of land and natural resources in economic growth compared with the share of capital accumulation and technological change.

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5.  J. J. Spengler, op. cit., p. 6.

But since the end of the Second World War revolutionary changes have taken place in the pattern of population growth particularly in the under-developed countries. There has been a revival of interest among the economists on the population issue as a result of this development. Nevertheless, save the exceptions of H. Liebenstein's[6] and R. Nelson's[7] attempts to incorporate population growth into theory, the numerous growth models that have been developed throughout this period remained surprisingly aloof towards the population phenomenon. And most economic models which attempted to incorporate the demographic factors treated population as an exogenous variable, losing much of their realism by not taking into account the fact that the demographic variables themselves are affected by socio-economic variables. Despite a growing body of literature on the interrelationship between economic and demographic factors, there are gaps and deficiencies in present knowledge on the topic. The present situation is summarized as follows in a recent United Nations report:

> "Although an integrated theory and empirical approach to the study of economic-demography is urgently needed, the current state of knowledge is neither sufficiently unified or comprehensive enough to infer with confidence the precise causes of various demographic events or their consequences of population trends".[8]

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6. H. Liebenstein Economic Backwardness and Economic Growth, (New York: John Wiley and Sons, 1957).

7. R.R. Nelson, "A Theory of Low-Level Equilibrium Trap in Underdeveloped Countries", AER, December 1956.

8. United Nations Report of the Ad Hoc Committee of Experts on Programmes in Demographic Aspects of Economic Development, 1970, p. 13.

It has been customary to classify various models dealing with the
economics-demography issue into the broad categories of macro economic and
micro economic approaches. Macro economic models study the interaction
between population on one hand and the key macro economic magnitudes on
the other, such as output, consumption, savings and employment. One such
macro economic model in which population plays a central role is the well-
known Coale and Hoover model, based on Indian experience.[9] This model pro-
vides a framework by which the economic impact of lower fertility can be
measured. The underlying assumptions of the model are that the size of
the labor force remained constant during the period under study, the qual-
ity of the labor force is not affected by the increased per capita con-
sumption, and only the monetized investments are taken into account. The
authors demonstrated that per capita incomes should be expected to increase
in less developed countries through lowered fertility, because the "wel-
fare expenditures" necessitated by lower fertility would allow a larger
portion of the total output to be invested in growth promoting capital
goods and thus stimulate economic growth. They showed that for a thirty
year period--from 1956 to 1986--the per capita income of India would grow
by 95 percent with low population growth.

The Coale and Hoover model is certainly an improvement over the more
simplistic Harrod-Domar model where growth in output is a function of in-
vestment only, and the contribution of labor to output is totally ignored

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9. A. J. Coale and E. M. Hoover, Population Growth and Economic
Development in Low-Income Countries, (Princeton: Princeton University
Press, 1958).

on the assumption that capital is the only scarce factor and labor is so abundant that its marginal productivity is zero or near zero. The major improvement in the Coale and Hoover model is that increases in population influence the aggregate output through its effect on savings and the pattern of investments. However, the Coale and Hoover model also implies the constancy of the capital-output ratio where increases in employment is a function of the capital invested and thus demographic variables do not directly influence output. This is not a realistic assumption particularly from the long term growth point of view of the economies.

In an attempt to overcome this deficiency, macro economic models have been constructed on basically neo-classical lines where both capital and labor are assumed to contribute to the growth of output. A production function of the Cobb-Douglas type with two factors, capital and labor, constitute the crux of these models. The increases in output is proportionate to a certain power of the capital and labor factors, where the exponents represent the elasticities of productivity of the factor involved. S. Enke's recent work is representative of this approach.[10] The model constructed by Enke includes a standard Cobb-Douglas production function along with an employment function linked on one hand with the rate of investment and with the available unemployed labor on the other. The levels of net investments and savings are estimated residually, once the level of of consumption is determined by the level of income and the population

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10. S. Enke, Population Growth and Economic Development: Background and Guide, Prepared for U.S. AID by Tempo, General Electric's Center for Advanced Studies, Santa Barbara, California, 1968.

growth. Then the model is solved under the two separate assumptions of constant fertility and declining fertility. The solution based on declining fertility results in slower population growth, a significant decline in the child-adult ratio, a significant increase in per capita gross national product and in total savings by the year 2000, while there is hardly any difference in the absolute level of gross national product.

The major shortcomings of both of these basically macro economic approaches as represented by the Coale and Hoover and the Enke models stem from their relatively simplistic, mechanical and one-sided nature. Macro economic models tend to oversimplify the interrelationship between the economic and demographic factors which is essentially a complex one. They totally disregard the behavioral aspects of this relationship and concentrate on the mechanics of how lowered fertility affects the growth in total output through its impact on consumption, savings and investments, assuming that aggregate production functions explain long term growth prospects for underdeveloped countries. Hoover suggests that in order to improve the realism of these economic-demographic models some measure of investment in "human capital" and technology should be included in the production functions along with the inputs of labor and capital as well as attention being paid to the economies of scale resulting from large population size.[11]

It should also be noted that the present macro economic models primarily emphasize only one aspect of the interaction between the demographic

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11.  E. M. Hoover, "Basic Approaches to the Study of Demographic Aspects of Economic Development, Economic-Demographic Models", Report prepared for the U.N. Conference on the Demographic Aspects of Economic Development, 1970, pp. 9-12.

and economic variables, namely the impact of reduced fertility over the key macro economic magnitudes, and often restrict their attention to only a few variables such as consumption, savings and per capita income. It is an established fact that human fertility itself is affected by socioeconomic factors such as change in income, educational improvement, urbanization and industrialization. This is actually the point of departure for the recently popular micro economic approach to the economics-demography phenomenon.

With the so-called micro economic analysis, the reproductive behaviour of couples in response to changes in their socio economic environment is evaluated. At the same time, the consequences of fertility changes are explored in terms of family consumption standards, saving patterns and labor force participation as well as how additional population pressure affects the behaviour of the couples.

A pioneer of the micro economic approach was H. Liebenstein. He discussed the utility derived from having children and the costs involved in rearing children.[12] Liebenstein identified three types of utilities accrued to the parents, as a result of first, a child being a "consumption good" (because it is a source of personal pleasure), second, "productive agent", and third, a "potential source of security". On the other hand he separated the cost of having an additional child into direct and indirect costs; direct costs being the "conventional expenses" of maintaining the

12. H. Leibenstein, op. cit., p. 161.

child and indirect costs referring to the "opportunities foregone" by
having an additional child. Leibenstein maintained that the correlation
between the level of income and the utility derived from an additional
child as a productive agent and a potential source of security was negative
while the relationship between income level and satisfaction from children
was indeterminate. Regarding cost, he suggested that both direct and
indirect costs of raising children increased as per capita income increased.

In 1960, G. Becker applied the conventional economic theory of con-
sumer behavior in a rigorous fashion to the fertility behavior of the
households.[13] According to Becker, "the theory of the demand for the con-
sumer durables is a useful framework in analyzing the demand for children"
since children provide "utility" as consumer durables. Like other consumer
durables, some children are of "higher quality", not because they are
superior but because the amount of money spent on them is relatively higher.
Becker maintains that since children are not inferior goods, the demand
theory tells us that an increase in income should increase both the quanti-
ty and the quality of children demanded. He thinks that Lieberstein erred
when he said that the cost of children rises as the parents' income increases.
According to Becker an increase in expenditure on children does not
necessarily mean a rise in the cost of children, but it means that parents
prefer "higher quality" children. It is not the cost but the quality of
children that goes up as income increases. As far as the supply of children

13. G. Becker, "An Economic Analysis of Fertility", in Demographic
and Economic Change in Developed Countries, A Conference of the Univer-
sities-National Bureau Committee for Economic Research, (Princeton: Prince-
ton Univ. Press, 1960) pp. 209-231.

is concerned, Becker argued that families tend to have "excess children" because of a lack of contraceptive knowledge. Given perfect knowledge of contraception, couples would choose to have a number of children based on the same principles that apply to the theory of demand for consumer durables.

R. Easterlin, in a 1969 article, continued where Becker left off and argued that "fertility behavior is the result of household choices, in which resources are weighed against preferences".[14] He suggested that income, tastes and prices are the building blocks of the study of the household behavior, and maintained that the "permanent income" concept is more pertinent to household decision-making than the observed income at a given time. The term permanent income is also defined as the potential income of the household. Given the potential income of a family, what determines the demand for children, he says, is the "structure of preferences" regarding goods, children, leisure and fertility control practice. On the other hand, experience, and past and current environment are instrumental in shaping the structure of preferences. Easterlin suggests that a third relevant factor, after permanent income and the structure of preferences is the various "price constraints", such as the prices of child care and of fertility control methods relative to the prices of other goods.

Easterlin does not agree with Becker's explanation of how the lack of contraceptive knowledge affects the supply of children. According to

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14. R. Easterlin, "Toward a Socio-Economic Theory of Fertility: A Survey of Recent Research on Economic Factors in American Fertility", in S. J. Behrman et al, eds., op. cit., pp. 127-156.

Easterlin the couples weigh the disutility of having an unwanted child
against the cost involved in fertility control, including the subjec-
tive cost. On account of this consideration the modern contraceptive
methods are more attractive than the traditional ones, not only because
they are more efficient but also because their subjective cost is con-
siderably lower.

These pioneering works on the theory of fertility behavior have stimu-
lated empirical studies exploring the relationship between economic and
social variables, and demographic variables. In some studies the relation-
ship between fertility and various measures of income was investigated.
In one such study, D.S. Freedman found that potential income was more in-
fluential on fertility than current income.[15] R. Freedman and L. Coombs
showed that increases in income might encourage the demand for children,
but "other reasons for not having children also increase with higher
economic status".[16] J. Blake showed that as the money income increased,
the "indirect costs" of raising children also increased.[17] The findings
of these studies generally supported the view that rising incomes en-
couraged fertility but at the same time increases in the cost of raising
children adversely affected fertility.

As the foregoing shows, theoretical models and empirical studies
of micro economic nature gained prominence during the last decade. These

15. D. S. Freedman, "The Relation of Economic Status to Fertility",
AER, June 1963.

16. R. Freedman and L. Coombs, "Economic Considerations in Family
Growth Decisions", Population Studies, Nov. 1966, p. 213.

17. J. Blake, "Income and Reproductive Motivation", Population
Studies, 1967.

studies approach the population problem at the family level and attempt to determine the impact of economic variables on the fertility behavior of the married couples. They represent important strides forward in the state of knowledge in this field compared to ten years ago. Nevertheless a number of questions remain unanswered or not sufficiently explored. One such area is the lack of comprehensive models bridging the gap between the macro and the micro approaches. The incorporation of the micro findings with the macro models would increase the realism of these models considerably.

Secondly there has been a heavy reliance on purely economic factors in these studies. As shown in the examples above, the relationship between income and fertility has been the center of attention. However, social factors may be equally important in the determination of fertility behavior. Even though factors such as education, urbanization, industrialization are often cited as relevent in the fertility discussions, their full impact has not so far been properly dealt with. A much needed comprehensive approach would require the recognition of these factors altogether.

Thirdly, the present theoretical models have been developed to explain the population phenomenon in the industrialized countries. Within this framework the treatment of children as consumer durables is appealing. But for a theory of fertility behavior to have universal value, it must take into account the socio economic conditions prevailing in the underdeveloped countries. Liebenstein's earlier contribution that children are not only consumer durables, but also productive agents and potential sources of security is certainly relevant in poor countries.

A similar criticism also applies to the empirical studies carried out on this subject. These studies are often based on the experience and data of the industrialized Western countries. Thus the applicability of the findings of these studies is very limited. The paucity of reliable data is certainly the major factor contributing to the lack of similar studies for the underdeveloped countries. Studies of this nature require the availability of detailed information on a number of variables and with the exception of a few countries this is not possible at present  But it is in these very countries that the need for an understanding of fertility behavior is most urgent so that appropriate policies can be formulated and implemented.

The following explores the socio-economics of fertility within the Turkish context.  Needless to say, the analysis is constrained by the limited data in many instances. At this stage, however, it would be appropriate to give some information on the socio-economic and demographic characteristics of the Turkish population.

III.  SOCIO-ECONOMIC AND DEMOGRAPHIC BACKGROUND

Turkey has a population of 35.7 million according to the preliminary results of the 1970 census. Turkey's population grew at an annual rate of 25.5 per thousand during the 1965-70 period. The rate of population growth has fluctuated in the past; from nearly 2 percent in 1935-40, it dropped to almost I percent during the Second World War years, but due to rapid lowering of mortality immediately after the War, growth rates jumped to 2.2 percent in 1945-50, to 2.8 in 1950-55 and 2.9 percent in 1955-60 before

it slowed down around 2.5 percent in the 1960-65 period. The lower growth rates in the sixties are not attributable to the slowing down of the fertility.  It is the result of the changes in the age distribution of the population--i.e., women entering the child bearing age who were born in the low growth rate period of 1940-45--and migration due to increased job opportunities in Western Europe.

The characteristics of Turkey's population are summarized in Table I based on the results of the Turkish Demographic Survey 1966-67.[18] The figures given are both for Turkey as a whole and for rural and urban populations separately.  As the data in Table I reveals, there is a marked difference in size between the rural and urban populations in most categories. At present, more than 65 percent of the Turkish people live in scattered village-type settlements or in small towns, and the remaining 35 percent live in towns and the cities with a population of 2,000 or more. The population of the cities increased by more than 5 percent annually throughout the 1960's. This, has not been the result of a higher birth rate in the cities, bu  rather because of migration from the villages to the cities.  Along with the phenomenon of city-bound migration, there has also been an east to west movement of population in Turkey. Despite comparatively lower birth rates in the Western provinces, more than two thirds of the Turkish population live in the Western part of the country, where the soil is more fertile and the level of industrialization is higher.

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18.  Vital Statistics from the Turkish Demographic Survey, 1966-67, School of Public Health, Ankara, 1970.

## Table I

## Vital Statistics for Turkey

|  | Turkey | Rural | Urban |
|---|---|---|---|
| **Age Groups (percentage)** | | | |
| 0-14 | 42.5 | 39.7 | 39.7 |
| 15-64 | 53.3 | 51.9 | 56.2 |
| 65+ | 4.2 | 4.1 | 4.1 |
| Dependency Ratio (percentage) | 87.6 | 92.7 | 77.9 |
| Proportion of Married Women (15-64) (percentage) | 78.3 | 80.0 | 75.2 |
| Median Age | 18.9 | 18.2 | 20.5 |
| **Median Age at First Marriage** | | | |
| Male | 21.2 | 20.2 | 22.9 |
| Female | 18.3 | 18.3 | 18.5 |
| Women of Childbearing Age (15-49) (percentage) | 22.8 | 22.2 | 24.0 |
| Crude Birth Rates (per thousand) | 39.6 | 43.9 | 31.4 |
| Crude Death Rates    "    " | 14.6 | 16.7 | 10.7 |
| Natural Increase    "    " | 25.0 | 27.2 | 20.7 |
| Total Fertility | 5.30 | 6.12 | 3.88 |
| Gross Reproduction Rates | 2.62 | 3.01 | 1.94 |
| Mean Childbearing Age | 29.3 | 29.7 | 28.4 |
| Child-Woman Ratio (percentage) | 71.3 | 77.3 | 60.8 |
| **Child Mortality (percentage)** | | | |
| Ages 0-1 | 14.6 | 16.1 | 11.9 |
| 0-5 | 18.7 | 20.9 | 14.7 |
| 0-15 | 20.3 | 22.6 | 16.1 |
| Expectation of life at Birth | 54.9 | 52.8 | 58.6 |

Source: Turkish Demographic Survey 1966-67.

One striking, though not surprising characteristic of the Turkish population is the high percentage of children. Children under 15 constitute some 42.5 percent of the total population according to the Turkish Demographic Survey, as shown in Table 1. As a result of higher population growth rates in recent decades, the share of this young age group has relatively increased. According to the census results in 1945, it was 39.5 percent, in 1950 38.3 percent, in 1955 39.4 percent, in 1960 41.3 percent and in 1965 it was 41.7 percent. Such an age distribution, despite the low percentage of those over 65 results in high dependency ratios; it is defined as the ratio between the non-working age and working age populations and is 87.6 percent for Turkey. The difference between the dependency ratios for rural and urban areas is also significant, it being as high as 92.7 percent in rural villages against 77.9 percent for the cities.

There are also differences between the rural and urban areas in terms of the median age, proportion of married women and median age at first marriage, as shown in Table 1. Both the median age as a whole and the median age at first marriage for males and females are lower for the rural areas compared with the cities. On the other hand, the proportion of married women is higher in the villages.

It is also revealed in Table 1, that the crude birth rates for the whole country is nearly 40 per thousand, and the crude death rates are around 15 per thousand. Nearly 150 out of 1000 children die before they reach the age of one. Expectation of life at birth is approximately 55 years.

Total fertility rate, defined as the total number of children that would ever be born to an average woman throughout her reproductive life-- between the ages of 15 and 49--is 5.3.  The rate varies between 6.82 for the rural and 3.88 for the urban populations.  On the other hand, the gross reproduction rate, which is the number of girls to an average woman in her reproductive ages, is 2.62 for Turkey.

According to the 1965 census, only 48.7 percent of the Turkish population over 6 years of age is literate. The literacy level for the male population was 64 percent as against 32.8 percent literacy for the female population.  There is an appreciable difference between the city and village literacy levels; 66.9 percent for the cities and 38.5 percent for the villages.  Provinces also differ significantly in terms of literacy levels. For example while some 77.3 percent of the people are literate in the province of Istanbul, only 17.6 percent are literate in the South-Eastern province of Hakkari.

Those who graduated from at least a five-year primary school are approximately 35 percent of the population eleven years old or over. Some 83 percent of primary school age children are attending schools at present, but the ratio drops to about 25 percent at the secondary level.

The present size of the labor supply is approximately 15 million in Turkey, and is growing at a rate of 3 percent annually.  According to figures given by the State Planning Organization[19] only 13.2 million or

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19.  1971 Annual Programme, Official Gazette, Table 426.

88 percent of these are domestically employed. Another 500,000 work abroad mainly in West Germany. Some 68 percent of the domestically employed labor is engaged in agricultural activities, about 11 percent work in industry, and the remaining 21 percent find employment in construction and in various services.

Per capita gross national product of Turkey was 230 U.S. dollars in 1970 at the official rate of exchange. The same year,some 30 percent of the net domestic income originated from agriculture, while the share of industry and services stood at 20 and 50 percent respectively. Marked disparities exist in personal and regional income distribution. According to a study conducted by the State Planning Organization, in 1963, 20 percent of the families which made up the lowest income group had a 4.5 percent share of the national income, while the share of the highest 20 percent income group was as high as 57 percent. Looking at it from a different angle, per family income was 278 dollars for the first group and 3.544 dollars for the latter group.[20] On the other hand the level of living is markedly different between the large cities and rural areas, as well as between the Western and Eastern provinces. For example, per capita income of Istanbul province is more than eight times as high as Bingöl province in Eastern Anatolia.

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20. Second Five Year Development Plan 1968-72, State Planning Organization, Ankara 1968, p. 63.

IV. METHODOLOGY AND DATA

The multivariate analysis has been widely used in studies exploring and measuring the impact of various socio economic variables on the fertility behavior of families. In these studies the dependent variable is a certain measure of fertility (i.e. total fertility, gross reproduction rate or the child-woman ratio) and the independent variables are those factors that are expected to influence the fertility behavior, such as level of income, industrialization, education, and urbanization.

Depending on the nature of the analysis both time series and cross-section analysis can be employed in these studies. The advantage of the time series analysis originates from the dynamic nature of the problem. One of the more important questions in the fertility analysis is how the changes in the socio-economic milieu affect the fertility behavior of the families. However, such an analysis requires data for a number of variables over an extended period of time.     It is generally very difficult to obtain consistent and reliable time series data for these variables, particularly in the less developed countries.

It is relatively easier to gather data for cross-section analysis. With this approach data is collected for a number of variables for a number of countries or for different regions of a given country for a given year, with a view to measure the impact of these factors on fertility. Exclusion of certain variables describing the differences in religions, cultural heritage, and values in different countries may adversely affect the realism of studies that draw on the experience of a

large number of countries. However, this problem becomes much less

formidable in the cross-regional or provincial studies in a single

country, since the population is usually more homogeneous from the cul-

tural point of view.

The present study is an application of the cross-section analysis to

the Turkish data, with the purpose of exploring the significance of a num-

ber of socio-economic variables in the determination of fertility behavior.

Originally data was collected on 16 variables for the 67 provinces of

Turkey for the year 1965. The year 1965 was chosen because this was the

most recent population census year for which detailed information was

available. After a number of trial runs the 16 independent variables were

reduced to 7 in the final analysis.

Two multiple regression problems have been worked out. In the first

problem the total fertility and in the second problem the child-woman

ratio was taken as the dependent variables, and all other variables were

treated as the independent variables. The reason why the total fertility

is chosen as the dependent variable is self-explanatory. The child-woman

ratio is also considered an adequate measure of the fertility behavior of

couples[21].

For the solution of the two multiple regression problems, the computer

program of Stepwise Regression was employed. The mechanics of this program

has been explained in the general description:

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21. The generally accepted definition of the child-woman ratio is
the ratio between children ages 0 to 5, and women 15-45 age group. However,
in this study the 0-9 age group children has been used instead for the
0-5    group, on account of greater age misreporting for the group in
the Turkish censuses.

"This program computes a sequence of multiple linear regression equations in a stepwise manner. At each step one variable is added to the regression equation. The variable added is the one which makes the greatest reduction in the error sum of squares. Equivalently, it is the variable which has highest partial correlation with the dependent variable partialed on the variables which have already been added; and equivalently it is the variable which, if it were added, would have the highest F value."[22]

The preliminary runs in the computer employing various combinations of variables have revealed that regression equation in the logarithmic form with the following independent variables produced the highest coefficient of determination (RSQ) and more consistent regression coefficients.

$$logY = a + b_1 logX_1 + b_2 logX_2 + b_3 logX_3 + b_4 logX_4 + b_5 logX_5$$

$$+ b_6 logX_6 + b_7 logX_7$$

where Y is either the total fertility[23] or the child-woman ratio[24], $X_1$ is the education variable (the level of literacy or the ratio of female primary school graduates[25] $X_2$ is the relative distance from two Western provinces[26] (Istanbul or Izmir), $X_3$ is the level of urbanization indicating the ratio of those living in cities with more than 50,000 population to the total population of the province,[27] $X_4$ is the level of industrialization as

22. W. J. Dixon, BMD Biomedical Computer Programs, Univ. of California Press, 1968, p. 233.

23. Total fertility rates have been estimated independently by F.C. Shorter of Princeton University, Office of Population Research.

24. 1965 Population Census of Turkey

25. Ibid

26. Highway Map of Turkey, Turkey's Highways General Directorate

27. 1965 Population Census of Turkey

indicated by the ratio of industrial labor to the total employment,[28] $X_5$ is the level of socio-economic development as indicated by a composite index,[29] $X_6$ is the population density per square kilometer,[30] and $X_7$ is the per capita income.[31]

The results of the solution of the two regression problems are shown in terms of four problems. In the two solutions of the first problem the dependent variable is the total fertility, and the education variables are first the level of literacy and second the ratio of female primary school graduates. In the two solutions of the second problem the dependent variable is the child-woman ratio, and the two educational variables are as explained above.

Before analyzing the results of this study, a few general observations should be made. In all four problems the coefficient of determination (RSQ) is very high and statistically significant. The lowest value of RSQ is 0.760 for problem #3 and the highest value is 0.847 for problem #2. On the other hand the educational variables (level of literacy and the ratio of female primary school graduates) singlehandedly explain between 63 and 72 percent of the variance in the total fertility and the child-

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28.  Ibid

29.  Socio-Economic Development Index for Turkey on a Provincial Basis, State Planning Organization, June 1970 (mimeo)

30.  1965 Population Census of Turkey

31.  T. Bulutay and H. Ersel, Turkiye Milli Gelirinin Iller, Imalat Sanayii Gelirinin Ücret ve Kar Arasinda Bölünusü Üzerine Bir Deneme, Journal of Political Sciences Faculty. Vol. XXIV, No. 4, 1970.

## Table 2. Fertility Regressions

### A. Level of Literacy as Education Variable

|  | Coefficient | Standard Error | t Value | RSQ | Increase in RSQ |
|---|---|---|---|---|---|
| Constant | 2.698 | | | | |
| Literacy | -0.283 | 0.073 | 3.877 | 0.643 | 0.643 |
| Distance | 0.062 | 0.013 | 4.769 | 0.786 | 0.143 |
| Industrialization | -0.123 | 0.051 | 2.411 | 0.796 | 0.010 |
| Urbanization | 0.012 | 0.005 | 2.400 | 0.819 | 0.023 |
| Density | -0.031 | 0.040 | 0.775 | 0.821 | 0.002 |
| Socio-Economic Development | 0.047 | 0.114 | 0.412 | 0.822 | 0.001 |
| Per capita income | 0.017 | 0.087 | 0.195 | 0.822 | 0.000 |

### B. Female Primary School Graduates as Education Variable

|  | Coefficient | Standard Error | t Value | RSQ | Increase in RSQ |
|---|---|---|---|---|---|
| Constant | 2.115 | | | | |
| Graduates | -0.170 | 0.032 | 5.313 | 0.697 | 0.697 |
| Distance | 0.054 | 0.011 | 4.909 | 0.810 | 0.113 |
| Density | -0.059 | 0.034 | 1.735 | 0.824 | 0.014 |
| Urbanization | 0.010 | 0.005 | 2.000 | 0.833 | 0.009 |
| Industrialization | -0.110 | 0.046 | 2.391 | 0.843 | 0.010 |
| Socio-Economic Development | 0.098 | 0.081 | 1.209 | 0.847 | 0.004 |
| Per Capita Income[*] | -- | -- | -- | -- | -- |

[*]F level insufficient for inclusion

## Table 3.  Child-Woman Ratio Regressions

### A.  Level of Literary as Education Variable

|  | Coefficient | Standard Error | t Value | RSQ | Increase in RSQ |
|---|---|---|---|---|---|
| Constant | 1.124 |  |  |  |  |
| Literacy | -0.228 | 0.059 | 3.864 | 0.611 | 0.611 |
| Distance | 0.047 | 0.011 | 4.272 | 0.739 | 0.128 |
| Urbanization | 0.006 | 0.004 | 1.500 | 0.743 | 0.004 |
| Industrialization | -0.076 | 0.041 | 1.854 | 0.755 | 0.012 |
| Density | 0.013 | 0.033 | 0.394 | 0.758 | 0.003 |
| Socio-Economic Development | 0.076 | 0.093 | 0.817 | 0.759 | 0.001 |
| Per capita income | -0.036 | 0.071 | 0.507 | 0.760 | 0.001 |

### B.  Female Primary School Graduates as Education Variable

|  | Coefficient | Standard Error | t Value | RSQ | Increase in RSQ |
|---|---|---|---|---|---|
| Constant | 0.676 |  |  |  |  |
| Graduates | -0.140 | 0.026 | 5.384 | 0.686 | 0.686 |
| Distance | 0.039 | 0.010 | 3.900 | 0.780 | 0.094 |
| Urbanization | 0.004 | 0.004 | 1.000 | 0.784 | 0.004 |
| Industrialization | -0.064 | 0.038 | 1.684 | 0.790 | 0.006 |
| Socio-Economic Development | 0.124 | 0.086 | 1.441 | 0.795 | 0.005 |
| Per capita income | -0.054 | 0.066 | 0.818 | 0.797 | 0.002 |
| Density | -0.012 | 0.031 | 0.387 | 0.798 | 0.001 |

woman ratios.[32] The regression coefficients and the standard error of estimates are given in Column I and Column 2 of Tables 2 and 3 respectively. The resultant values are shown in Column 3, and indicate that only less than fifty percent of the coefficients are statistically significant at the five percent level. It should also be noted that with the exception of per capita income and density variables, the t-values are relatively high.

## V. MAJOR FINDINGS

### A. Income and Fertility .

In any study of fertility, the impact of the level of or the increase in per capita income on fertility occupies central importance. The theoretical discussions centering around the influence of income on fertility behavior of couples have already been summariezed and the findings of some of the empirical research, mostly based on the experience of the industrialized societies have been discussed. Research in underdeveloped countries on fertility-income issue is scarce, due to the unavailability and the unreliability of the data.

Those who have attempted to explore the influence of the level of income on fertility behavior in less developed countries are quick to admit the difficulty involved in separating the partial effects of income changes from the overall effects. In reality, detailed family income

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32. In order to verify the strength of educational variables, trial runs were made removing the educational variables. In all cases the distance variable became the most significant explanatory variable, but the value of coefficient of determination dropped to below 70 percent.

statistics are necessary before the partial impact of income on fertility can be measured with accuracy. In some studies, including the present one, other variables such as education appear to be more significant than income in affecting the fertility. However, it is widely accepted that the absolute level and the rate of growth of income is highly correlated with the so-called modernization variables such as education and urbanization, and the level of income contributes to the improvement of the factors that are instrumental in lowering the fertility rates.

In a cross section regression analysis covering 37 countries I. Adelman found that the partial effect of income on fertility was consistently positive, for all age groups.[33] A similar conclusion was reached by R. Weintraub.[34] J. L. Simon after analyzing the results of these two studies and comparing them with the experience of industrialized countries, maintains that partial regression results are not relevant and what is important is what he calls the "unconditional effect" of income on fertility. He maintains that "in underdeveloped countries the unconditional effect of income on fertility is negative, even though its partial effect (after abstracting from other operative variables) may well be positive.[35]

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33. I. Adelman, "An Econometric Analysis of Population Growth", AER, June 1963, p. 320.

34. R. Weintraub, "The Birth Rate and Economic Development: An Empirical Study", Econometrica, Oct. 1962.

35. J. L. Simon, "The Effect of Income on Fertility", Population Studies, Nov. 1969, p. 334.

Our analysis is inconclusive with regard to the partial effect of income on the fertility pattern in Turkey. The regression coefficients are not significant at all and the income elasticity is very low. What adds to the state of indeterminancy is the fact that the sign of the partial regression coefficient is once positive and once has an F value too low for inclusion in the analysis, when the total fertility rate is taken as the dependent variable, and it is negative when the child-woman ratio replaces the fertility variable. However in most of the trial runs the sign of the coefficient was positive. Thus in looking at the results one reaches the conclusion that the partial impact of per capita income differentials in Turkey is not significant in any way.

In the study of the relationship between the level of income and fertility the distribution of income within each province is also very important. Given the mechanical estimates for per capita incomes, the income level of the bulk of the people in certain provinces may be considerably lower than the per capita figure indicates, due to highly unequal income distribution. The income distribution problem, however, could not be taken into account in this study.

It is also important to note here that even though the partial impact of income proves to be insignificant, per capita income level is highly correlated with some modernization variables, indicating the overall strong impact. For example the correlation coefficient between the per capita income and the literacy level is 66 percent, with female .primary school graduates it is 73 percent, and with industrialization is 88 percent.

## B. Education and Fertility

The negative correlation between the level of education and fertility has been evidenced in the studies based on data both in underdeveloped and developed countries. For example, I. Adelman found that for all age groups in underdeveloped countries the regression coefficient of birth rates with respect to education was always negative[36]. A similar result was reached by K. Dandekar in a study based on data for forty nine underdeveloped countries. According to the results of a National Sample Survey in India, approximately 60 percent of illiterate married people knew about contraception. This ratio was 78 percent among the primary school graduates and 96 percent for the university graduates[37]. R. B. Hughes found the same negative correlation between fertility and education.[38] The relatively high correlation coefficient found in these studies supports the thesis that education depresses fertility levels.

The repressive influence of education on fertility may be explained by at least four factors. One of them is that literacy and education help people learn about contraception. This point seems to be particularly relevant in the less developed countries. In more advanced countries where the level of literacy is 90 percent or more education may not be a significant factor as far as knowledge of contraception is concerned. But in

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36. I. Adelman, op. cit., p. 322.

37. K. Dandekar, "Effect of Education on Fertility", in United Nations, World Population Conference, 1965, New York 1967, p. 149.

38. R. B. Hughes, "Human Fertility Differentials: The influence of Industrial-Urban Development on Birth Rates", Population Review, July 1959, p. 62.

underdeveloped countries with very high illiterate masses it is not un-
realistic to expect that lack of knowledge can conceivably be a factor
contributing to high fertility.

The relationship between education and the knowledge of contraception
may also be looked at from a different angle. As discussed, Becker ar-
gued that the reason the number of children in a family differed from the
preferred number was because couples lacked contraceptive knowledge. But
R. Easterlin maintained that this was too simple an explanation and that
for a complete analysis of fertility behavior, the production of another
good--namely coitus--must be introduced into the analysis. Thus he says that
couples consider the loss of utility attributable to the possibility of
an unwanted birth against the utility lost by using contraceptive methods.
One can conclude from this that even when one assumes the masses have
contraceptive knowledge, education increases the opportunities for a more
effective use of it while lowering the subjective cost of fertility con-
trol.

A second way education adversely affects fertility is that education
may provide opportunities, particularly for women, that conflict with
child rearing. This is probably true for both developed and underdeveloped
countries. Women with education have a wider opportunity to be gainfully
employed outside the home, and in societies where child-care facilities
are either inadequate or non-existent child rearing becomes an obstacle
for economic advancement.

A third effect of education on fertility can be explained in terms of the general effects of education on human beings. Education provides a new outlook towards the world, and makes people more conscious of his surroundings and opportunities. It makes them more rational and frees them from tradition.

A fourth factor may be the increasing cost of child-rearing with educational level of parents. Even though the cost of children of similar quality is not different for educated and uneducated couples, as Becker pointed out in the discussion of income level and the cost of children, it is true that the educated couple may want children of higher quality with better education. Thus the high cost of rearing children may also be a depressing factor on fertility among educated people.

It is not surprising that the findings of the present study coincide with the general opinion that education is negatively correlated with fertility. But the results are rather overwhelming. Both literacy and female primary school graduates score very high in the analysis. In all cases the sign of the education regression coefficient is negative. The coefficients are always statistically significant at five percent level. And the elasticities are relatively high. But more importantly, in all cases education explains more than 65 percent of the variance in the dependent variable, and the remaining factors combined explain approximately 15 percent of the variance. All these strongly suggest that the relationship between education and fertility is a causal one. It is also interesting to observe that the female primary school graduate variable seems to be

more important than the literacy variable in explaining the variance in fertility, indicating the role of formal education. On the other hand when the female primary school graduates variable is replaced by the male primary school graduate ratio as the educational variable, the RSQ drops significantly. This suggests that the female education is more important than male education in lowering the fertility rate.

In a study of the relationship between women's education and fertility, S. Timur found that average live births for illiterate women in Turkey was 4.2 while literate women without formal education had on the average 3.2 children, women with primary school education had 2.8, with secondary education 2.0 and those with university education had 1.4 children. However she also found that husband's education influenced fertility in a much less effective way and a break in fertility occurred only at the secondary level of schooling.[39]

The Turkish Demographic Survey revealed that birth rates varied according to the education of the women. For example in the most fertile age group, 20-24, the birth rate among illiterate women is 305 per thousand whereas the birth rate stands at 235 per thousand among the primary school graduates, and 113 per thousand for the middle school graduates.[40]

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39. S. Timur, "Socio-Economic Determinants of Differential Fertility in Turkey", Institute of Population Studies, Hacettepe University, Ankara, 1971, pp. 11,14. (Mimeo).

40. Turkish Demographic Survey, op. cit. pp. 51, 54.

## C. Urbanization, Population Density and Fertility

Data from a large number of countries suggest that urban fertility rates are generally lower than rural fertility rates in both developed and underdeveloped countries. According to the Turkish Demographic Survey, the total fertility rate for urban Turkey (population 2,000 or more) was 3.88 and for rural Turkey 6.12 for the survey period of 1966-67. Similarly the crude birth rates also differed significantly in the cities and the villages, birth rates being 3.14 for urban and 4.39 for rural Turkey.

A number of reasons have been given for the fertility differentials in the urban and rural populations. It has been argued that urban settings provide more economic opportunity and social freedom for women. In the cities, women are generally less dependent on men. It has also been argued that the cost of raising children is higher in the cities and people often consider cities a poor place to raise children. The addition of another child to the family in rural areas does not increase the space requirements and various expenditures in the same proportion as it does in cities. And the value of children as productive agents is considerably less in the cities. Children help the families as labor from very early ages on farms whereas the opportunity to use them for any kind of labor is little in the cities even in the poorest countries.

In this analysis the level of urbanization is defined as the ratio between the number of people living in cities with 50,000 population or more and the total population in a province. Other criteria for the level of urbanization have also been used in order to test the impact of urbanization

on fertility. The level of urbanization variables estimated on the basis of 2,000, 10,000 and 20,000 population or more produced statistically less significant coefficients and contributed lower values to the RSQ.

All urbanization variables including the one used in the final analysis gave coefficients with relatively low values and with positive signs indicating that the level of fertility is very little affected by urbanization, and whatever effect urbanization had on fertility, it was positively correlated. This is contrary to the widely held belief that urbanization contributes to the lowering of the fertility. However, what is observed here may be regarded as a temporary phenomenon. In Turkey, as in many other underdeveloped countries, migration from the rural areas to the cities gained momentum during the last two decades. Rapid increases in the birth rate have put a heavy strain on the already limited resources and opportunities in the villages while increased use of machinery in the farmland has displaced men. Those who move to the cities often live in squatter settlements, without socially mixing with the city dwellers. In such a setting they adhere to the values, practices and outlook towards life which they brought from their rural background. It would be realistic to expect that as the time passes, the offspring of this generation, particularly with the aid of education, will have different values and different behavioral patterns, including fertility behavior.

S. Timur also reached a similar conclusion with a different set of data on Turkey. She says that the city-ward migration did not induce

lower fertility unless it was accompanied by a move towards higher socio-economic status.[41]

The impact of population density on fertility has also been explored. Two considerations led to the inclusion of the density variables in this analysis. Firstly, it has been suggested elsewhere[42] that the population-resource ratio may exert some pressure on reproductive behavior. Admittedly population density may not reflect the actual resource availabilities, but density is a close approximation particularly for countries like Turkey where more than 70 percent of the people derive their livelihood from the land. Secondly, population density in a given province is an indication of how close the communities are geographically and shows the degree of possible social mobility and contact.

In this analysis the density coefficients in all four problems have had low values with relatively high standard errors. However, the density variable was negatively associated with fertility and child-woman ratios in three of the four problems. Thus, even though fertility is slightly higher in provinces with a high level of urbanization, it is generally lower in more densely populated provinces. One or both of the above mentioned factors ought to be instrumental in explaining why fertility is lower in more densely populated areas.

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41. S. Timur, op. cit., pp. 9-10.

42. I. Adelman, op. cit., p. 318.

## D. Industrialization and Fertility

In the Western countries' experience, industrialization, urbanization, and lowering of the fertility all coincide with each other. This led many to expect the same pattern would repeat for the underdeveloped countries. As these countries are more industrialized and more urbanized societies the birth rates were expected to rapidly fall. This analysis, however, reveals that even for a transitional period, the type of urbanization taking place in Turkey does not lead to an immediate decline in fertility, as already mentioned.

As a measure of industrialization, the ratio of industrial labor to the total labor force was taken. In all four problems the sign of the coefficient of the industrialization variable is negative and the t value is around two. This suggests that industrialization is associated with lower fertility. In a different problem the industrialization variable was replaced by another variable expressing the ratio of non-agricultural labor to total employment. The sign of the coefficient became positive and the coefficient itself became very insignificant. This reinforces the result arrived at with the urbanization variable. That is very large portion of the non-agricultural labor force is made up of city dwellers who recently migrated from the villages, and participate in service-oriented activities.

E.  Distance from the West

There is a marked difference in the level of living between the Eastern and Western provinces of Turkey.  In the East, which is less densely populated, per capita income, level of literacy, level of urbanization, and per capita industrial output are considerably lower compared with the Western part of the country. The existing regional disparities also have been recognized by the government, and reducing the regional gap became an explicit official target of Turkey's five year plans.

On the other hand fertility differentials are also evident in these different regions of the country.  According to the results of the Turkish Demographic Survey, crude birth rates in 18 Eastern provinces averaged 49.7 per thousand in rural areas and 47.9 in urban centers, whereas the corresponding ratios for 14 Western provinces were 35.6 and 26.5 per thousand respectively.  Obviously the lower fertility in the Western provinces is connected with the higher level of literacy and education as well as higher level of industrialization, income and urbanization in a direct or indirect way.  Nevertheless, there could be another factor not covered by the above considerations, that might influence fertility behavior. After all, the population of Western provinces of Turkey have traditionally been in contact with the European populations and have been more strongly influenced by the values prevailing in these societies. These observations suggest the need for the inclusion of a factor, called the distance variable for practical purposes, representing the relative

distance for each province from either Istanbul or Izmir--whichever is shorter--the two large western cities traditionally cultural and commercial centers.

The analysis showed that the distance variable proved to be an important one explaining the variance in the dependent variable, only second to the education variable. Also in all four problems the distance coefficient was significant at 5 percent level. Nevertheless, the value of the coefficients were small indicating the relatively low partial impact of the distance. As expected, in all problems it was obvious that the fertility and child-woman ratios were positively correlated with the value of the distance variable. That is, the longer the distance from Istanbul or Izmir the higher the fertility was.

## F.  Socio-Economic Development and Fertility

At the time the present study was being conducted, a "synthetic" index of the level of socio-economic development of the provinces of Turkey was published.[43]  Included in this index were 22 variables grouped under four headings. The first group of variables described the level of industrialization, the second group urbanization and organization, third group modernization in agriculture, and the fourth group the quantity of services. Accordingly each province assumed an index value, based on a value of 100 for Turkey.  In this index, the province ranking at the bottom of the list assumed a value of 35 while the value attached to the province at the top of the list was 377.

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43.  Socio Economic Development Index for Turkey, op.cit.

The computations showed that the level of socio economic development variable had a relatively large partial impact on the dependent variable, but the standard error was too large for the coefficient to be statistically significant at 5 percent level. On the other hand the sign of the coefficient was positive in all cases showing that fertility and socio-economic development was positively correlated.


## VI.  SUMMARY AND CONCLUSIONS

The foregoing analysis reveals the strength and significance of the relationship between various socio-economic variables and the fertility behavior of the population in Turkey.  However, caution must be exercised in the interpretation of the findings of such a study.  Strong inferences to the causal relationship would be unwarranted and misleading. Given the constraints and limitations of such a study, the following pattern emerges from the analysis of the relationship between the socio-economic variables and the fertility in Turkey.

Education in general, and female education in particular, seems to be the most important variable causing the fertility differentials in various provinces of Turkey. The adverse relationship between literacy and female primary school graduates on one hand and the total fertility and child-woman ratio on the other is so significant and consistent that one is led to believe that the relationship must be a causal one. It is plausible that education depresses fertility by helping individuals to learn about contraception and by providing opportunities that may conflict with child-rearing as well as by affecting the values and overall outlook of people towards life.

The relationship between the level of industrialization and fertil-
ity also seems to be an adverse one even though the coefficients were not
statistically significant.   Industrialization is expected to depress
fertility by changing the entire pattern of living and expectations of the
people.   On the other hand, the level of urbanization, contrary to the
expected, has proven to have hardly any impact on fertility, and more
importantly, the relationship between the two variables was positive.   The
only plausible explanation to be given for this finding is that the type
of urbanization taking place in Turkey, like in most underdeveloped
countries, is not conducive to a rapid transformation of the values and
life style of the people migrating to the cities. A majority of these
migrants are employed in various services and the rate of unemployment runs
high among them.   They do not mix socially with other city dwellers and
they live in squatter houses on the periphery of the larger cities.   Under
these circumstances it is understandable why the mere incidence of
urbanization does not automatically produce lower fertility for at least
a generation or so.

The present analysis is inconclusive as far as the relationship be-
tween the level of per capita income and fertility is concerned.   However
it is necessary to make a distinction between the partial and overall im-
pact of the level of income. Even though the level of per capita income
does not seem to have any significant partial impact on the fertility
differentials among  various provinces, it is very highly correlated with
some modernization variables including literacy and formal education.   The

level of literacy as well as the level of industrialization, both of which seem to have a depressing effect on fertility, are relatively higher in provinces with higher per capita incomes.

Finally, the distance from the Western provinces of Turkey explains a surprisingly high percentage of the variance in the fertility data. The farther the distance from the West the higher the fertility rate becomes. One explanation for this phenomenon is the fact that the population of the Western provinces have been historically in closer contact with the European communities mostly as a result of migration and have been influenced by the style of life and standards of these communities.

It is appropriate here to pause to ask what such an analysis adds to our knowledge concerning the economics-fertility issue in underdeveloped countries. At the expense of repeating ourselves, it should be stated at the outset, that the relationship between the socio-economic factors and fertility is obviously a more complicated matter than can be explained by the few quantifiable variables selected here. And thus, the present analysis should be considered a first step in the exploration of the underlying factors of the economics-fertility issue, instead of being conclusive.

In addition, this type of analysis illuminates the so-called "demographic transition" phenomenon. It is thought that the pattern of decline in fertility rates following the decline in mortality rates, as occurred in West European countries during the previous century, will repeat itself in the present day underdeveloped countries, as these countries go through a period of increasing per capita incomes, industrialization and rapid urbanization. However, an important factor that often escapes the eye is

the fact that the decline in mortality rates in West European countries following the industrial revolution was the result of the transformation of the whole socio-economic system, whereas the relatively rapid decline in mortality rates in the underdeveloped countries, particularly since the Second World War, is attributable mainly to external factors such as the introduction of the practices of modern medicine and preventive health measures. Thus it may be misleading to compare the underlying factors behind the decline in mortality in these two groups of countries.

The findings of this study suggest that the impact of the so-called modernization variables, with the exception of education, is not very significant in depressing the fertility rates in a country like Turkey, at the present stage of economic development. Even though the static nature of this analysis does not allow us to predict the impact of the changes in the selected variables on fertility, throughout time, the relatively low level of the partial impact of per capita income differentials, urbanization and even industrialization should justify the above conclusion. These findings do not support the view that a rapid demographic transition will take place in the underdeveloped countries, once these countries accelerate their economic growth associated with rapid urbanization. The decline in fertility rates in underdeveloped countries will probably be realized at a slower pace than most people expect. It will also require overwhelming changes in the attitudes, values and institutions alongside with gains in per capita income. And the present study gives a clue that education may be the key variable in this process.