ECONOMIC ROLE OF WOMEN AND CHILD SURVIVAL :

A RE - APPRAISAL

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I hereby affirm that the research for this dessertation titled `*Economic Role of Women and Child Survival: A Re-Appraisal'* being submitted to the Jawaharlal Nehru University for the award of the Degree of Master of Philosophy was carried out by me at the Centre for Development Studies, Trivandrum.
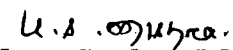
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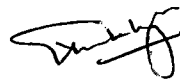
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INTRODUCTION

1.1 The Background

It is widely accepted that the active participation of women in economic activities is a pre-requisite for development and demographic features at the community level. The extent of women's participation in paid work and the type of work they perform (including whether they work in the formal or informal sector) are influenced by their access to land and capital, their skills and personal experience, the structure of the labour market for women, and the cash rewards of market work (Standing, 1978; Ware, 1988).

Occupational and educational discrimination often restrict women's work opportunities in the formal sector to selected occupations and industries. As a result, in the course of socio-economic development as the maintenance of the family depends increasingly on access to cash economy, women have a smaller range of opportunities than men within the diversifying labour market. They are found largely in the informal sector , where pay is low and unsteady and social security is not available (Boserup 1970). Hence such a system provides only limited options to women. This phenomenon can be well explained in the case of India, where majority of women are confined to subsistence sector.

The ways in which women's employment interacts with child bearing vary widely and depends on different factors like socio-economic status of the family, biological factors, cultural practices etc,.

Even though the overall economic development implies the participation of women in the process of production, labour force participation of women has an adverse impact on the child care. So the discussion on the postulated incompatibility between a woman's productive and reproductive roles centres around the implications of this incompatibility for fertility and infant mortality.

The increasing female educational attainment, which accompanies development, is known to influence female work participation positively. Education has a direct bearing on child care as well as survival and it has an indirect influence through work participation.

In societies where a substantial number of middle-class and upper-class women work outside the home, labour force participation might be more strongly associated with relatively higher child mortality among the poorly educated and presumably in low socio-economic classes. For the well educated women, the benefits that employment may produce through increased income may counteract the disadvantages of the mother being outside the home. On the other hand, as the well educated women usually work in the better paid occupations, they can afford a substitute care for their children while they are engaged in economically productive activities. So, there might be an interaction between education, activity status, and child mortality. Along with maternal activity status which affects child mortality, the nature of the women's job which is determined by the level of education is also very important.

1.2 Review of literature

A review of the existing literature on different aspects relating women's productive work and her reproductive role follows. The undercounting of women's work is a serious concern in this area of research. Many studies have considered the gender perspectives of women's work of which a few prominent ones are detailed here. Studies on developing countries reveals that, it is the economic pressure which drives women into the work place, and in a country like India, this deserves particular attention. A discussion on the postulated incompatibility between women's productive and reproductive roles also forms a part in the following review. A brief explanation of the socio- economic and biological variables which determines women's work and thereby her reproductive functions has also been detailed. Finally a variety of studies analysing various intermediate mechanisms existing in between female work participation and child care/survival has also been discussed.

1.2.1 Measuring women's work:

The measures of women's employment in the literature is questionable. The major criticism is that women who work in activities which are commonly performed by men are much more likely to be counted as working. Dixon (1982) has referred to women as "invisible workers" because of the failure to enumerate domestic labour in the census and the national accounts. Desai and Jain (1994) in their study on rural south India noted that with the supposed conflict between children's need for care and mother's need for income, the role of domestic labour of women tend to be ignored. In addition to the domestic activities like cooking, cleaning etc., women spend considerable time for other

activities like the making of cow dung cakes, collection of firewood etc., which are rarely considered as economic activity. Although they are highly productive, they are called "marginal economic activity" or "expenditure saving activity" (Desai and Jain, 1994).

1.2.2 Gender Dimensions of Female Work: Despite the growth in size and composition of the female labour force, it continues to exhibit the same characteristics. For instance, women still hold traditional roles, occupy low-status position, and earn much less than men do. Female employment is characterised by occupational segregation as a result of traditional societal sex-stereotyping of roles and the division of labour at home. Sex-stereotyping of jobs and the concentration of women in low-status occupations have resulted in an unfavorable pay scale for women.

A major part of gender inequalities in the labour market in wages, incomes and activity patterns can be traced to societal stereotyping of men and women that are related to women's reproductive roles, and women's responsibility for child care and housework.

In order to understand the interrelations between the household and the labour market, it is necessary to theorize the household as a socio-economic unit. Sticher (1990) suggested that the following aspects of social relations of household production and reproduction can be expected to have an impact on women's employment patterns.

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1. Reproductive work

a) Amount of reproductive work: This refers to the level of completed or expected fertility in the household.

b) Allocation of reproductive work: This consists of the sex division of childbirth and child rearing, and the distribution of such work among household members.

c) Ability to transfer such work to others outside the household.

2. Productive work

a) Amount of productive work: This varies according to the household production for itself and for market economy, and the house hold purchases from the market.

b) Allocation of productive work: It implies sex and age based division of work.

c) Ability to transfer such work to others outside the household.

3. Household structure

This refers to size, age/sex composition, and persistence of the household unit. Important sub-types include single households and female-headed families.

4. Income and resources

a) Total level of household income and total value of productive resources.

b) Distribution of income and resources among all household members. It includes immediate distribution as well as inheritance patterns.

5. Decision-making and power relations among members

It involves husband-wife relations and also parent's decisions about daughter, their schooling, training and employment.

Even though gender inequality is a major determinant in shaping intra-family dynamics, the gender-role ideology of female subordination does not necessarily dictate a woman's withdrawal from income earning work and in fact it may be perfectly compatible with her earning income for use by the family as a whole. One frequently observed strategy is for men to reduce the hours of work in family farm and to increase participation in wage work. Since there are wage differentials among men and women and women workers are more likely to suffer than male workers from seasonal unemployment, this is economically rational (Desai and Jain 1994). So women's specialization in domestic sphere is not only an outcome of the micro level ideology of gender discrimination within family but also a result of macro level inequality in wage and opportunity structure.

According to Sen and Sen (1985), there are two major competing explanations for the relationship between the household and the participation of women in the labour market. One explanation states that female labour force participation is conditioned by child bearing and rearing and women's responsibility for domestic work. Thus a rise in labour force participation rates in most western industrialised countries during this century is traced to the decline in fertility and dramatic changes in the technology of housework. Labour force participation, in this theory, is residual to women's responsibility for child care and other domestic work.

1.2.3 Economic Pressure and Female Work: While not denying women's primary responsibility for domestic work, the alternative theory of Sen and Sen places greater emphasis on the economic pressures that necessitates women's earning cash income through work outside the home. In a situation where a household does not have access to sufficient economic resources for its ongoing reproduction, women may have to participate in wage labour, regardless of child care or domestic work.

The actual experience of any country or region will obviously depend on how widespread the phenomenon of economic pressure is. Gita Sen says that, in a country like India where a significant proportion of the population is below the official poverty level, quite a large proportion of women would be expected to be under pressure to participate in the labour force.

A United Nation's study (1985) suggested that economic stress may be an important factor in explaining the higher infant and child mortality for economically active women. Many of those who enter may do so because of low family income and therefore it is suggested that the lower survival rates of the children of these women may in fact be due to basic economic need and not to child neglect. If the husband is in a well paid occupation, maternal employment could be less detrimental because the mother might be able to afford adequate substitute care. On the other hand, the working mother's contribution to the family income might be most valuable when the husband is in a low status occupation.

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1.2.4 Incompatibility between Women's Productive and Reproductive roles (time allotment by women): Women's time is allocated to three types of activities like production of home goods and services, labour, and leisure. Female work participation could be expected to increase if fertility declines, if there is a decline in the prices of market substitutes for home goods and services, particularly child care relative to women's wages, and if there is an increase in the relative wages paid to women.

These factors reduce the relative returns to leisure and production of home goods and services as compared to that of market labour activity. Hence, among developing countries where labour force participation of women is observed to be genuinely low, it could be expected to rise as the economy develops. Also increasing female educational attainment, which accompanies development, is known to influence female work participation positively (Standing,1983).

An ILO (1978) study says that the mother's activity is believed to be indicative of time spend in child-rearing and domestic activities. Thus maternal participation in the labour market is expected to raise child mortality. However, certain conditions may prevent this. This include: (a) women engaged in highly paid jobs that permit them to replace themselves in child care activities; (b) the mother shares the responsibility of child care activities with other adult members of the family; (c) availability of institutional child care services of high quality. Thus, in order to assess the effect of mother's labour force participation on child mortality, one must take into account other variables such as

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occupation, place of work, flexibility of working hours, pay, and household composition and institutional facilities for child care.

According to **Standing (1983)** the compatibility of work and mortality will vary with the time intensity and quality of child care involved. In low income environments where access to schooling is limited, most jobs require little schooling. Further, when there is little opportunity for occupational mobility, the time intensity of child care could be expected to be relatively low. Conversely, the allocation of time could affect children's pre-schooling learning, health, and acquisition of skills and attributes needed to attain occupational and income mobility. In this case, women's work activities could be expected to be more constrained by their ability and incentives to influence their children's development.

A common conceptualisation is that a mother's activity status has been regarded as a proxy for material time allotted to child-rearing. Those women who participate in the labour market are believed to spend the least amount of time in maternal activities. Those who do not participate at all are assumed to spend the largest amount of maternal time, and women who are engaged in market activities at home are thought to occupy an intermediate position. Reductions in maternal time devoted to child-rearing may be directly related to infant or child mortality through the loss of specific elements in a desirable child care regimen.

The general assumption is that mothers who are not involved in economic work are available for child care. Infact, based on the

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actual time use pattern obtained in a survey conducted by **Desai and Jain (1994)**,it is found that this is far away from reality. Most of the rural women spend substantial time in household activities and many of these activities are conducted away from home.

1.2.5 Socio-economic Status of Women and Child Survival: In their analysis, Desai and Jain (1994) found that children whose mothers report themselves as wage workers or engaged in petty trade are less likely to be immunised and more likely to suffer from lack of nutrition than children whose mothers are family worker or house wives. On the other hand, the difference in health and nutritional status between children whose mothers work on family farms and those whose mothers are house wives is relatively small.

But these results did not lead them to conclude that the maternal participation in wage work causes poor health outcomes for children. Women's economic activities are strongly correlated with family income and socio-economic status. Wage workers are more likely to belong to scheduled castes and scheduled tribes to have less education, lower family income and consumption. Hence, the apparent negative correlation between mother's wage work and child health is more likely to be influenced by the family's socio-economic circumstances than with maternal work status alone.

Pathak and Murthy (1985) analysed the socio-economic determinants of fertility and mortality decline in India using census data of 1971 and 1981. Using path analysis they found that in 1981 social

development and health development variables[1] emerge as the most important set of variables that influence fertility and mortality respectively. They concluded that the social and economic development along with the basic health facilities are the important and necessary pre-requisite for the change in both fertility and mortality.

Besides the socio-economic factors confounding the maternal employment-child mortality relationship, certain bio-demographic variables may also be of significance. The most relevant of this is mother's age. Women's labour force participation rates tend to rise with age. Employed women may have a higher proportion of older women. Therefore, there is a higher proportion of women at risk of high child mortality due to parity, exposure, and cohort effects.

Another important feature of mortality in the Indian context is the excess female child mortality. India recorded an excess female child mortality of ten per thousand according to the 1981 census. A study by Tulasidhar (1993) reveals that the female child mortality is more among illiterates and is found more in North India than in South India. He identified three important factors to explain excess female mortality.

1. Cultural preference for male children

2. Low social status for women

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[1] They used literacy rate and per capita income as a proxies for social development and economic development respectively.

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3. Low female labour requirements in areas where rice is not grown[2].

1.2.6 Female Work Participation and Child Survival: The relationship between female labour force participation and infant mortality is a complex one. On the one hand, labour force participation can have an adverse impact on child health as the child will not get full attention from its mother and may even forgo the benefits of breast feeding. This will probably happen in those families where because of poverty the mother must participate in the labour market soon after the delivery. On the other hand, mother's work force participation will enhance the family income which will in turn have a positive impact on child nutrition and health. The female labour force participation and child care on mortality are directly related. A study by **Mencher (1988)** on women in landless agricultural labourer household reveals the different ways in which men's and women's income are spent. The data presented strongly indicate that a very high percentage of the income earned by female goes to household maintenance, where as a lower percentage of male income is comparably spent. Thus the eventual outcome of female labour force participation on child mortality depends on the relative influence of these two routes of causation.

Unfortunately, the unpleasant implication of female employment has not received more than passing attention in the literature, even

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[2] This is consistent with Bardhan's (1988) hypothesis that there exist low economic value of women and female children in the areas where the labour force participation rates of women are low.

though various empirical studies (Basu and Basu, 1991) have found a negative association between a mother's employment status and her child survival.

Now let us look at the concrete conclusions made by different researchers using different data sources and methodologies.

Using census data of 1981, Year book of Ministry of Health and Family Planning 1987 and Registrar General of India 1988, Basu and Basu (1991) came to the conclusions that women's employment, inspite of other benefits, has a crucial adverse consequence on child mortality. Examining various intermediate relationship they conclude that shortage of time is one of the main reasons for this negative relation between maternal employment and child survival. However, Desai's findings contradicts this result.

Krishnaji (1995) has analysed the impact of female work status on child survival with 1981 census data and found that in all the states working mothers experience a greater child loss than non-working mothers. He arrived at the conclusion that in India work among women can be closely identified with poverty and this identification of poverty of a lasting kind with working mothers results in a poor nutrition and health care among their children.

Using aggregate data from the Registrar General of India's survey of Infant and Child mortality, Beanstalk and Sturdy (1990) concluded that, controlling for other socio-economic factors, the relative probability of infants dying was 27% higher for working than non-working mothers. The same remarks holds good with the

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multivariate analysis of Lesotho data by Banda, Lesetedi and Sastri (1990) which concluded that working women were 1.2 times more likely to experience an infant death than non-working women.

The study conducted at the Centre for Development Studies by Zachariah et.al (1994) focussed on the demographic changes in Kerala in the 1980s' and their determinants. Three districts - Ernakulam, Palakkad, Malappuram - were selected for the study. According to the authors, one of the most intriguing mortality differentials is with respect to work status of parents. Children of working mothers tend to have higher mortality rates than non-working mothers. The infant mortality rate for working and non-working mothers are 54 and 29 respectively for the period 1980-89. The probable reasons cited are: the shorter duration of breast-feeding and the lesser amount of time the mother spends with the child. The joint effect of working status of the father and mother on infant and neo-natal mortality shows that infant mortality rates are higher among children where both father and mother are working. This may be due to the negative effect of mother's absence.

Mason and Kuhulthau (1986) made a study on the constraints of child care on women's labour supply and fertility and used a probability sample of mothers of pre-school aged children living in Detroit Metropolitan Area. Their analysis investigated the factors associated with perceiving child care to be problematic and reporting a child care constraint on employment and fertility. It is found that economic resources are important in determining whether women perceive locally available child care as adequate and

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whether they report in turn that child care problems have constrained their employment behavior. Low-income women have fewer options than the affluent, perhaps because the areas in which they live offer poorer child care facilities. Consequently, they are more likely to perceive child care as problematic. This point suggest that policies designed to improve the supply or lower the costs of child care to low-income women, would have the benefit of increasing these women's labour supply and hence of reducing the public assistance burden. Women's commitment to working versus traditional domestic roles affect their perceptions of available child care and child care constraints, as does the supply of related care givers. Thus attitudes as well as income and wages are important for women's perceptions of child care and their employment decisions are influenced by child care problems.

With these limited evidences, an attempt has made to re-examine the dynamics of women economic role and child care in the Indian context.

1.3 Objectives

1. To examine differentials in child survival in relation to working characteristics of women and
2. To understand the role of female labour force participation on child survival.

1.4 Data sources and Methodology

The sources of data used for the present study are mainly from the recent Censuses such as the census 1981 and 1991 and National Sample Survey data collected through various rounds such as 27th,

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32nd and 38th, in order to understand different trends and levels of female work participation rate and child survival. Moreover, we have also extensively used various publications of Registrar General based on the 1981 census and also the Annual Sample Registration System publications. Statistical techniques such as regression and path analysis have employed to assess the link between the economic role of women and child survival in India, if any.

1.5 Terms and Definitions used

1.5.1 Female Labour force participation rate (FLFP)

Female labour force participation rate is defined as the percentage of female main workers in total female population. There has been changes in the definition of workers in decennial censuses. The 1961 census defined a person to be in the labour force if he/she had been engaged in any economic activity for a greater part of the past season. The 1971 census made this definition more rigorous: it included only those persons whose main activity in the reference year was economically meaningful work. The 1981 census recognized that people could work for varying lengths of time in a year and accordingly identified two categories: main workers (working 183 days or more) and marginal workers (employed for less than 183 days). Worker definition in 1991 census is more or less similar to that of 1981 and both are comparable.

The NSS, since 27th round in 1972-73, has conducted quinquennial surveys on employment/unemployment in which comparable definitions have been used. Under the three broad categories the population is classified into three activity categories - `working' (employed),

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`not working but available for work' (unemployed) and `neither working nor available for work" (not in the labour force). The `employed' and `not in the labour force' are distributed among several detailed activity categories (which are coded) within each of the three broad categories. The NSS uses three alternative criteria for defining labour participation: the usual status (US), the current weekly status (CWS) and the current daily stats &(CDS). A person is included in the labour force by the usual status if he/she spends a major part of the last 365 days in gainful economic activity or is actively seeking work/available for work. According to CWS, a person is deemed to be in the labour force if he/she has worked or is available for work for even one hour during the reference week preceding the date of interview while according to the CDS the labour participation is calculated as a proportion of the number of person-days worked (plus available/seeking for work) to total person-days on an average day in the reference week. Modern sector workers have been defined as female main workers other than agricultural labourers and manual workers.

The variable child suvival (CS/CEB) is defined as the proportion of children surviving to total children ever born for women who are ever married. Other two variables used in the present study are Female Literacy (FL) and Percent Married (PM). The percent married is the proportion of women who are married in the selected population. Female literacy is nothing but female who are literate in a population.

1.6 Scheme of chapters

The present chapter extenisvely reviews the various studies carried out in India and abroad on the relationship between mother's work and child care/survival using numerous data sources and independent surveys. This chapter also includes the study objectives, sources of data, methodology and the terms and defintions used in the various chapters of the dissertation.

Indicators such as trends in male-female activity rates throughout the century, sector wise and industrial category wise percentage distribution of female workers have been presented in chapter II in order to understand the structure and composition of female labour force participation across states in India. It also has a analytical section on the association between female work status and education.

Third chapter provides a region-wise analysis of infant and child mortality in India, extensively estimated using the 1981 census. We could not compare the estimates of 1981 with the 1991 due to the non-availability of the information to estimate the infant and child mortality. The discussion also includes the analysis of infant and child mortality by education and occupation of mother for all the major states in India. Various determinants of infant and child mortality, particularly the female labour force participation and education are discussed at length.

The fourth chapter provides a multivariate analysis to assess the relationship between female labour force participation and education on chances on child survival and contribute to the

existing debate on women's work and child survival. A conceptual framework has been developed and tested through the path analysis. The last chapter summarizes the major findings and provide a new direction for mortality research along with some policy guidelines to be adopted for enhancing the women's work.

Chapter 2

EDUCATION AND FEMALE LABOUR FORCE PARTICIPATION

2.1 Introduction

It is known that the increased participation of women in economic activities is a pre-requisite for a change in demographic characteristics of a population. But more than mere labour force participation, the structure and composition of the work force is important. The structure and composition of the work force is not only implied by the nature of the economy, but also depends on the educational achievements of the workers. In any country, education has a direct bearing on the labour force participation and the work status is determined by educational status and the type of work varies with levels of education. So, generally work participation may be termed in two categories "education induced " and "without education". This chapter consists of two sections, the first of which provides a macro picture of the level of female work participation in different states and the second examines the inter-relationship between education and work force participation.

2.2 Concepts and Definitions

The magnitude of labour force participation depends on the definition of the economic activity or labour force that is used. The *economically active population* may be regarded as comprising "all persons of either sex who furnish the supply of labour for the production of economic goods and services as defined by the United Nations systems of national accounts and balances during a specified time-reference period" (ILO, 1988). It comprises of persons who are working (the employed) as well as those who don't

have work and are looking for one (i.e., unemployed). There are
two measures of the economically active population: the *usually
active population* measured "in relation to a reference period such
as a year" and the currently active population measured "in
relation to a short reference period such as one week or one day"
(ILO, 1988a:49). The *currently active population* is also referred
to as *labour force.*

The concept of usually active population is of particular interest
in situations where data reflecting the dominant pattern of
activity is required and where the pattern of activities is
primarily seasonal in character, especially if repeated
measurements cannot be made during the same one-year period. A
reference period of one year is indicated if seasonal agriculture
constitutes an important aspect of economic activity (Farooq and
Ofosu, 1992).

The population not economically active can be similarly
characterised as "not currently active" or as "not usually active".
The population not currently active "comprises all persons not
employed or unemployed during the brief reference period and hence
not currently active". It is equivalent to the concept of persons
not in the labour force. In contrast, the population not usually
active "comprises of persons whose main activity status during the
longer specified period was neither employed nor unemployed. The
distinction allows usually inactive persons such as students, home-
makers and retires to be considered as currently active if they had
been engaged in an economic activity, however minor, during the
brief reference period in question.

Figure 1 presents a simple scheme of how a country's labour supply is determined. It underlines the essential factors determining labour supply as:

(a) the size of the population, which is a function of past rates of natural increase and net migration;

(b) the age-sex structure of the population, which is determined by the interplay between fertility, mortality and migration - autonomous factors; and

(c) age-sex specific labour force participation rates (LFPRs) which are influenced by economic, social, cultural and demographic factors - induced factors.

Figure 2.1

Flow Diagram of Basic Determinants of Labour Force Size

Demographic Factors : Fertility, Mortality and Migration (internal and international)

Economic , Social and Cultural factors*

Size and Age-Sex Composition of Population

Age and Sex-Specific Activity Rates

Size and Age-Sex Composition of Labour Force

——— Strong Relationship
+/+/+ Relatively weak Relationship
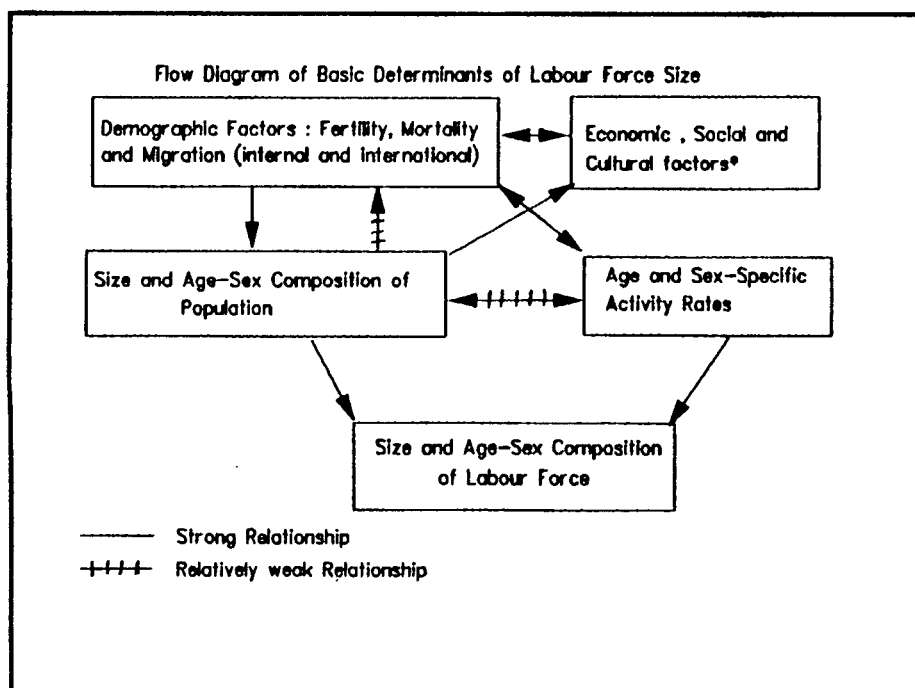
Source: Farooq G M, ILO, 1985.

Section 1

2.3 Female Work Participation Rates - A macro picture

Labour Force Participation by women has been widely researched into since the mid-seventies. Women workers in India form a rather small proportion of the country's total female population. According to the 1981 population census only one-fifth of the total women are in the labour force. The remaining 80 per cent comprised women classified as non-working, because they are not economically active in the sense of participating in any economically remunerative activity.

Table 2.1 presents the macro picture of work participation, by sex, as it has evolved since the turn of this century.

Table 2.1: Percentage of economically active population, 1901-1981, All India

Census period	Percentage of economically active persons		Women's work Participation as a % of men's work Participation rate	Terms used for denoting the economically active
	Male	Female		
1901	61.11	31.70	52	Actual Workers
1911	61.90	33.73	54	Actual Workers
1921	60.52	32.67	54	Actual Workers
1931	58.27	27.63	47	Earners
1951	54.05	23.30	43	Self supporting
1961	57.16	27.93	49	Worker
1971	52.75	14.22	27	Main activity worker+non-workers having secondary work
1981	53.19	20.85	39	Main activity workers + marginal workers
1991	51.56	22.73	44	Main activity workers + marginal workers

Source: Gulati and Rajan,1995; Simon 1994; Gulati, 1995

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From Table 2.1, certain issues become evident: (a) women's work participation rate in the country as a whole has been lower than that of men.

(b) The relative gap between men and women in this regard has been increasing so that while during 1901-21, women's work participation rate was a little over half that of men; in more recent years, 1961-91, women's work participation has been markedly less than half of the rate for men. If we look at the age-specific work participation rates, the trends in the declining female participation become more apparent (Table 2.2).

Table 2.2: Age-Specific Work Participation Rates By Sex, India, 1950-85

Ages	1950		1960		1970		1980		1985	
(Years)	M	F	M	F	M	F	M	F	M	F
10-14	41.4	28.1	33.6	25.3	25.8	20.8	18.0	16.2	15.8	13.8
15-19	77.0	38.3	69.4	35.4	62.4	31.0	55.0	26.5	53.8	25.4
20-24	93.6	45.4	90.4	42.4	89.2	36.4	88.0	30.4	87.8	29.3
25-39	97.7	52.3	97.6	49.5	97.6	43.9	96.9	38.1	96.8	36.5
40-59	97.0	48.3	96.3	46.1	96.1	41.3	95.7	36.6	95.4	34.7
60 abv	79.5	24.6	75.2	21.3	70.2	18.6	65.1	15.7	62.7	14.6
Total	61.3	30.5	57.5	28.5	54.9	24.8	54.2	21.7	55.1	21.0

Source: International Labour Organisation, 1986.

It is clear from Table 2.2 that the decline in the male work participation rate is primarily due to its decline in the ages between 10 and 19 years. This decline perhaps is a positive factor reflecting on the increasing accessibility to education. So, the increasing access to education may partially explain the decline in the overall male work participation rates. On the other hand, the decline in the female work participation is shared by all the age groups. Hence, the declining work participation rates among females is not only due to continuing in education alone. Between 1950 and

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1985 there was 9.5 percent decline in the male work participation rates while the corresponding figure for the females is 31.1 percent. The difference in the participation of two sexes shows that it is an increasing function of age (except for the age group of 60 and above).

Women's work participation in India depicts various trends, which are reflections of the structural changes of the Indian economy and society. The female work participation in India is quite low in comparison to that of other countries. In advanced industrial countries, the female work participation rate ranges between 30 percent to 45 percent while in India, it is just 19.7 percent. (Alaka N Sarma, 1992). In 1991 it has improved to 22.3 percent.Besides the low participation of women in economic activity, there are certain other features of employment pattern which require consideration.

Sectoral share of Agriculture in India's National Income, though declining over the decades, is still considerably high (nearly 50%). It provides a livelihood to about three fourths of the total population. The women, therefore are found to be engaged in the rural sector in large numbers, particularly in agriculture. According to 1981 census more than 80 percent of female workers are occupied with cultivation and agricultural work. Table 2.3 shows the industrial distribution of female main workers.

Table 2.3: Distribution (percent) of Female Main Workers by
Industrial Categories, 1971, 1981 and 1991

Industrial Category	1971	1981	1991
Total	100.00	100.00	100.00
1)cultivators	29.84	33.20	35.04
2)Agricultural labourers	50.86	46.18	45.75
3)Live stock, fishing, forestry etc.	1.91	1.85	1.60
4)Mining & quarrying	0.40	0.36	0.33
5)Manufacturing, process servicing and repairs			
a)Household industry	4.24	4.59	3.42
b)Other than household industry	2.77	3.55	2.25
6)Construction	0.65	0.80	0.59
7)Trade & commerce	1.78	2.04	2.04
8)Transport, storage & communication	0.47	0.38	0.27
9)Other services	7.08	7.05	7.36

Source: Census of India, 1988; Premi and Raju, 1994.

Among female main workers the share of cultivators have gone up by 3.36 per cent whereas the share of agricultural workers have declined from 50.86 percent in 1971 to 47.18 in 1981 (3.68 per cent). During the decade 1981-1991, the proportion of female cultivators has increased while a corresponding decline among agricultural labourers has been noticed.

Given the fact that this was the period during which the impact of green revolution was being felt and there was mechanisation of agriculture to some extent, it is possible that women had less opportunities for work as labourers as opposed to men (Mencher 1988). Such women may have worked in their family farms as cultivators, though such work may not have been highly remunerative. This is one possible explanation that can be suggested.

The following categories (Livestock, fishing and foresty, mining and quarrying, transport, storage and communication) have shown a marginal decline and the remaining categories of workers have registered an increase which is not very impressive. The sector wise distribution of Main workers is presented in Table 2.4. Percentage distribution of female main workers by industrial category for all states are given in appendix (see Appendix Table).

Table 2.4: Distribution (percent) of Main Workers in Primary, Secondary and Tertiary Sectors 1971,1981 and 1991

Sector	1971		1981		1991	
	Male	Female	Male	Female	Male	Female
Primary	70.22	83.01	66.22	81.59	63.40	81.10
Secondary	11.48	7.66	13.91	8.94	13.30	8.10
Tertiary	18.30	9.33	19.00	9.47	23.30	10.80

Note: Figures excluded Assam.
Source : Census of India,1981; Premi and Raju , 1994.

If we compare 1971 and 1981 figures for the share of male and female in three sectors, the percentage decrease of male work participation in primary sector is 4 percent and the same for female participation is only 1.42 percent. In 1991, male work participation in primary sector reduced by 2.82 per cent from 1981 where as female participation does not have any considerable change. In secondary sector, both male and female participation does not show any remarkable shift from 1981. Tertiary sector shows a 4.3 percent increase in male participation from 1981 and percentage change in female participation in this sector is only 1.33. These increases can be attributed to grown in the informal sector employment.

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The state-wise distribution of Female main workers in primary, secondary and tertiary sectors is presented in Table 2.5.

Table 2.5: Distribution of Female Main workers in primary, secondary and tertiary sectors,1981.

States	Primary		Secondary		Tertiary	
	1981	1991	1981	1991	1981	1991
Andhra Pradesh	83.86	84.11	8.24	7.57	7.90	8.32
Bihar	90.36	92.23	4.42	3.14	5.22	4.63
Gujarat	80.55	85.63	7.14	4.83	12.31	9.54
Haryana	71.72	77.94	7.58	6.12	20.70	15.94
Karnataka	78.49	80.54	12.25	10.11	9.26	9.35
Kerala	54.99	49.20	21.15	21.53	23.86	29.27
Madhya Pradesh	89.07	90.36	6.38	4.84	4.55	4.80
Maharashtra	85.21	84.89	6.64	5.58	8.15	9.53
Orissa	81.54	84.11	8.89	7.10	9.57	8.79
Punjab	32.62	42.10	15.42	10.87	51.96	47.03
Rajastan	86.75	91.68	6.24	3.32	7.01	5.00
Tamil Nadu	78.63	77.40	12.41	11.49	8.96	11.11
Uttar Pradesh	83.39	86.23	7.71	5.84	8.96	7.93
West Bengal	64.05	63.40	15.76	19.67	20.19	16.93

Source: Same as Table 2.4.

The possible reasons for a large scale involvement of female in the primary sector of employment may be as follows:

a) Most agricultural operations are simple and being traditional does not require any skill or special training;

b) Female employment in agriculture is of a seasonal nature and does not require being away from home for a long period;

c) The wage paid for female labour in agriculture being generally less than wage paid for male labour, it pays to employ female labour for operations in which males do not enjoy any advantage;

d) Whatever the legislative restrictions, if any, on the number of hours of work in agriculture, women probably can be made to work extra hours much more easily;

e) it may be easier to take along a child to an agricultural job than to an office or factories (Vohra and Sen, 1985).

Comparison of work participation rates has been affected by changes in the definition of workers. The 1961 census defined a person to be in the labour force if he\she had been engaged in any of the economic activity for a greater part of the past season. The 1971 census made this definition more rigorous: it includes only those persons whose main activity in the reference year was economically meaningful work. The 1981 census recognised that people could work for lengths of time in a year,and accordingly identified in two categories : main workers(working 183 or more days) and marginal workers (employed for less than 183 days). Thus the work force of 1961 can be compared with the main workers and marginal workers of 1981 and the same has been given in Table 2.6.

Table 2.6: Percentage Distribution of Persons in the Labour Force (to Total Persons) in Specific Age Groups, by Sex and Residence: All India Census, 1961 and 1981

Male

Area\Year	Age Groups 0-14	15-34	35-59	60+	Total
Rural:					
1961	10.60	91.90	97.40	80.00	58.20
1981	6.92	82.06	97.10	69.00	53.80
Urban:					
1961	3.50	77.00	93.30	58.40	52.30
1981	2.50	66.40	93.80	48.20	49.07

Female

Area\Year	Age Groups 0-14	15-34	35-59	60+	Total
Rural:					
1961	7.60	49.70	52.20	24.30	31.40
1981	5.25	36.60	39.30	16.00	23.00
Rural:					
1961	1.50	15.70	23.00	11.40	11.00
1981	1.07	11.52	16.50	6.40	8.30

Note: For 1961 the figures are retained as such while for 1981 the main and marginal workers are added together.
Source: Acharya and Mathrani, 1992.

The main and marginal workers have been merged for 1981 for a possible definitional comparison. There is a decline observed in the participation rates of both men and women in rural as well as urban areas. The decline is more prominent in rural areas and among women. Prior to speculating into the reasons for such decline, it would be pertinent to look at the 1971 census and the National Sample Survey (NSS) data as well.

The definition of a worker in the 1971 census is broadly comparable with that of a main worker in 1981. A comparison of these data shows that no significant change over the decade. The higher participation rates seen in the 1961 figures therefore could be due to a larger netting of marginal and occasional workers (Seal, 1980).

The NSS, since its 27th round in 1972-73, has conducted quinquennial surveys on employment\unemployment, in which comparable definitions have been used. The NSS uses three alternative criteria for defining labour participation: the usual status(US), the current weekly status (CWS) and the current daily status(CDS).[1] A person is included in the labour force by the usual status if he\she spends a major part of the last 365 days in gainful economic activity or is actively seeking work\available for work. Table 2.7 shows the percentage of persons of age 5 and above in the labour force as obtained from the of the NSS.

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[1]The NSS, Usual Status definition may appear similar to the 1981 Census definition but the two data sets are not strictly comparable since Census is a point enquiry while the NSS enquiry stretches through the year. Also there is a minor difference in the definition of marginal workers(see Krishnamurthy,1984).

Table 2.7: Percentage Distribution of Persons in the Labour Force (to total persons) of Age Five and above Working according to the Usual Status, by Sex and Residence: All India, Three Rounds of NSS

Type of workforce		Rural male	Female	Urban Male	Female	Rounds
27(72-73)	Main+Marginal	63.84	37.53	57.09	15.53	
32(77-78)	Main+Marginal	64.06	38.48	57.48	17.80	
38(1983)	Main+Marginal	63.23	38.74	57.71	17.31	
32(77-78)	Main	62.25	28.82	56.22	14.03	
38(1983)	Main	61.10	28.29	56.29	13.81	

Source: Acharya and Mathrani, 1991.

Figures in Table 2.7 shows that among the main workers, there is no perceptible difference observed in the participation rates over the decade, in both rural and urban areas. The rural female labour participation shows a minute rise of about 1 percent while the urban female participation shows a 2 percent rise, in the 32nd and 38th rounds over the 27th round.

The percentage of female marginal workers to total female workers in the labour force is about 25 in rural areas and 20 in urban areas according to the NSS. Since agriculture is the dominant occupation in the rural areas and its activities are seasonal, many women join the labour force during the sowing and harvesting seasons and withdraw otherwise in the face of evident disutility of work. This seasonality severely affects only women because this has to do with notions of the nature of work that women undertake within the agricultural sector as opposed to the work done by men[2]. In urban areas, marginal workers of all ages are engaged in a

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[2]For example, transplanting and weeding for rice cultivation is considered exclusively "women's work". This work is available only during the specific season.

variety of jobs in self-employment in the informal sectors, often as part-time workers.

According to the CWS, a person is deemed to be in the labour force if he/she has worked or is available for work for even one hour during the reference week preceding the date of interview while according to the CDS, the labour participation is calculated as a proportion of the number of person days worked (plus available \seeking for work),to total person days, on an average day in the reference week. Table 8 shows that the proportion of persons in the labour force by CAWS is smaller compared to the US and that by the CDS is still smaller. The gap is smaller in rural areas as against urban areas and larger among women as against men. This indicates the irregular nature of rural jobs compared to those in urban areas and the volatility of female labour compared to male labour. The gap between the US and the CDS participation rates among rural women is 15-17 percent, implying that upto 25-30 million women in rural areas could withdraw or join the labour force periodically. The same figure for the urban areas is in the range 2-3 million.

Table 2.8: Percentage Distribution of Persons of Age Five and above, Working according to Current Weekly Status and Current Daily Status, by Sex and Residence: All India, Three Rounds of NSS

| Rounds | Current Weekly Status | | Current Daily Status | |
	Male	Female	Male	Female
Rural:				
27(72-73)	61.42	30.52	57.99	25.22
32(77-78)	59.94	25.92	56.12	21.63
38(1983)	58.98	25.02	55.43	21.76
Urban:				
27(72-73)	56.34	13.98	54.70	12.19
32(77-78)	56.05	14.75	54.13	13.00
38(1983)	56.02	13.81	53.77	12.49

Source: Same as Table 2.7

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Section 2

2.4 Female Work Force Participation and Education

Female work participation unlike male work participation is dependent on several factors. Socio-economic change, both at the household and community level, therefore has the potential to influence responsiveness of women to labour market cues. Among other socio-economic variables that influence labour force behaviour, education has the first and foremost position. Educational characteristics are known to exert influence on labour force behaviour and consequently, work force participation. In the case of developed countries, it has been seen that educational levels and work force participation are positively related. In the context of developing countries, with strong social influences on social behaviour, the relationships are much more ambiguous.

In general, empirical and theoretical studies have revealed a positively correlated relationship between education and work force participation rate (Standing, 1978, Paukert, 1984). The results relating to India have commonly come up with a non-linear relation (Rayappa and Espenshade, 1975, Acharya and Mathrani, 1991). The non-linearity can be seen in the form of a U-shape curve in which those with higher levels of education and lower levels of education have had higher participation than those with intermediate level of education.

Sinha (1967) justified the U-shaped curve by arguing that labour force participation rate declines with literacy but female education above the matriculation favours higher rates of employment. Again, a similar relationship was reaffirmed by

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Acharya and Mathrani based on both 1981 Census and the 38th Round of the NSS data. They found the U-shaped pattern to be holding good in both rural and urban areas. The various explanations for this are speculative in nature. For example, Acharya's argument for the U-shape is that "within the intermediate level of education,the level of participation could be low since some primary level education and some middle certificate holders could consider secondary level" and that "women graduates (in both rural and urban areas) predominantly belong to the middle class or landed households where taboos against working outside the household, along with non-availability of appropriate jobs keep women out of the labour market" have not been empirically sustained.

Rayappa and Espenshade (1975) found a relationship between education and work force participation at two levels. At the point of school entry, when number of enrolments increase, the immediate impact would be seen in lowering of work participation rate in the younger ages as a result of movement of persons from economically active status to school going status. The authors also note that there is frequently a third category of persons who are neither in school nor economically active, but remain at home. The relationship between those who have already left school with various levels of educational attainment and labour force participation is less clear. Empirical studies have not been unanimous in the results they present.

State-wise Education and Work participation rate
The statewise education and work participation rate for 1981 and 1991 have been compared (see Table 2.9).

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Table 2.9: Literacy Rate and Work Participation Rate among
Females-All India, 1981 and 1991.

States	Literacy rate 1981	1991	Work rate 1981	1991
Andhra Pradesh	24.20	32.70	27.00	30.05
Bihar	16.50	22.90	9.10	9.97
Gujarat	38.50	48.60	11.00	13.73
Haryana	26.90	40.50	4.70	6.01
Karnataka	33.20	44.40	19.00	22.73
Kerala	75.60	86.10	12.80	12.81
Madhya Pradesh	19.00	28.80	22.30	22.82
Maharashtra	41.00	52.30	24.00	26.47
Orissa	25.10	34.70	10.70	12.10
Punjab	39.70	50.40	2.30	2.79
Rajastan	14.00	20.40	9.30	13.04
Tamil Nadu	40.40	51.30	22.40	25.13
Uttar Pradesh	17.20	25.30	5.40	7.45
West Bengal	36.10	46.60	5.80	7.96

Source: Census Of India, 1988; Premi and Raju, 1994.

The rate of increase in literacy from 1981 to 1991 is much higher than that of work participation in almost all the major states of India. This implies that an improvement in literacy does not induce a corresponding increase in work participation rate. It is possible that female work is not mainly education induced but poverty induced. We shall turn to this point again in Chapters III and IV. Hence literacy rate among workers is a worth considering factor and the same is given in Table 2.10.

Table 2.10: Literacy rates for population and workers by sex, 1981.
==

| | Literacy Rate for | |
States	Population	Workers
Andhra Pradesh	20.40	7.20
Bihar	3.60	4.73
Gujarat	32.30	20.25
Haryana	22.30	21.48
Karnataka	27.70	16.63
Kerala	65.70	59.36
Madhya Pradesh	15.50	6.83
Maharashtra	34.80	20.56
Orissa	21.20	7.24
Punjab	31.70	40.01
Rajastan	11.40	5.64
Tamil Nadu	35.00	20.68
Uttar Pradesh	14.00	9.69
West Bengal	30.30	17.21

Source: Census of India, 1988.

The literacy rate for female workers vary dramatically between states. Kerala shows the highest percentage of literates among both workers and population and Bihar shows the lowest. Literacy has a definite bearing on economic activity. It affects Work Participation Rate, productivity and the mobility of workers. The industrially developed states like Gujarat, Maharashtra and West Bengal have higher proportions of literate workers as compared to economically backward states. The higher rates of literacy among workers in Punjab can be linked to the importance of service sector and industrial employment to women in the state.

Table 2.10: Literacy rates for population and workers by sex, 1981.

States	Literacy Rate for Population	Workers
Andhra Pradesh	20.40	7.20
Bihar	3.60	4.73
Gujarat	32.30	20.25
Haryana	22.30	21.48
Karnataka	27.70	16.63
Kerala	65.70	59.36
Madhya Pradesh	15.50	6.83
Maharashtra	34.80	20.56
Orissa	21.20	7.24
Punjab	31.70	40.01
Rajastan	11.40	5.64
Tamil Nadu	35.00	20.68
Uttar Pradesh	14.00	9.69
West Bengal	30.30	17.21

Source: Census of India, 1988.

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Table 2.11: Education Specific Labour Force Participation Rates for Persons of age 15 and above , by sex: Census 1981 and 38th Round of NSS. 1983 (by Usual Status)

Education Level	Census 1981				NSS Round 1983			
	Rural		Urban		Rural		Urban	
	Male	Female	Male	Female	Male	Female	Male	Female
Illiter.	90.63	26.07	82.58	12.99	91.82	54.29	86.81	29.58
Literate								
Primary	86.83	18.03	79.97	6.63	90.90	41.79	85.16	18.09
Middle	67.67	10.99	66.50	4.41	75.26	29.32	70.96	11.06
Secondary	64.18	12.17	64.17	10.4	73.25	26.93	67.49	15.59
Graduate								
and above	72.49	41.70	77.43	27.06	77.43	29.46	82.49	29.70
Total	–	–	–	–	87.67	50.87	78.43	22.53

Source: Sarvekhana, 1987; Census of India 1981.

Figure 2.2
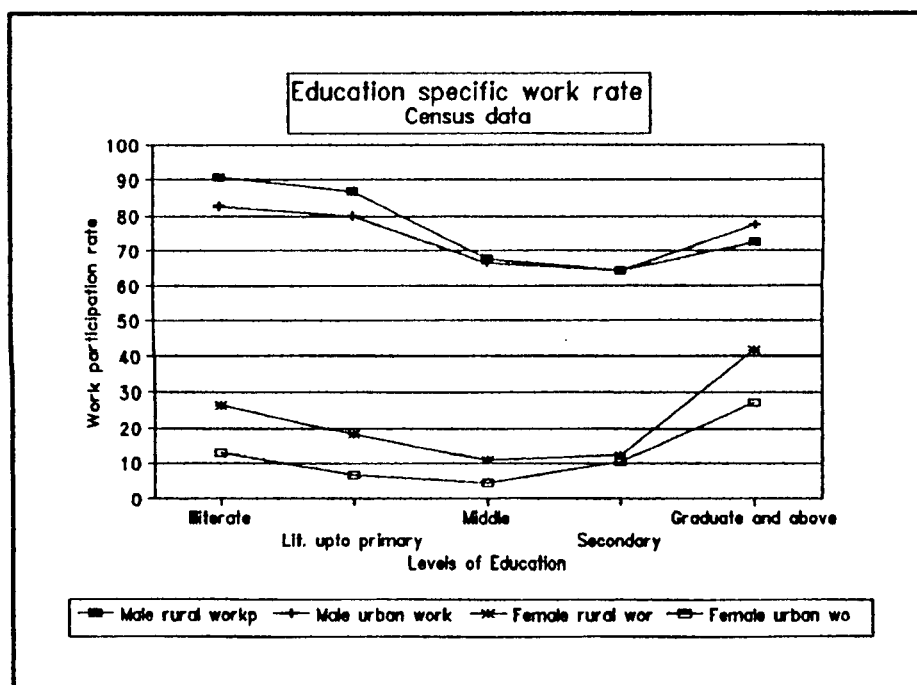
The education-specific labour participation rates, as observed from the 1981 Census and the 38th round of the NSS , are given in the table. This table shows a U-shaped pattern for participation for both rural and urban areas. For lower and higher levels of

education, higher rates of participation can be seen in Figure 2.2
as well (see Figure 2.2).

Table 2.11(a): Education Specific Work Participation Rates
           According to Usual Principal and subsidiary) Status,
           Urban Female 15 +

State	not lite.	lit. upto primary	middle	secondary	graduate and above	All
Andhra Pradesh	35.96	15.73	11.48	14.71	34.97	26.66
Bihar	22.53	10.35	4.83	6.72	18.79	17.00
Gujarat	27.75	14.42	13.81	10.17	25.06	19.78
Haryana	16.95	11.90	9.30	19.95	18.16	15.86
Karnataka	38.97	29.24	14.76	19.42	35.54	29.68
Kerala	37.65	33.80	23.05	28.44	48.69	31.44
Madhya Pradesh	31.27	14.65	9.83	11.35	19.05	22.66
Maharashtra	32.86	18.63	8.67	15.84	34.93	22.76
Orissa	25.45	7.02	2.77	5.71	36.06	16.56
Punjab	20.52	13.98	18.85	14.55	40.32	19.43
Rajastan	37.36	17.05	6.61	9.91	25.81	29.37
Tamil Nadu	38.91	25.83	14.08	24.00	35.15	29.67
Uttar Pradesh	19.14	10.43	5.38	8.68	19.00	15.33
West Bengal	23.52	14.92	9.74	13.84	32.42	17.52
All India	29.58	18.09	11.06	15.59	29.70	22.53

Source: Sarvekshana, Vol.11, No.4,Issue No.35,April 1988.

Table 2.11(b): Education Specific Work Participation Rates According to Usual
           (Principal and subsidiary) Status, Rural Female 15 +

State	not lite.	lit. upto primary	middle	secondary	graduate and above	All
Andhra Pradesh	72.26	43.93	30.44	21.55	18.73	67.69
Bihar	40.64	19.63	13.36	16.35	34.54	38.40
Gujarat	64.94	58.25	39.49	33.67	40.11	61.63
Haryana	37.15	35.06	41.38	14.00	16.80	36.56
Karnataka	60.48	52.36	40.70	20.86	8.51	57.40
Kerala	48.42	52.04	37.59	31.25	50.62	45.93
Madhya Pradesh	70.23	46.98	28.81	28.38	22.00	67.33
Maharashtra	74.57	65.71	43.61	26.33	35.77	70.65
Orissa	48.47	20.05	9.35	13.52	36.63	42.25
Punjab	50.58	38.71	31.91	36.58	34.61	46.64
Rajastan	68.98	44.54	43.71	17.54	32.78	67.17
Tamil Nadu	67.92	57.27	34.10	37.68	27.55	63.31
Uttar Pradesh	41.48	27.32	25.56	25.61	8.39	39.69
West Bengal·	34.15	20.87	13.70	14.50	23.90	29.95
All India	54.29	41.79	29.32	26.93	29.46	50.87

Source: Same as Table 2.11a

Figure 2.3
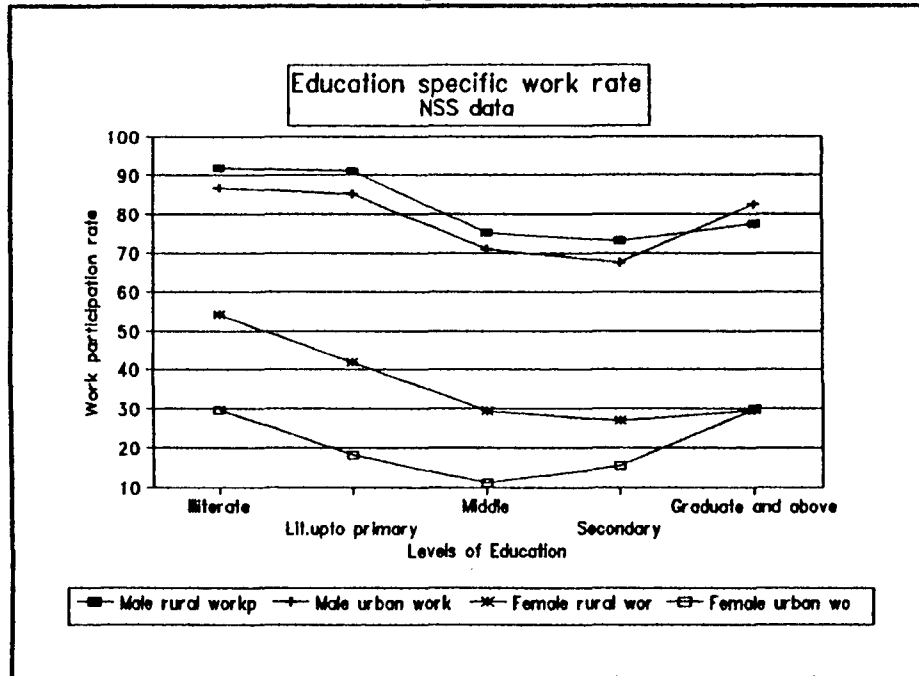
In an analysis of education specific work participation rates for rural and urban areas by state for most states, the U-shaped relationship between female education and work participation rates persisted (see table 2.11(a), 2.11(b) and figure 3). There are no exceptions in urban areas for this relationship and in rural areas, Andhra Pradesh, Karnataka, Madhya Pradesh, Tamil Nadu and Uttar Pradesh form the exception.

Conclusion

While analysing the relationship between education and work force participation, we can find that among the females who are participating in labour force, majority are agricultural wage labourers and cultivators having the least level of education as illiterate or primary in all the fourteen major states of India. So,their work participation seems "not induced by education".

Hence, work participation of females in absence of education can well be hypothesised as poverty induced which is compulsive rather than self-intentive. In such circumstances of female work force participation, any negative implication cannot be a function of `women work' alone rather than its allied features like personal characteristics of the women as well her household. The educational characteristics of women as well as the economic characteristics of the household may also be equally contributing to such negative implication. The next two chapters are in the above direction to analyse the causality between women's work and child mortality.

Chapter 3

FEMALE EDUCATION, WORK PARTICIPATION AND CHILD SURVIVAL

3.1. Introduction

The mortality level in a population, especially infant and child mortality is often considered as an indicator of socio-economic development. The variation in the level of infant and child mortality has a direct bearing on the life expectancy at birth which is also considered as an indicator of development while comparing the global disparity in development across regions. For instance, quality of life index and even the latest Human Development Index developed by the United Nations consider infant mortality as one of the variable in their calculations (Morris and Morris, 1979; United Nations, 1995). An overall low level of mortality in any population or region implies a lower level of infant and child mortality. As mortality is comparatively higher in India in relation to the developed world, there remains ample scope for understanding its levels and differentials across states and regions with socio-cultural differences. A greater degree of differential in infant and child mortality levels across states and regions of India necessitates an analysis of the relative influence of different determinants of mortality.

3.2. Definition

There are different measures of infant and child mortality.[1]
For demographic and statistical purposes, all children under the
age of one year are considered as 'infants' and so the term 'infant
mortality' refers to mortality among children of less than one year
of age.

Infant Mortality Rate = $\dfrac{\text{No. of deaths of infants before attaining the age of one year during the calendar year} \times 1000}{\text{Total live births in the calendar year}}$

Infant mortality may be defined as the number of deaths that occur
per thousand live births in any population in one calendar year. In
other words, infant mortality rate is nothing but the infants who
died before celebrate their first birthday. From the very
definition, it is obvious that the infant mortality does not take
into account either foetal deaths that is 'still births', but only
live births and infant deaths.

3.3. Trends in Infant Mortality in India

Thus a detailed and serious study on infant mortality in any
community or country, however (and particularly in a large and
heterogeneous country like India), must be based on an adequate

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[1] Neonatal mortality: the probability of dying in the first
month of life;
Postneonatal mortality: the difference between neonatal and
infant mortality;
Infant mortality($_1q_0$): the probability of dying before the
first birthday;
Child mortality($_4q_1$): the probability of dying between the
first and fifth birthday.

knowledge of the complex biological, economic, social and cultural

factor affecting the health, morbidity and mortality of infants.

Table 3.1: Trends in Infant Mortality Rate in India
==

Year	Infant Mortality Rate
1901-11	205
1911-21	212
1921-31	176
1931-41	168
1941-51	147
1956(1951-61)	146
1966(1961-71)	129
1970	129
1971	129
1972	139
1973	134
1974	126
1975	140
1976	129
1977	130
1978	126
1979	120
1980	114
1981	110
1982	105
1983	105
1984	104
1985	97
1986	96
1987	95
1988	94
1989	91
1990	80
1991#	80
1992#	79
1993#	74
1994#*	73

Notes:* Provisional
Excludes Jammu and Kashmir
Sources: Sandhya S 1991; Sample Registration Bulletin. 1994;
       Zachariah K C et.al. 1994.

As a prelude, Table 3.1 presents the trends in the infant mortality

rate (IMR) in India from the beginning of the twentieth century to

the present day. Above 200 IMR was reported before 1920s, above 150

before 1940s, above 100 before the end of 1980s and 73 in 1994. The

estimates comes from two different sources. Over the last ninety years, the IMR has shown a continuous decline. Prior to 1970 estimates are based on the census data and beginning of 1970s to 1994 are based on the annual Sample Registration System carried out by the Registrar General of India, New Delhi.

Studies in India show that approximately 42 percent of total deaths are among children below 5 years of age. Of these, about half are within first twelve months of life. Several studies also show a very high rate of mortality in the first few days of life ie. less than 7 days (Krishnamurthy, 1986; Pisharoti, 1990; Zachariah, 1995; Zachariah and Irudaya Rajan, 1996; Srinivasan, 1995).

3.4. Determinants of Child Survival

Infant and Child Mortality rate is a product of interaction of several factors - demographic, socio-economic, environmental and infrastructural. A closer examination of these factors will give a clear picture of the influence of different factors on child survival. Let us discuss the each factor separately. Mason (1983)has hypothesised the relationships of women's status on child mortality as given in appendix (see Figure 3.1).

3.4.1.Demographic factors

Among the many demographic factors determining the chances of child survival, the following three variables are considered as important and are discussed below in detail.

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3.4.1.1. Age at Marriage

Age at maternity has a significant impact upon child survival. The Infant and child Mortality survey conducted by the Office of the Registrar General of India (1979), revealed that the age at effective marriage showed a negative relationship with infant mortality in countries like India. In a number of countries, the rate of infant loss among women younger than 20 years has been observed to be high; it is lowest among mothers between 20-30 years of age and starts increasing beyond the age of 34 (Visaria L, 1988) The same is also noted in recent studies carried out in Gujarat and Kerala (Visaria, Visaria and Jain, 1995; Zachariah et.al, 1994). Therefore, age at maternity below twenty years and above 35 years of age is considered to be high risk ages both with regard to the child survival as well as survival of the mother.

3.4.1.2. Maternal Age and Parity

Age and parity are usually highly correlated and therefore it is difficult to isolate their independent contributions to the risk of child death. Each of these factors in general show a U or a J shaped relationship with infant mortality. Taylor (1978) found out that infant mortality was at the highest in extreme age groups of the mother, such as 15-19, and above 30 years. The available literature provides enough evidence that mortality is associated with birth order. Infant mortality rates were higher for the first and fourth parity when compared to middle parities (Mosely, 1983). It is also noted that higher risk of infant deaths is biologically associated with child bearing at very young age (less than 18), and older ages (over 35). A U shaped distribution with parity and mortality is found out in many studies (Stockel and

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Chowdhary, 1972; Trussel,1983; Omran and Standley, 1976). A study on India by United Nations reveals that the level of infant mortality is actually quite high at first order births, but very high again for the forth and higher order births. Thus the infant deaths show a pattern according to the order of births, which is rather a biological phenomenon (United Nations, 1954; Zachariah et.al, 1994).

3.4.1.3. Birth Interval

Another factor that confounds the effect of age and parity on infant mortality is the length of the preceding birth interval. Women of any given age can have high parity births only if the intervals between births are shorter. Thus, a higher risk of infant death for fourth or higher parity births in comparison to second and third parity births among women in their twenties can be an artifact of shorter birth intervals (Krishnamurthy, 1986). It has been treated as independent as well as dependent variable to show its influence on child mortality and vice versa.

Concerning the influence of birth interval on infant mortality Knodel (1968) found that the infants born with short intervals were subject to comparatively higher mortality risks . The reason for this is that the previous child in the household claims some of the care that a mother could otherwise devote to the new born infant. Shorter birth intervals might weaken the mothers health, affecting inturn, the physical constitution of the infant and at the same time lessening her ability to provide adequate care to the infant. When the preceding child is older, the birth interval is

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longer, his/her claim on the mother's attention need not adversely affect the new born.

3.4.2. Environmental and infrastructural factors

Some of the major environmental and infrastructural factors which affects child mortality are (a) accessibility to medical facility, (b) availability of safe drinking water and (c) sanitary facilities.

Easy access to medical care seems to be one of the reasons for lower infant mortality in urban areas than in rural areas. **Ayeni and Oduntan (1978)** observed that population groups that are urban and have access to modern medical care, generally live in better socio-economic conditions and have lower mortality rates than the population groups depending mostly on traditional medicines or limited and low quality health care.

While adequate water is necessary for the maintenance of hygienic conditions, availability of pure drinking water is one of the most important means of preventing many of the diarrhoeal infections.

The elements of physical environment that constitute most of the features of mortality are poor sanitation and water supply. The World Health Organisation estimated that in 1980, 57 per cent of the people in the developing countries lacked safe drinking water and 75 per cent did not have adequate sanitation. With the anticipation that the improvement of water supply and sanitation will have a substantial impact on diarrhoea morbidity and mortality rates, especially in developing regions, the International Drinking

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Water Supply and Sanitation Decade came into existence. However, in 1990, nearly 855 million people were still without access to

safe drinking water and nearly 1.7 billion people do not have access to sanitation facilities worldwide (**World Bank, 1992**)

3.4.3. Socio-economic and Cultural Factors

3.4.3.1. Female Education

Overwhelming micro and macro level evidences suggests a negative association between maternal education and child mortality (see for details, Cochrane, Leslie and O'Hara 1980; Cleland and Van Ginneken, 1988; Cleland, 1990; Bhat and Rajan, 1990). It may be useful to recapitulate the major routes of causation identified by the earlier studies before attempting to review the possible influence of female labour force participation on child mortality. The surveys indicate that the way in which maternal education influences child mortality is fairly complex and has three different facets. First, the observed relationship between maternal education and child mortality could partly be due to certain independent factors associated with education, such as different fertility behaviour and higher economic and social status, which reduce mortality risk. Secondly, education itself can have an independent influence on child mortality by promoting better child-care practices at home and more intensive use of preventive and curative health care. Finally, certain extraneous factors may either enhance or suppress the overall strength of the relationship between child health and maternal education. What is observed is an amalgam of these three routes of causation.

Figure 1: Theoretical model linking maternal schooling with child survival through literacy, comprehension of public health information and health practices.

```
┌─────────────────┐
│ 1.SCHOOLING     │
│ during child-   │
│ hood and adol-  │
│ escence         │
└────────┬────────┘
         │
┌────────┴────────┐     ┌─────────────────────────┐     ┌─────────────┐
│ 2.LITERACY      │     │ 3.HEALTH SKILLS         │     │ 4.HEALTH    │
│ skills retained ├─────│ understanding messages  ├─────│   CARE      │
│ in adulthood    │     │ interacting with        │     │ practices   │
│                 │     │ clinicians              │     │             │
└─────────────────┘     └─────────────────────────┘     └──────┬──────┘
                                                                │
                                                         ┌──────┴──────────┐
                                                         │ 5.  CHILD       │
                                                         │   SURVIVAL      │
                                                         └─────────────────┘
```
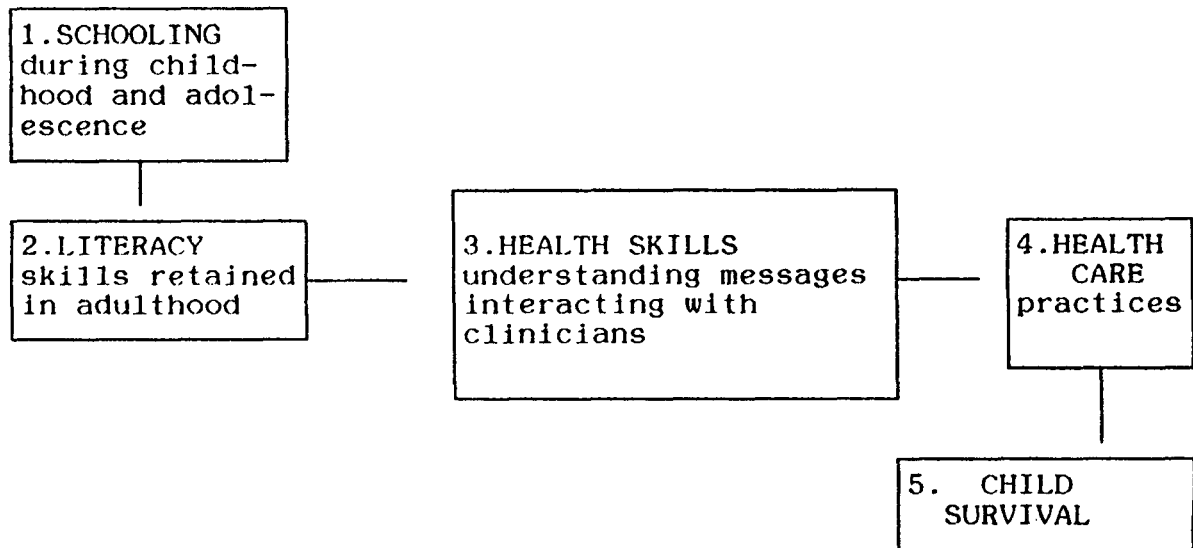
Part of the observed association between maternal education and child mortality may due to certain other characteristics of educated mothers. Differential fertility behaviour and better socioeconomic status are often cited as important associated factors. The fertility behaviour of educated mothers minimizes the child mortality risk associated with birth as they tend to have children when they are neither too young nor too old; they also may maintain better spacing between births. All these factors are known to reduce the child mortality risk. Similarly, with higher education, women are likely to have higher incomes and better social status either through their direct participation in the labour market or through the higher probability of being married to wealthier men. Studies using World Fertility Survey data clearly show that education has a strong favorable effect on child mortality independent of the influence of different fertility

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behaviour and better socioeconomic status (Hobcraft, McDonald and Rutstein, 1984; Cleland and van Ginneken, 1988).

Mother's education affects child survival in two main ways: through better child-care practices and higher standards of hygiene at home, and more rational and greater use of preventive and curative medical services (Mosley and Chen 1984; Cleland and van Ginneken 1988). The first way is known as the household production of health in the health-economics literature (Grossman, 1972). It is hypothesized that the effectiveness with which basic child-health-promoting inputs, such as personal hygiene, prenatal and postnatal care, and feeding practices, improves with the level of education of the mother. It is also argued that education gives greater independence to the mother which will help her to take child-health-promoting decisions without any hindrance (Caldwell, 1986). The second important pathway of influence is through the superior health-seeking behaviour among educated mothers. There is considerable empirical evidence, from the less developed countries in all parts of the world, that the propensity to use preventive and curative health services for self and children is high among educated mothers. Educated mothers are also found to have better knowledge of diseases and they seek timely treatment more often (see Cleland and van Ginneken 1988; Irudaya Rajan, Mishra and Ramanathan, 1996). However, some studies deny superior health-care knowledge on the part of educated mothers, particularly among those with lower levels of education (Caldwell, Reddy and Caldwell 1983; Lindenbaum, Chakraborty and Elias 1985). To sum up, the available evidence indicates a strong and independent association between

mother's education and child health, but the exact mechanisms through which it operates are not yet clear.

A number of external factors influence the strength of association between maternal education and child mortality. The overall strength of the association is greater among children in the age group three to seven years than among infants (Cleland and van Ginneken 1988), because biological factors rather than child-care practices, including breastfeeding, play an important role in determining mortality among younger children. As they grow, the influence on health of environmental factors and child-care practices becomes important. Further, the influence on mortality differentials of the improved availability of basic public health facilities such as clean drinking water, good primary health facilities and sanitary disposal of human and animal wastes is found to be indeterminate (Cleland and van Ginneken 1988). In some societies, notably Costa Rica, China, Sri Lanka and the State of Kerala in India, improved access to better public health facilities has reduced the differences in child mortality rates between well educated and poorly educated mothers;(Tulasidhar, 1993; WHO, 1983; Bhat and Rajan, 1990; Zachariah et.al, 1994) but in many developing countries the mortality differentials due to maternal education do not change appreciably even after some improvement in public-health facilities have become more available. Thus, the supportive role of public-health infrastructure in strengthening the influence of maternal education on child health is not clear.

3.4.3.2. Work Status

The relationship between female labour force participation and child mortality is even more complex. On the one hand, labour force participation can have an adverse impact on child health as the child will not get full attention from its mother and may even forgo the benefits of breastfeeding. This will probably happen in those families where because of poverty the mother must participate in the labour market soon after delivery. On the other hand, the mother's work force participation will enhance the family income which will in turn have a positive impact on child nutrition and health. Thus, the eventual outcome of female labour force participation on child mortality depends on the relative influence of these two routes of causation.

The empirical evidence on this issue also reflects this conflict. Many of the international studies cited in Dwyer and Bruce (1988), suggest an inverse relationship between child health and female labour force participation. Some studies suggest that, after controlling for family income, children are better fed and looked after in households where women work. In such households, a larger proportion of the family's earnings are expended on child care and related activities. A study by Kumar (1977) in Kerala indicated a positive association between female earnings and child nutrition, but a similar association between paternal income and child nutrition was not found. Another study of poor households in Kerala and Tamil Nadu categorically state that eliminating female work, even if it means some improvement in male employment, would have a very negative effect, not only on the females themselves, but also on the families they support (Mencher 1988).

On the contrary, some studies indicate a direct relationship between child mortality and labour force participation (Hobcraft et al. 1984; Basu and Basu, 1991). For instance, a recent Indian study reported an adverse impact on child mortality of the mother's participation in the labour force (Basu and Basu, 1991). Another study done on Kerala also reveals the same (Zachariah et.al, 1994). The authors trace this to the inability of working mothers to give adequate care to infants and breastfeed them properly.

3.5. Mortality Differentials among states

A high degree of mortality differential exists among the states, particularly in regard to infant and child mortality. Table 3.2 gives mortality estimates for age 1, 2, 3 and 5 for all the states based on the 1981 census. The information such as children ever born and children surviving to estimates the mortality values for 1991 census are not available at the time of completing the dissertation. So the remaining pages of this chapter, we discuss the infant and child mortality estimates by work status and educational attainment based on the 1981 estimates.

Table 3.2: Estimated Values of q(1) q(2) q(3) and q(5), 1981

States	q(1)	q(2)	q(3)	q(5)
Andhra Pradesh	91	105	118	139
Bihar	94	112	125	141
Gujarat	84	102	109	124
Haryana	94	124	125	138
Karnataka	81	103	121	142
Kerala	52	55	63	80
Madhya Pradesh	150	162	171	197
Maharashtra	92	114	121	145
Orissa	115	148	165	179
Punjab	77	94	102	111
Rajastan	114	149	157	176
Tamil Nadu	86	103	114	132
Uttar Pradesh	130	152	168	190
West Bengal	95	102	111	124
All India	115	123	132	152

Notes: q(1), q(2), q(3) and q(5) denote the number of deaths per 1000 live births by age 1, age 2, age 3 and age 5 respectively. Moreover, there should be a gradual progression in estimates from q(1) to q(5) as mortality from birth to age 1, 2, 3 and from birth to age 5 will increase progressively.

States Classified by q(1) values

Less than 70	-	Kerala
71 to 90	-	Gujarat, Karnataka, Punjab, Tamil Nadu.
91 to 115	-	Andhra Pradesh, Bihar, Haryana, Orissa, Rajastan, West Bengal
116 to 140	-	Uttar Pradesh
141 and above	-	Madhya Pradesh

States Classified by q(5) values

Less than 100	-	Kerala
100 to 135	-	Gujarat, Punjab, Tamil Nadu, West Bengal
135 to 170	-	Andhra Pradesh, Bihar, Haryana, Karnataka, Maharashtra
170 and above	-	Madhya Pradesh, Rajastan, Uttar Pradesh

Source: Census of India, 1988.

The levels of infant and child mortality vary considerably between the different parts of the country. The extent of regional variation is illustrated by the contrast between Kerala and Uttar Pradesh. In the state of Kerala, the child mortality is 80 and in

Uttar Pradesh it is 190, almost two and half times than Kerala, in 1981. We can also notice that the northern states of India like Madhya pradesh, Orissa, Rajastan and Uttar Pradesh have child mortality higher than all India average where as south and east Indian states have comparatively much lower level of child mortality. The same pattern is observed for other estimates too.

In his study Nag (1983) made a comparison of the state of Kerala in the south with the state of West Bengal in the east. The author attributed Kerala's lower mortality level mostly to its higher social development and partly to its favorable environmental and hygienic conditions.

In their study, Dyson and Moore (1983) grouped the major states in India in to two basic demographic regions: the north and the south including the states in the east. The authors found that `in contrast to the north, states in the south and the east are characterised by lower infant and child mortality'. They attributed these regional differentials in child mortality to lower female autonomy under the northern kinship system and hypothesized that even in the absence of modern health and education services - differences in kinship structure and female autonomy between north and south may influence patterns of child care and hence child mortality. According to the statistics presented by Dyson and Moore, the infant mortality rate in 1958-59 among states in the south and east varied from 89 deaths per thousand livebirths in Kerala to 161 in Bihar. The infant mortality rates among states in the north varied from 114 in Rajastan to 221 in Uttar Pradesh. Hence, there should be some differences in addition to the

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differences in female autonomy and kinship structure, like differences in their social development as pointed out by Nag.

The impact of education on child survival also varies among different states. Even though education reduces the chances of child loss in all the states, at a given level of education the child survival chances varies. Table 3.3 shows the infant and child mortality at different levels of education across major states.

Table 3.3(a): Statewise estimates of q(1) by educational level of mother

States	Illiterate	Educational Level		Matriculate below graduate	Graduate& above
		Literate but below middle	Middle but below matriculate		
Andhra Pradesh	90	77	67	43	24
Bihar	96	78	68	45	51
Gujarat	118	111	67	47	–
Haryana	124	126	104	80	16
Karnataka	82	75	55	34	–
Kerala	78	52	45	14	–
Madhya Pradesh	151	132	105	66	18
Maharashtra	120	114	89	57	43
Orissa	166	161	124	50	–
Punjab	130	120	97	63	–
Rajastan	142	121	78	50	–
Tamil Nadu	115	91	71	43	–
Uttar Pradesh	131	105	95	63	25
West Bengal	96	89	62	47	22
All India	117	99	76	48	32

Source: Census of India, 1988.

Table 3.3(b): Statewise estimates of q(5) by educational level of mother

States	Illiterate	Educational Level Literate but below middle	Middle but below matriculate	Matriculate below graduate	Graduate& above
Andhra Pradesh	152	102	66	47	31
Bihar	151	95	71	51	33
Gujarat	138	100	73	54	34
Haryana	149	97	70	51	30
Karnataka	159	106	75	47	23
Kerala	118	78	53	33	-
Madhya Pradesh	212	127	78	58	39
Maharashtra	172	114	75	44	26
Orissa	191	152	91	55	33
Punjab	123	91	63	44	32
Rajastan	185	113	76	54	41
Tamil Nadu	153	108	78	53	29
Uttar Pradesh	201	126	89	64	44
West Bengal	140	97	51	34	24
All India	170	107	71	48	32

Source: Same as Table 3.3(a)

The level of female education shows a strong negative influence on infant and child mortality. The infant mortality among illiterate mothers in India is 117, 99 among literate but below middle, 76 among middle but below matriculate, 48 among matriculate but below graduate, 32 for graduate and above. The above educational categories, the estimated child mortality values are 170, 107, 71, 48 and 32 respectively. This result imply more than 50 per cent reduction in child mortality at least with middle school level of education. This negative effect of female education on infant and child mortality is usually attributed to better child care including better utilisation of available medical facilities.

It is also evident that this bearing of education on mortality is not homogeneous across states. In the southern states, there might be other factors like high female age at marriage, better

infrastructural facilities for health care etc., which are more active than in northern states.

Table 3.4(a): State wise estimates of q(1) by occupation of the female main workers

States		Rural			Urban	
	Cultivators	Agricultural Labourers	Manual Workers	Non-manual Workers	Manual Workers	Non-manual Workers
Andhra Pradesh	96	107	99	78	92	30
Bihar	98	127	170	118	85	27
Gujarat	119	157	135	58	172	32
Haryana	120	174	118	35	111	–
Karnataka	91	99	110	49	87	12
Kerala	64	84	98	84	72	27
Madhya Pradesh	147	188	195	178	136	200*
Maharashtra	123	153	158	94	124	7
Orissa	143	169	214	275	122	–
Punjab	–	151	94	–	67	–
Rajastan	165	200	245	124	122	82
Tamil Nadu	110	138	134	93	138	60
Uttar Pradesh	138	151	144	105	101	–
West Bengal	85	98	123	56	107	70
All India	125	137	140	83	113	27

Occupation

Note: In Urban areas, cultivators and agricultural labourers have been included under manual workers.
*Graduation is not possible in Urban.

Source: Census of India 1988.

Table 3.4(b):   State wise estimates of q(5) by occupation of the
female main workers

States		Occupation				
		Rural			Urban	
	Cultivators	Agricultural Labourers	Manual Workers	Non-manual Workers	Manual Workers	Non-manual Workers
Andhra Pradesh	152	169	157	134	138	72
Bihar	154	190	179	107	163	64
Gujarat	118	168	156	100	138	64
Haryana	146	183	169	77	125	56
Karnataka	151	186	163	124	160	77
Kerala	86	117	109	43	96	38
Madhya Pradesh	198	243	244	174	190	83
Maharashtra	161	210	185	116	162	64
Orissa	184	200	388	187	186	86
Punjab	108	151	147	64	93	37
Rajastan	199	247	211	120	159	77
Tamil Nadu	142	174	180	99	167	64
Uttar Pradesh	190	238	207	132	160	79
West Bengal	108	137	156	95	120	43
All India	167	193	175	106	156	63

Source: Same as Table 3.4(a)

The Infant and child mortality is comparatively high among agricultural labourers and manual workers than non-manual workers both in urban and rural areas (see Tables 3.4a and 3.4b). So, the type of work is more important in this regard. However, the work status and type of work are determined to a considerable extent by the level of education. In fact, it is found that the literacy level among female workers is lower indicating the fact that a majority of them might be engaged in manual work (See chapter 2, Table 2.2).

The highest infant and child mortality rates are reported for agricultural labourers, followed by manual workers, cultivators and non-manual workers in the rural areas and the highest among manual workers, followed by non-manual workers in the urban areas. There

is a clear difference existing among workers of different categories.

Table 3.5: Child Mortality q(5) of working and non-working mothers in rural and urban areas, India, 1981.

| | Urban | | Rural | |
	Workers	Non-workers	Workers	Non-workers
Andhra Pradesh	122	83	162	128
Bihar	132	83	178	137
Gujarat	111	83	146	131
Haryana	91	88	165	145
Karnataka	142	95	172	134
Kerala	64	69	102	73
Madhya Pradesh	170	115	220	196
Maharashtra	130	84	185	134
Orissa	159	116	195	180
Punjab	67	74	131	122
Rajastan	136	77	206	177
Tamil Nadu	135	96	163	123
Uttar Pradesh	135	114	209	201
West Bengal	104	72	137	136
All India	126	93	179	157

Source: Child Mortality Estimates of India, Census of India, Occasional Papers No.5 1988.

The child mortality of workers are higher than that of non-workers in rural and urban areas (Table 3.5), possibly it could be due to the type of female work. Table 3.4 also shows that child mortality is high among agricultural and manual workers when compared with non-manual workers.   Since the incidence of child loss is high among agricultural labourers and manual workers it could be induced by poverty. Table 3.6 shows the figures of child mortality among workers and non-workers and level of poverty for fourteen major states.

Table 3.6: Child mortality of female workers&non-workers and. Poverty

States	Child mortality of Workers	Child mortality of non-workers	Poverty[*]
Andhra Pradesh	162	127	7.0
Bihar	178	137	13.0
Gujarat	146	131	3.0
Haryana	165	145	0.9
Karnataka	171	133	5.2
Kerala	102	73	3.7
Madhya Pradesh	220	196	9.6
Maharastra	185	133	9.2
Orissa	194	180	6.0
Punjab	134	122	0.9
Rajastan	206	178	3.3
Tamil Nadu	163	123	7.0
Uttar Pradesh	209	201	16.7
West Bengl	136	136	8.7

Note: * - Percentage distribution of population below poverty line in rural areas (calculated from NSS Round in 1977-78). The reference year for this poverty variable is 1977-78, rather than 1981 (as with the other two variables). The justification for using 1977-78 data is that the 1981 mortality estimates are based on birth and death informations pertaining to the late 1970s,and the poverty levels in the 1977-78 period is an appropriate reference period.

Source: 1. Gedam R, 1995; Poverty in India, Deep & Deep publications, New Delhi,1995,p.363.
2. Occasional paper 1 of 1987, Recent Literacy Trends in India, Office of Registrar General of India and Census Commissioner, New Delhi,1987.

Using the figures in Table 3.6, regression were run to find the influence of poverty on child mortality. Interestingly, it is found that poverty is having a positive and statistically significant (t-value 1.86) relationship with child mortality among workers and such a relationship is absent among non-workers (t-value 0.99). It implies that it is because of poverty, that women are working in low paid activities and this poverty directly affects chances of child loss.

Table 3.7: Different correlates of child mortality

State	Literacy rate above 15 years	Work rate	Percent employed	Mortality q(5)	Modern sector workers	Agriculture& manual workers
Andhra Pradesh	20.00	27.00	12.00	139.00	3.24	23.76
Bihar	13.20	9.10	8.40	141.00	0.76	8.34
Gujarat	33.20	11.00	19.40	124.00	2.13	8.87
Haryana	21.60	4.70	26.30	138.00	1.24	3.46
karnataka	28.20	19.00	19.00	142.00	3.61	15.39
Kerala	7.80	12.80	43.90	80.00	5.62	7.18
Madhya Pradesh	15.90	22.30	8.20	197.00	1.83	20.47
Maharashtra	34.60	24.00	13.50	145.00	3.24	20.76
Orissa	21.20	10.70	15.60	179.00	1.67	9.03
Punjab	32.40	2.30	64.00	111.00	1.47	1.03
Rajastan	12.00	9.30	14.80	176.00	1.38	7.92
Tamil Nadu	34.70	22.40	17.50	132.00	3.92	18.48
Uttar Pradesh	13.90	5.40	11.70	190.00	0.63	4.77
West Bengal	33.30	5.80	38.40	124.00	2.23	3.57

Notes:

Work Rate   - Female Main Workers x 100
              Total Female Population

Percent employed - Total women employed in modern sector x 100
                   Total female main workers

Mortality   - Child Mortality Rate q(5)

Modern Sector - Total women employed in modern sector x 100
  Workers   Total female population

Agricultural & - Total women in agriculture and manual workers x 100
Manual Workers Total female population

Source: Occasional paper 1 of 1987, Recent Literacy Trends in India, Office of Registrar General of India and Census Commissioner, New Delhi,1987

Though the child mortality levels for workers are always higher compared to non-workers, it does not necessarily imply that female workforce participation induces the risk of child survival. Child mortality by type of work force participation indicates that working mothers in non-manual work have an advantage over other type of workers with regard to child mortality (see Table 3.7).

Table 3.7 also shows that the per cent of non-manual workers are low in the total work force, shown as modern sector workers. Among workers, majority are agricultural labourers and manual workers, whose levels of education are considerably low.

Hypothesising that each of these factors namely labour force participation and literacy affect child mortality, a regression analysis has made to explain inter-state differences in child mortality. The result revealed that female literacy is the only variable which is statistically significant in the case of level of mortality.

The female work participation rates among women do not explain the regional differences in mortality. As Krishnaji (1995) rightly pointed out, "it is clear that the variations in female work participation rate across states have no relationship with levels of mortality. Two factors may be at work here: the levels in death rates are determined by a whole host of other factors and the extent of women's work may play a marginal role only; but more importantly, female work participation rate itself depends on a complex set of agro-economic, social and cultural factors not all of which may influence mortality variation".

Interestingly, it is found that the female participation in modern sector inversely related to mortality. It indicates that women working in modern sector are economically better off and can substitute the child caring responsibility. Therefore the social context in which women are working is important rather than work participation per se.

3.6. Conclusion

A comparison of the child mortality among workers and non-workers indicates that it is high among workers than non- workers. Among the workers, the child mortality of agricultural labourers and manual workers are much higher than that of non-manual workers. In the case of agricultural labourers and manual workers, their work is compulsive in nature and it is not an intentive work. It is the economic pressure, which compels them to go for work. Also the levels of education of these workers are very low. Hence more than the direct relation between work status on child survival, it would be education that determines the work status and influencing the chances of child survival. This argument can be substantiated by quoting **Helen Ware (1984)** "in the demographic literature the discussion of the relationship between women's work and child mortality has almost always focused on paid employment outside the home, which is believed to be a possible cause of child neglect and child malnutrition due to the abandonment of breastfeeding. Put another way both level of nutrition and standards of care may be significantly affected by the nature of the mother's employment, but the problem lies in separating the effects of poverty or ignorance from those of the mother's work per se. Ideally, it is better to divide mothers who work outside the home into two groups: those who work because of the driving pressure of the poverty and those whose work is more a source of interest and a higher standard of living".

This necessitates a further enquiry in this particular proposition. The next chapter attempts to trace the different mechanisms in which the various factors influence the infant and child mortality.

Chapter 4

DETERMINANTS OF CHILD SURVIVAL: A MULTIVARIATE ANALYSIS

The impact of different factors such as education, employment and age at marriage on child survival have been studied individually in earlier chapters. In this chapter, an attempt is made to analyse the joint effect of the above mentioned variables on child survival using suitable multivariate techniques. The hypothesised relationships are presented in Figure 1, which provides the conceptual frame work.

4.1 Conceptual Framework

Figure 1: Conceptual framework for the determinants of child survival
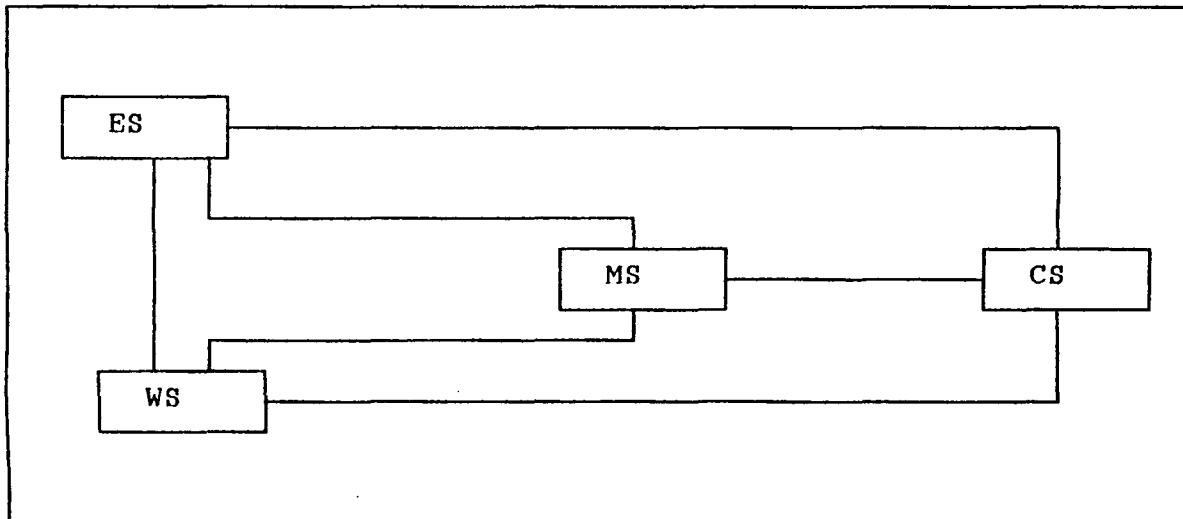
ES : Educational Status; WS : Work Status; MS : Marital Status
CS : Child survival

Education is expected to enhance the general awareness of women by increasing their knowledge of health and hygiene. Such women would be in a better position to seek and obtain health care for their children, resulting in improved child survival (Chen 1983).

Educated women tend to seek employment in sectors which utilize their education. Such educated and employed women would have their marriages postponed beyond the high risk young adolescent ages. Continuing education would by itself also contribute to postponement of marriages, resulting in delayed child birth. An educated mother would be in a better position to care for and bring up her offspring, restrict their numbers and provide quality nurturing.

Employed mothers, whose incomes would also contribute to family expenses, would be expected to enhance child survival by being able to pay for better nutrition and health care for children. On the other hand, such mothers, by virtue of the reduced time spent with their children, are expected to experience more incidents of child loss than others, unless, their absence is complemented by alternative surrogate child care facilities.

Alternatively, less educated women working in subsistence sector are assumed to be compelled by the economic pressure within the family, and this has implications for the health status of their children. Further, they may have had an early marriage which would increase the chances of child loss. This is the reverse of the situation experienced by women in employment induced by education.

It is well known that in Indian settings, where child bearing outside marriage is almost non-existent, age at marriage of women has a direct bearing on child survival. Women who belong to high risk age groups are supposed to have higher chances of child loss irrespective of education and parity (Hobcraft, McDonald and

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Rulsteen, 1985) or previous incidents of child loss (Dasgupta,1990).

In this study, the multivariate technique of 'path analysis' has been used to study the direct and indirect influences of the mother's education and work status on child survival. The modalities of influence being rather complex;path analysis was preferred over the more commonly used regression analysis.

4.2 Methodology

Path analysis is chosen to estimate both direct and indirect effects of independent variables on the dependent variable. It is primarily a method of decomposing and interpreting relationships among a set of variables in a hypothesised causal system. Using path analysis, it is possible to estimate and test the internal consistency of models with a postulated causal structure. This method examines the causal processes underlying the observed relationships and estimates the relative importance of alternative paths of influence. The postulated structure is displayed in the form of path diagrams, where one way arrows link the causal variable to their outcomes.

Path analysis also provides a measure of the residual term which remains unexplained in the system. It enables us to decompose the correlation between any two variable in terms of three components: direct effect, indirect effect and the residual term. The residual is assumed to be uncorrelated with the independent variables and is distributed with `0' mean and variance `1'.

The direct effect is equal to the path coefficient and the indirect effect is the sum of the products of path coefficients for each of the indirect paths along the chains relating the specific independent variables and the ultimate dependent variable being studied. The sum of direct and indirect effects is termed as the total effect. It need not necessarily be equal to the total association between the two variables. The difference, if any, is due to common cause and un-analysed correlations outside the postulated system, called the exogenous effect (Hermalin, 1986).

In this study, the recursive model of path analysis is used where reciprocal relationships are ruled out. The first step of path analysis is the temporal ordering of the selected variables and in this system of ordering, those variables that are not determined by any of the selected variable (called input variable) get causal priority over others. A system of equations - simultaneous equations - are built up on the basis of the hypothesized relationships, one for each dependent variable, so that all variables except the input variables will become both dependent and independent variables in the system. The equations interact together and must be read simultaneously. As in the case of regression, the independent variables are assumed to be linearly additive and causal (Kendall and O'Muircheartaigh, 1977). Here, a full model[1] which includes all significant and insignificant variables is being tested.

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[1] Full model includes all significant and insignificant variables. After all the path coefficients have been estimated, those which are not statistically significant at a given criterion of significance can be eliminated from the path model. The reformulated path model, using the significant variables is called truncated model.

Path analysis has some limitations also. It validates the causal and chronological ordering of events and relative influence of each event on others. The cross-sectional data, which is a one point information, is a constraint for this exercise and it is a definite limitation. All other limitations of ordinary least square regression are applicable to this analysis like the assumption of the constant variance of residuals, and normality conditions are equally applicable to path analysis.

4.3. Variables Selected

Since it is known that the female age and parity have a bearing on child survival (Stockel and Chowdhary 1972, Trussel 1983), the path analysis exercise was carried out with age specific set of information. Data on several of the selected variables are not available in quinquennial age groups above the age of 35. Hence the present study, does not consider ages beyond 35 in quinquennial groups. Further, as the analysis is limited to the reproductive ages alone, the last age category is taken as 35+ in order to have uniform data sets for different variables.

The variables under consideration in the path analysis are follows:
(i) Per cent married (PM) to represent age at marriage.
(ii) Percent female having an educational level of Higher secondary and above (FL) to represent female educational status
(iii) Percentage of female work participation (FLFP)to represent employment status and
(iv) Proportion of children surviving to children ever born (CS/CEB) to represent child survival.

There are specific reasons for selecting the above mentioned variables. Female education has a positive impact on child survival through better child rearing practices. Women having higher level of education measured using the number of years of schooling are expected to have better work status. Again, increase in educational levels delays the age at marriage of females which ensures maternity out of the high risk lower age group and this would have a positive impact on child survival. As there is no information available on age at marriage of females of different age cohorts, a proxy for this variable is considered in terms of proportion currently married in specified age group.

From a detailed analysis[2], it was found that the number of years of schooling is worth considering instead of literacy status taken as literate\illiterate. It was also found that higher secondary and above levels of education has a significant relationship with child survival. Percentage of women who are working (both main and marginal) in each age category was selected as another independent variable. This is expected to influence the chances of child survival.

The overall levels of child mortality has not been considered as the dependent variable. Instead child survival is approximated in terms of the ratio of total children surviving to total children ever born in each age category. The reason for considering child

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[2] Regression using CS/CEB as the dependent variable, education status measured in different ways as proportion of women who were literate, proportion of women educated upto primary, middle school, higher secondary and above were attempted. It was found that only when the threshold level of higher secondary crossed was a significant association with child survival noticed.

survival as dependent variable is that, it is a cohort measure like all the other variables which consider life cycle experiences of women.

4.4. Path Model

The Path model has been visualized on the basis of the conceptual framework. The hypothesised causal relationships are shown in the in the Figure 2. Female education directly associated with child survival (path coefficient P1). Along with this, female education is indirectly influences the chances of child through female work participation and percentage of female married. This indirect influence[3] can be calculated by adding the products of the path coefficients linking female education to child survival.

Similarly the female work participation is also directly and indirectly related to child survival and it is hypothesised that percentage married is the only proximate variables here influencing child survival. All the hypothesised causal relationships are shown in the following figure.

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[3]For Instance, the direct relationship between female educational status and child survival will be equal to P2*P3 + P4*P5 +P2*P6*P5.

Figure 4.2: Path Model
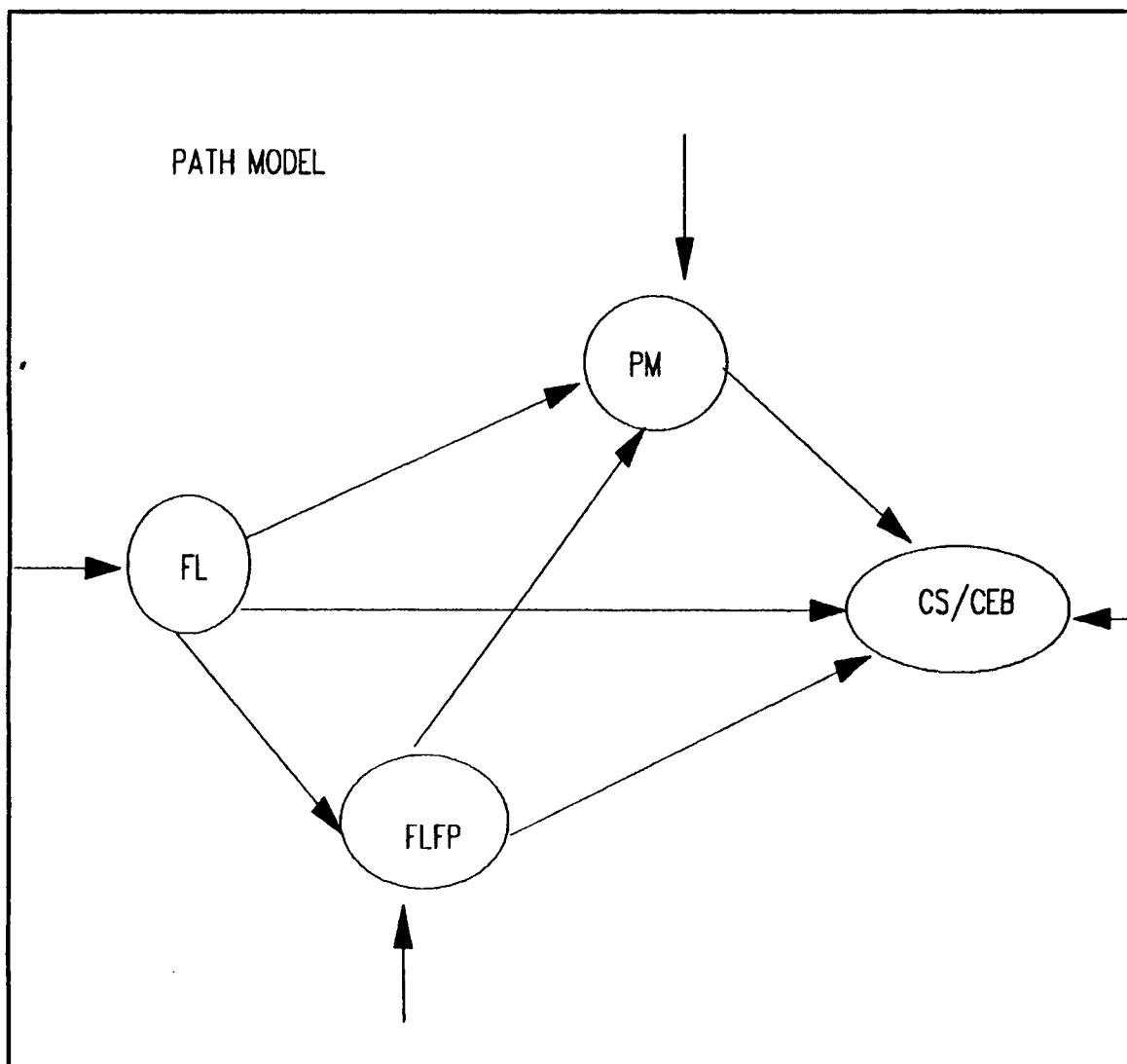
CS/CEB - Proportion of total children surviving to total
          children ever born
PM   - Percentage of women who are married
FLFP   - Female work participation rate
FL   - Females having higher secondary and above levels of
education

The associations which are considered in the hypothesised path model are given in Table 4.1.

Table 4.1: Associations Considered for Path Analysis
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Age	Dependent Variable	Independent Variables		
		FL	FLFP	PM

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Age	Dependent Variable	FL	FLFP	PM
All Ages	CS\CEB	*	*	*
	PM	*	*	—
	FLFP	*	—	—
15-19	CS\CEB	*	*	*
	PM	*	*	—
	FLFP	*	—	—
20-24	CS\CEB	*	*	*
	PM	*	*	—
	FLFP	*	—	—
25-29	CS\CEB	*	*	*
	PM	*	*	—
	FLFP	*	—	—
30-34	CS\CEB	*	*	*
	PM	*	*	—
	FLFP	*	—	—
35+	CS/CEB	*	*	*
	PM	*	*	—
	FLFP	*	—	—

==

Notes: * means the associations which are considered.
       - means the associations which are not considered.
CS/CEB - Proportion of total children surviving to total
         children ever born
PM   - Percentage of women who are married
FLFP   - Female work participation rate
FL   - Females having higher secondary and above levels of
         education

The appropriate regressions in each age categories were run. The
results have been given in Table 4.2. Included in this table are
the path coefficients (regression coefficients) which give the
direct relationship between dependent and independent variables,
the associated R^2 values (the proportion of variance in the
dependent variable explained by this independent variable) and
level of significance.

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Table 4.2 : Path coefficients for the full model

| Age | Dep.Variable | Independent Variable | | | R^2 | Adj.R^2 |
		FL	FLFP	PM		
All ages	CS\CEB	0.4399**	-0.2521**	-0.1737*	0.3000	0.2682
	PM	-0.1092	0.1978*	–	0.0475	0.0175
	FLFP	-0.0812	–	–	0.0066	-0.0080
15-19	CS\CEB	0.7481*	-0.1766	0.1792	0.4564	0.2933
	PM	-0.7559**	0.1237	–	0.6315	0.5645
	FLFP	-0.2395	–	–	0.0574	-0.0212
20-24	CS\CEB	0.2862	-0.2161	-0.2150	0.3329	0.1327
	PM	-0.8554**	0.0559	–	0.7565	0.7122
	FLFP	-0.2262	–	–	0.0512	-0.0279
25-29	CS\CEB	0.7707**	-0.0761	-0.0962	0.6989	0.6059
	PM	-0.5169*	-0.2068	–	0.2778	0.1465
	FLFP	-0.1504	–	–	0.0226	-0.0588
30-34	CS\CEB	0.2644	-0.4769*	-0.6620**	0.5319	0.3915
	PM	-0.0870	-0.2655	–	0.0924	-0.0727
	FLFP	-0.3102	–	–	0.0962	0.0209
35+	CS\CEB	0.6204**	-0.5276*	-0.0183	0.7060	0.6178
	PM	-0.5554*	-0.4711*	–	0.4993	0.4082
	FLFP	-0.0595	–	–	0.0035	0.0795

Note: ** – significant at 0.01 per cent.
* – significant at 0.05 per cent.
Adj. R^2 – Adjusted R^2

Table 4.3 : Path coefficients for the full model (modern Sector)

| Age | Dep.Variable | Independent Variable | | | R^2 | Adj.R^2 |
		FL	FLFP	PM		
AllStates	CS\CEB	0.1238	0.4448*	-0.3443	0.6263	0.5142
FLFP mod.	PM	-0.5502*	-0.2963	–	0.5568	0.4762
sector	FLFP	0.5194*	–	–	0.2698	0.2089
work						

Note: ** – significant at 0.01 per cent.
* – significant at 0.05 per cent.
Adj. R^2 – Adjusted R^2

From the Table 4.3, it is clear that age wise analysis gives more

insights about differentials in relationships across ages.

The proportion of variation explained for each of the regressions

varies by age category.   It is the least for the regression of

female labour force participation using female literacy as the

independent variable(R^4 values ranging between 0.0066 to 0.0962).
The proportion of variance explained is highest where child
survivorship is the dependent variable, especially in the age
categories beyond 25+.

It is seen that in all ages category, child survival has a
significant bearing on variables like female literacy, female work
participation and percentage of women who are married. Again, it
is also seen that female work -participation is directly
associated with percentage of women who are married.

Apart from this observation for `all ages,' many interesting
results emerged from age-wise analysis. For instance, female
education has become a statistically significant variable in
determining child survival in 15-19 and 35+ age groups. In the
same age groups, the association of percentage of females who are
married with child survival becomes statistically insignificant.
When this analysis was repeated replacing the female labour force
participation variable for the all ages category by total
percentage of women in modern sector work, it was seen that child
survival is enhanced by labour force participation(path coefficient
is 0.4448, significant at the 95 percent confidence level).
Further,female literacy is also positively associated with female
labour force participation in the modern sector[4]. This serves to
reinforce the hypothesis that education induced labour force
participation is not detrimental to child survival.

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[4]Modern sector workers are defined as main workers other than
agricultural labourers and manual workers.

The results depicted in Table 4.3 have been used to draw in the relevant path diagrams, one for each age category included and the same have been given in Figure 4.3.

Figure 4.3: Path diagrams for each age category.

AGE 30-34

AGE 35+

ALL STATES FLFP - MODERN SECTOR
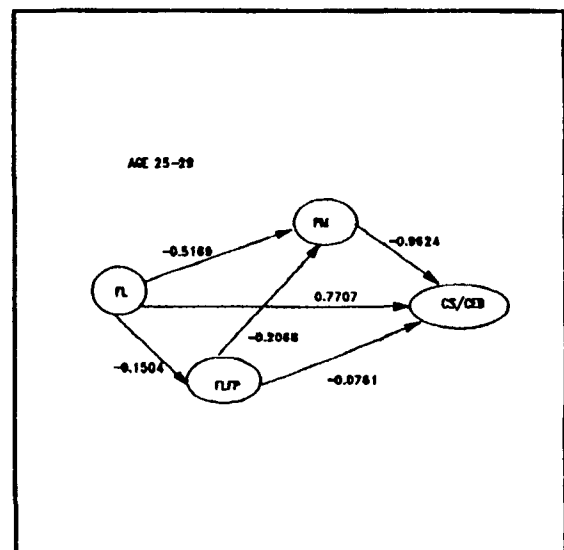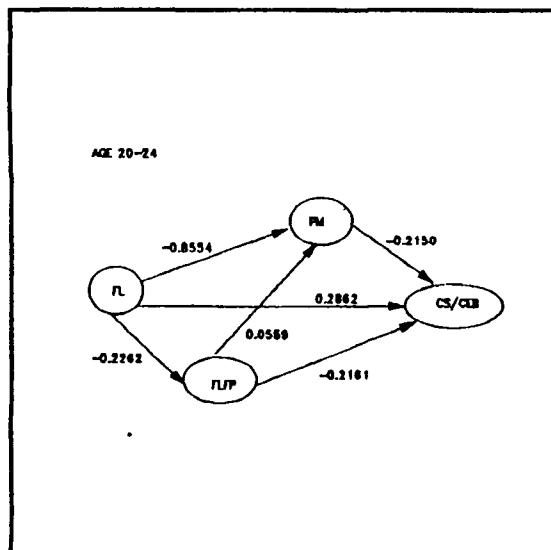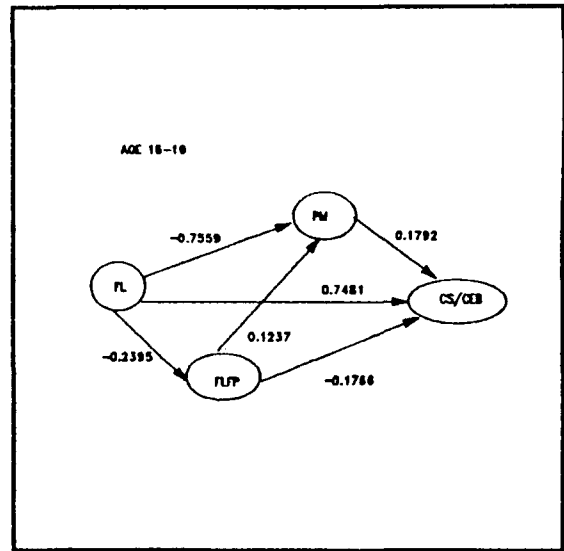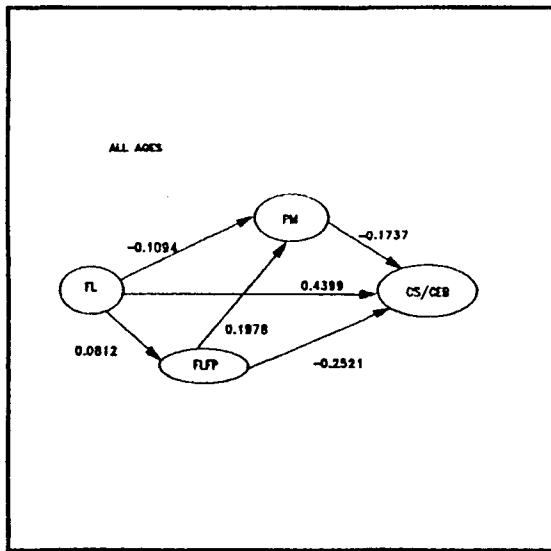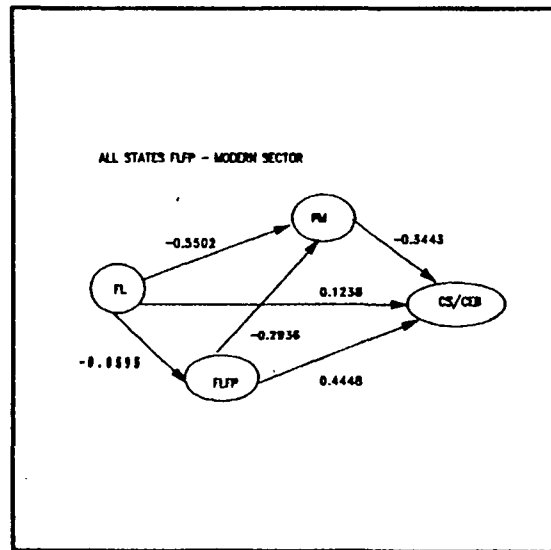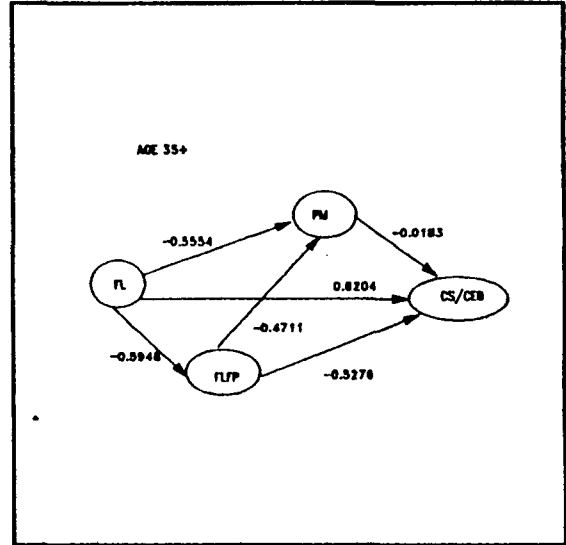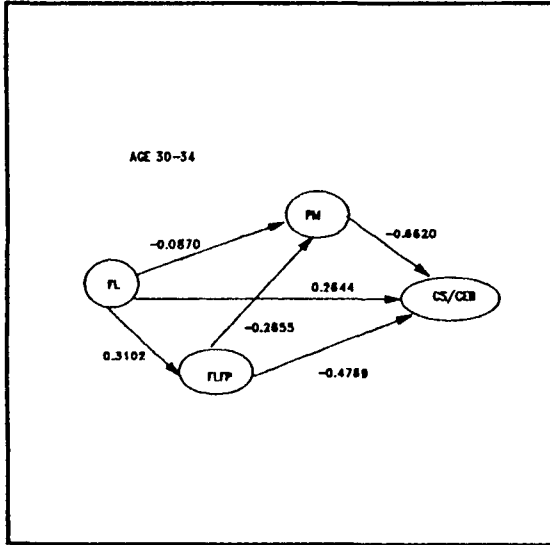
In Table 4.4, the correlations, the direct and indirect effects summing to the total effect and the exogenous effect have been given.

Table 4.4: Correlation, Direct, Indirect, Total and Exogenous
Effects of Independent Variables on Dependent Variable

Age Considered	Variables	Corre-lation	Direct Effect	Indirect Effect	Total Effect	Exogenous Effect
All Ages	CS\CEB&FL	0.4240	0.4399	-0.0028	0.4371	-0.0151
	CS\CEB&PM	-0.3457	-0.1737	-	-0.1737	0.1720
	CS\CEB&FP	-0.3817	-0.2521	-0.0344	-0.2865	-0.0952
	PM&FLFP	0.1618	0.1978	-	0.1978	-0.0360
	PM&FL	-0.2429	-0.1092	0.0161	-0.0931	-0.1495
	FLFP&FL	-0.0405	-0.0812		-0.0812	0.0407
15-19	CS\CEB&FL	0.6497	0.7481	-0.0985	0.6496	-0.0001
	CS\CEB&PM	-0.4623	0.1792	-	0.1792	-0.6415
	CS\CEB&FP	-0.3011	-0.1766	0.0222	-0.1544	-0.1467
	PM&FLFP	0.3048	0.1237	-	0.1237	0.1811
	PM&FL	-0.7855	-0.7559	-0.0296	-0.7855	-
	FLFP&FL	-0.2395	-0.2395	-	-0.2395	-
20-24	CS\CEB&FL	0.5217	0.2862	0.2354	0.5216	0.0001
	CS\CEB&PM	-0.5174	-0.2150	-	-0.2150	-0.3024
	CS\CEB&FP	-0.3345	-0.2161	-0.0120	-0.2281	-0.1064
	PM&FLFP	0.2495	0.0559	-	0.0559	0.1936
	PM&FL	-0.8681	-0.8554	-0.0126	-0.8680	-0.0001
	FLFP&FL	-0.2262	-0.2262	-	-0.2262	-0.2262
25-29	CS\CEB&FL	0.8289	0.7707	0.4790	1.2497	-0.4208
	CS\CEB&PM	-0.4608	-0.0962	-	-0.0962	0.3646
	CS\CEB&FP	-0.1796	-0.0761	0.1990	0.1229	-0.3025
	PM&FLFP	-0.1291	-0.2068	-	-0.2068	0.0777
	PM&FL	-0.4858	-0.5169	0.0311	-0.4858	-
	FLFP&FL	-0.1504	-0.1504	-	-0.1504	-
30-34	CS\CEB&FL	0.2286	0.2644	0.0545	0.3189	-0.0903
	CS\CEB&PM	-0.5673	-0.6620	-	-0.6620	0.0947
	CS\CEB&FP	-0.2012	-0.4769	0.1757	-0.3012	0.0999
	PM&FLFP	-0.2924	-0.2655	-	-0.2655	-0.0269
	PM&FL	-0.1693	-0.0870	-0.0823	-0.1693	-
	FLFP&FL	0.3102	0.3102	-	0.3102	-
35+	CS\CEB&FL	0.6614	0.6204	0.3188	0.9392	-0.2728
	CS\CEB&PM	-0.1143	-0.0183	-	-0.0183	-0.0960
	CS\CEB&FP	-0.5566	-0.5276	0.0086	-0.5190	-0.0376
	PM&FLFP	-0.4381	-0.4711	-	-0.4711	0.0330
	PM&FL	-0.5273	-0.5554	0.2802	-0.2522	0.2522
	FLFP&FL	-0.0595	-0.0595	-	-0.0595	-

Where the relationship between child survival and female literacy
is concerned, it is seen that the indirect effect is the minimal in
the younger ages (total effect comes almost entirely of the direct
effect), but gradually increases over age. The contribution of

direct effect in the association between child survival and female labour force participation also increases with age upto the category 30-34, and then declines. Possibly this two relationships are indicative of the overwhelming influence of the age effects in the younger and older ages and the strong influence that education and labour force participation have in these extreme age categories.

Female labour force participation to some extent determines percent married in the different age categories. This relationship is stronger in the higher ages (30+). This is possibly due to the entry of seperated and widowed women into the labour force. The proportion of women educated upto higher secondary and above in each age category is negatively associated with the proportion married. This is clear evidence of postponement of marriage due to higher education. The exogenous effects in this case are almost minimal except in the final category of 35+. However, this relationship of postponement of marriage induced by education is invalid in the higher ages, viz.35+, where given the trend of universal marriage, almost everybody is expected to be married. A detailed examination of the relationships in this category revealed that the higher degree of variance was the contribution of two outliers, viz. Kerala and Maharashtra. A re-analysis, omitting these two outliers, showed a weak relationship prevailing between female literacy and percent married in the 35+ age category.

Female labour force participation in general is not induced by literacy at all in any of the age categories as evidenced by the weak negative relationship between the two. An anomaly seems to be

indicated in the age group 30-34, and this needs further examination which is beyond the scope of this study.

The various effects and correlations when proportion of women in modern sector work replaces female labour force participation have been given in table 4.5.

Table 4.5: Correlation, Direct, Indirect, Total and Exogenous Effects of Independent Variables on Dependent Variable (modern sector)

Age Considered	Variables	Corre- lation	Direct Effect	Indirect Effect	Total Effect	Exogenous
All states	CS\CEB&FL	0.5968	0.1238	0.4730	0.5968	-
FLAP is Mod.	CS\CEB&PM	-0.6890	-0.3443	-	-0.3443	-0.3447
Sector work	CS\CEB&FP	0.7086	0.4448	0.1011	0.5459	0.1627
	PM&FLFP@	-0.5794	-0.2936	-	-0.2936	-0.2858
	PM&FL	-0.7027	-0.5502	-0.1525	-0.7027	-
	FLFP@&FL	0.5194	0.5194	-.	0.5194	-

Note: @   - For these regressions, female work participation rate was replaced by per cent of females employed in modern sector

It can be seen that when labour force participation is induced by education, there is a positive association between female literacy and child survival, perhaps due to enhanced earnings. Female participation in modern sector is also positively linked with literacy, as opposed to that seen in table 3.1.

4.5. Discussion

In the age group of 15-19, the female literacy has a positive association with child survival where as it is having a negative relationship in the case of percent married. A possible explanation is that despite an early marital age which has immediate implication to attainment of maternity in the high risk ages i.e

below the age of twenty years, differential in educational levels remains the only answer for the differences in the chances of child survival. Even though a woman is married at an early age, if she is educated, the chances of child survival are high, when compared with an illiterate woman. The same relationship holds good even in the other high risk age group ie.35+.

There seems to be some inconsistency in the extent of significant influence of female education on child survival through all ages of women, as it is only significant in age groups 15-19, 25-29 and 35+. One possible reason behind such inconsistency may be explained in terms of the parity effect. Even though a woman is educated and belongs to 20-24 age group, if the parity is four or five, the survival chances of her child are less.

Another explanation has been put forth by Das Gupta, (1990). Her study shows that a small proportion of families (12.6%) account for the majority (62.2%) of child deaths in the community. This clustering of deaths is explained to a large extend by the basic abilities and personality characteristics of the mother, independently of education, occupation, income and wealth. The author argues that people's basic abilities are very far from being the same and while education can improve them, it does not make them homogeneous. However, for the present study, which has used census data, it was not possible to segregate the events of child death into recurrences or first time events experienced by the same mother, so any further analysis was not attempted.

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In the age group of 35+, a negative association can be seen in between female work force participation and percent married. It could be because, in this age group the number of widowed and divorced are high and they participate in work force out of the need to support their families. As a result the work force participation is higher in that age category.

Child survival and female work participation are negatively related and significant in the age group of 30 and above. Since the percentage of widowed and divorced is high in this age group, women have more responsibility in running the household, compared to other age groups. In this age group, most of the women have children and the economic pressure from the family compels them to go for work. This socio-economic pressure experienced by the household perhaps reduces the survival chances of their children.

In all the age groups, no significant relationship can be found between female education and work force participation. Since the majority of women are working in agricultural sector, their work is not an education induced one.

The modern sector employment is supposed to be induced by education. A state level analysis relating modern sector work participation of females with their educational levels exhibits a strong and statistically significant (at 0.05 per cent level) association between the two (see Table 2).

A positive and significant association can be seen in between female work participation in the modern sector and child survival.

This indicates that women's work in gainful employment is not in any way directly responsible for child loss.

There is evidence to suppose that women who are educated delayed their marriage. A negative association has been found between percent married and female literacy in almost all ages except the 30-34 category. However, in the 35+ age group this relationship was not in the expected direction. To analyse this distortion; the educational levels across states in the 35+ age category was examined. It was found that two states viz. Kerala and Maharashtra were outliers responsible for this distortion. On deletion of these outliers, no significant association could be found between percent married and female education, in the 35+ age group.

Conclusion

An important factor which has been noticed is the mitigating impact of female education over high risk maternity. This finding implies that even though a woman belongs to high risk age group, if she is educated, the chances for child death are lesser than an uneducated women in the same age category.

Female education and work participation rates are not significantly related in any of the age groups. In India, a high percentage of women are working in agricultural sector. So, the female work participation is not mainly education induced one, it is induced by the economic pressure within the household. The role of female work participation in child survival is not strong in the Indian context. This is possibly because labour force participation is not induced by education but by economic need.

A reversal relationship can be seen if the female work participation rate is replaced by percentage of women in modern sector employment. Since, a higher level of education and a better economic status is associated with modern sector employment, the positive association between modern sector employment and child survival is expected. Hence, it is clear that female work participation as such does not induce child mortality.

Chapter 5

SUMMARY AND CONCLUSIONS

The present study was intended to examine the underlying association between the work status of women and the child care/survival. Various casual relationships are analysed in order to get a clear understanding. Even though many studies have been undertaken in this direction, still the association between the two remains complex and unresolved. For instance, Mamata Murthy (1995), in a recent study has made a statement that `it is difficult to determine that priori whether the effect of higher female labour force participation on child survival is likely to be positive or negative'. This necessitates a further inquiry and this work is a beginning in this direction.

The study used the information from secondary sources, particularly the decennial census.

Female work status can be broadly classified into two categories: `education induced' and `education absent'. It is found that the literacy rate among female workers is much lower than that of female population. Further, the fact that majority of women are working in subsistence sector, in all the major states, validates the argument of education absent work among women.

Female education is now widely considered as one of the most powerful determinant of child survival. A regression analysis has made with female literacy and female labour force participation as independent variables, to explain the interstate differences in

child mortality and female literacy becomes the only variable which turned out to be statistically significant.

It was found that the child mortality among workers are much higher than that of non-workers. Using a measure of poverty, regressions were run between child survival among workers as the dependent variable and poverty as independent variable, it is found that the poverty variable is having a positive and statistically significant association with child mortality among non-workers. It is evident from this result that the female work is induced by economic pressure and directly induces chances of child loss.

In this context, multivariate analysis has carried out using path analysis, for an indepth examination of the casual relationships. Since it is known that maternal age affects child survival, age-specific data has been collected for each variable. In order to have uniform data for the quinquantial have been used viz., `all ages', 15-19, 20-24, 25-29, 30-34, 35+.The independent variables which are selected for the analysis are percentage married, female labour force participation and female literacy. It is found that female education has a significant impact on child survival only with higher secondary and above levels of education and it is used as female education variable. Rather than considering a one point measure (child mortality), child survivorship is considered for its cohort nature. Since maternal age is significant in determining chances of child survival, percentage married has also been considered. Significant results that emerged from the path analysis are the following. The mitigating effect of education on

child survival in high risk age groups such as 15-19 and 35+ was noticed.

This reconfirms the significance of education on chances of child survival. The child survival chances are high in the case of an educated woman compared to uneducated; even if both belongs to high risk age groups. This result is an indicator for the need emphasize on education from the perspective of planners and policy formulators. It is also found that education can effectively delay marriage and thereby positively influence the child survivalship.

Female literacy and labour force participation shows a weak relationship in all age groups and if female labour force participation is replaced by female labour force participation in modern sector, it shows a positive association between the two. This clearly shows female labour force participation in general included mainly women in agricultural sector and manual workers and their work may not be education induced. In contrast, the modern sector is education induced. Hence, any negative influence of female work status on education is determined by the level of education. The combined effect of low levels of education and economic pressure within household compels women to participate in economic activities and a high probability of child loss among them may not be due to child neglect/ maternal absence.

A reverse relationship can be seen if the work participation rate is replaced by percent of modern sector employment. Since, a higher level of education and a better economic status is associated with modern sector employment, the positive association

between modern sector employment and child survival is reasonable. Hence, it is clear that female work participation as such does not induce child mortality.

Since the general argument is that the child care is a constraint the labour force participation of women, there is a clear cut need for better child care facilities such as day care centres for nursing children to improve the chances of child survival. .The government should also encourage modern forms of joint family systems where parents or other older relatives of the young couple would stay with them. Government can intervene in this regerd in a multitude of ways. This can be promoted through introducing new policy measures such as tax rebate in urban areas for such family units and provide special rationing system in the public distribution system in rural areas. This can be an input for the policy formulation at the Government level.

Appendix A

Distribution (percent) of Female Main Workers by Industrial Categories, 1971,1981 and 1991 Industrial Category

States	Cultiva-tors	Agricul-tural labourers	Livestock, fishing, forestry, etc.	Mining & Quarrying	Manufacturing, Process servicing and repairs		Constru-ction	Trade & Commerce	Transport, Storate and communica-tion	Other Services
					Household industry	Other than hh.industry				
Andhra Pradesh	32.49	60.53	0.67	0.42	4.55	2.45	0.57	2.45	0.03	5.70
Bihar	31.86	61.22	0.19	0.49	2.07	0.88	0.20	0.81	0.08	3.73
Gujarat	32.26	47.09	6.00	0.28	1.50	2.73	0.60	1.80	0.31	7.42
Haryana	50.63	26.81	0.39	0.09	1.17	4.03	0.92	1.13	0.23	14.57
Karnataka	26.36	50.67	3.04	0.46	1.99	7.44	0.68	2.70	0.30	6.35
Kerala	5.62	36.51	6.34	0.72	5.91	14.71	0.92	4.49	1.47	23.30
Madhya Pradesh	51.72	37.83	0.52	0.29	2.89	1.49	0.46	0.97	0.10	3.73
Maharashtra	39.77	44.29	0.67	0.16	1.55	3.18	0.85	2.33	0.39	6.81
Orissa	26.42	55.98	0.76	0.95	5.21	1.59	0.30	2.07	0.16	6.57
Punjab	10.85	30.17	3.07	0.00	3.27	6.67	0.95	3.90	0.72	42.40
Rajasthan	71.20	18.60	1.36	0.54	1.53	1.30	0.49	0.64	0.10	4.26
Tamilnadu	21.15	54.25	1.84	0.21	5.07	5.75	0.68	2.37	0.32	8.42
Uttar Pradesh	49.22	36.47	0.49	0.06	3.29	2.26	0.29	1.30	0.14	6.49
West Bengal	17.11	39.81	6.17	0.31	11.45	7.87	0.35	2.80	0.46	13.67

Figure 3.A

Hypothesized Effects of Female Status Variables on Infant and Child Mortality Levels
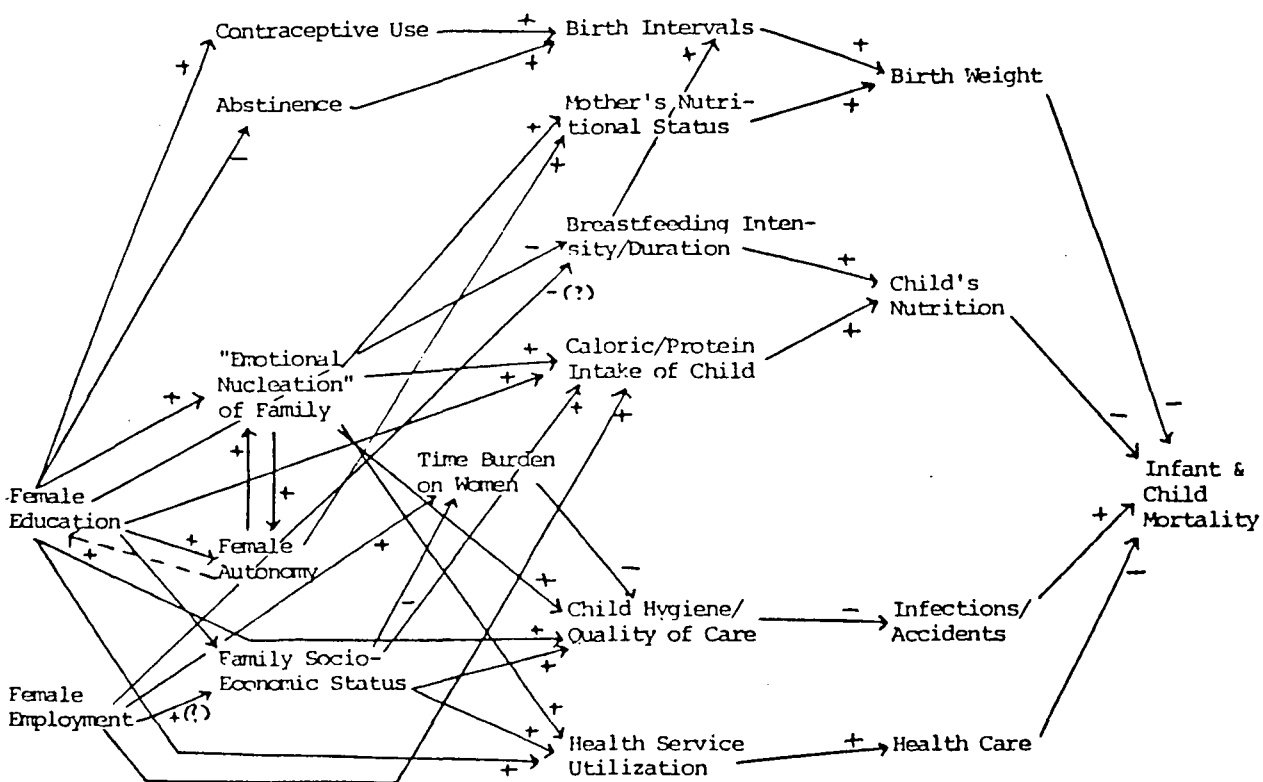
Source: Mason (1984).

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