Agricultural modernisation and its influence on fertility is a valuable area of research with the general realm of the determinants of fertility. As agricultural modernisation occurs, population growth may be affected via a number of possible linkages. With agricultural modernisation, the socio-economic, cultural, and demographic variables and community characteristics undergo great changes. This transformation of the farm households environment is postulated to have an ultimate effect on fertility decisions. In other words, the concept of agricultural modernisation and its influence on fertility is associated with a number of variables — economic, social, psychological, cultural and demographic. However, the modus operandi of how these variables influence fertility still remains obscure due to lack of studies explaining possible links between agricultural modernisation and rural fertility. These issues are complexly interrelated and cannot be studied unless some information is available specifically since attitudes and motives interfere between economic stimulus and the demographic response.
The importance of this concept was increasingly realised only recently. A few empirical studies (Basu, et al., 1979; Kocher, 1973; Mueller, 1976; Schultz, 1971) were undertaken. But most of these studies covered one or two dimensions of agricultural modernisation only. Micro level studies examining the relationship between agricultural modernisation and fertility behaviour, especially village level studies are scarce. However, knowledge of the studies undertaken up till now would help researchers who are interested in examining in greater detail the effect of different dimensions of agricultural modernisation on fertility.

(As such the present review is a comprehensive analysis of research done up to now, encompassing the various dimensions of agricultural modernisation and fertility behaviour - land holding, irrigation, cropping pattern, mechanisation, asset ownership, aspiration level, contraception, value of children and modernisation.) In addition, the later part of the chapter, presents an overview of literature on a few selected socio-economic determinants of fertility namely education, age at marriage and income as they also play an important role in understanding the nexus between agricultural modernisation and fertility.
AGRICULTURAL MODERNISATION AND FERTILITY

Agricultural modernisation which led to increased and more regular food supplies, played an important role in bringing about the mortality decline, and in turn, with the other factors helped to bring about a decline in fertility. Few attempts have been made to identify those factors which provide the linkages between agricultural modernisation and fertility or their implications for population policy (Khuda, 1988; Samper, 1988; Swaminathan and Subramanyam, 1986; Victor Levy, 1985; Suchart Prasith, 1979; Basu et al., 1979; Karunatileke 1979; Johnston and Kilby, 1975). Mueller (1976) by drawing upon the experiences in Japan, Taiwan and Indian Punjab, traces socio-economic, economic-demographic and purely economic path ways whereby agricultural change has both fertility raising and fertility reducing effect.

Khuda (1988) examined the demographic impact of rural development programme in a village, in Comilla district, Bangladesh, especially with respect to changes in fertility behaviour. As a result of agricultural development programmes, the area under mechanisation, fertiliser application, use of pesticides, and the cropped area under high yielding varieties increased considerably. Further it is observed that age at marriage and contraceptive use are higher and fertility lower, in the village
than in other parts of the country. Many rural families have acquired new tastes for modern consumer durables and the ownership of consumer durables and farm implements per household was higher, and schooling has raised the costs incurred for children. Finally, Khuda concludes that economic improvements resulting from agricultural development programme were responsible for all these changes in the sample area. In a similar study, Hackenberg (1988) noted that the Green Revolution in the Digos-Padada valley in Philippines, has brought both of the major blessings of rural modernisation: income gains and fertility losses.

Samper (1983) undertook a study on "Agricultural and socio-demographic interrelationships: a study of three areas at different levels of Development in Tolima, Columbia" and found that small holding families had an average of 5.2 live born children compared with 3.8 children in both the traditional and modern capitalist sectors and within all these three sectors, family size declined as income and area of landholding increased. In all three sectors, the age of women contracting unions was lower than in previous generations. The greatest drop in the age of women entering unions was in the capitalist sector, these women now enter to union 2.4 years younger compared with 30 or more years ago. Among small holding sector, the drop is 1.5 years and thus the earliest age of marriage
was in the modern capitalist sector. Hence, contrary to
most studies that find increasing delays in age of marriage
as a society modernises, there does not appear to be this
link in the area studied. It was also noticed that the
knowledge and use of contraceptives was higher in the
two capitalist sectors in comparison to small holding
sector.

The study by Victor Levy (1985) focussed, on the
one hand, the direct relation between modernisation and
changes in agriculture and, on the other, the economic
contribution of children and its effect on desired family
size and fertility among farmers. He examined cross-sec-
tional evidence on differential fertility in rural Egypt,
which indicated that variation in labour contributions
from children has appreciable effect on farmer's attitude
toward fertility and actual family size.

Basu et al., (1979) proposed a model for studying
the relationship between agricultural development and
fertility. The model emphasizes the demand dimension
of fertility is the most significant and immediate factor
which influences changes in fertility as a result of a
sequence of events prompted by improved agricultural prac-
tices. They believe that the demand dimension is the essen-
tial link between improved agricultural development and
fertility. The model was applied to a pilot study in Guja-
rat (India), selecting experimental and control villages.
The analysis showed that the "developed" villages had a lower cumulative fertility index than the "undeveloped" villages. They also found that the aspiration level of the benefitted class had gone up significantly, leading to a higher perceived cost of children and a lowered desired family size.

Similar study was carried out by Suchart Prasith (1979) to analyse the relationship between agricultural practices and fertility in a village in Northern Thailand. The study shows that the size of the area under cultivation and fertility were positively correlated. The use of modern technology such as fertilizers and ground water was negatively correlated. Those who are modern as shown by the use of the above two factors of production tend to have lower fertility.

Based on data collected, in two blocks of Periyar district, Tamil Nadu, Swaminathan and Subramanyam (1986) revealed that a differential rate of adoption of family planning methods between an agriculturally developed block and agriculturally less developed block, confirming the hypothesis that agricultural development influences the adoption of family planning. They also concluded that the agriculturally developed block had a significantly lower level of fertility.

In another study conducted by Karunatilake (1979), notes the difficulty of establishing a relationship between
fertility and improvement in agricultural practices but presents data on some factors that may explain part of the fertility decline due to improvement in agriculture.

There are two variants of the "psychological hypothesis" which links agricultural modernisation to declining fertility. One suggests that a successful experience with agricultural innovations, for example, of the Green Revolution variety will make families prone to experiment in other aspects of life too such as birth control (Johnston and Kilby, 1975; Brown, 1970). A parallel hypothesis of psychological linkage has been suggested by Epstein (1962) who views some of the new agricultural practices as disruptive of traditional relations and of social norms, to the extent that they facilitate certain conditions of modern behaviour.

Kocher (1973) hypothesised that if increased agricultural production is widely diffused the rural income rise in a fairly egalitarian manner and a set of processes will be activated leading to improved living conditions and a more modern life style for most of the rural population. He observed the simultaneous trends of declining fertility, advancing agricultural productivity, and increas- singly egalitarian rural income distribution in Taiwan, Japan and South Korea. He also illustrated the cases of dominating impact of inegalitarian agricultural development
on fertility level. Lee and Sun (1973) while reviewing the Taiwanese development experience argue that in the first stage of agricultural development in a society with rapid population growth, the new techniques, and innovations introduced are those which are labour intensive in character, so that the extra labour force in rural areas could be absorbed and labour productivity improved. They also suggest that modernisation raises aspiration of rural families for consumer goods and children's education and put pressure on families to minimize family size. In addition, adoption of modern agricultural techniques facilitate adoption of family planning. Alexandratos et al., (1977) opines that the improvements brought by different patterns of agricultural development will eventually lead to changes in attitude to family size through such factors as increased opportunity costs of children, increased aspirations, changes in group norms and traditions and age at marriage.

Thus, from the above findings, it may be noted that a number of factors related to agricultural modernisation have been identified as having direct or indirect bearing on fertility behaviour of the rural couples. However, the findings of most studies either inconclusive or have examined only one or two dimensions of agricultural modernisation. Further, studies which have tried to examine the relationship between agricultural modernisation and
fertility comprehensively are very limited. Therefore, it was thought that it would be worthwhile to fill this gap.

LAND HOLDING AND FERTILITY

Land holding is one of the major dimensions of agricultural modernisation which has its impact on fertility. A number of recent studies have highlighted the relationship between size of land holding and fertility in rural areas of developing countries (Suchart Prasith, 1979; Alauddin, 1979; Schutjer and Stokes, 1982; Mueller and Short, 1983; Lee and Bulatao, 1983).

Mueller and Short (1983) reviewed 13 studies which include a measure of land availability such as farm size. Some of these were aggregate cross regional (but within country) studies; others were at the individual farm level. A striking consistency was found in almost all studies; that there was a significant positive relation of fertility to family size. In another research study Schutjer and Stokes (1982) have given special attention to the implications of this relationship for the design of agricultural and rural development policy. They state that the size of operational holding has a positive and the size of ownership holding has a negative effect on fertility. Lee and Bulatao (1983) argue that the positive relation of land holding and fertility is the result of pure income
effect while the work of Schutjer and Stokes group emphasizes the economic value of children, that is the complementary of child labour and land holding, underlies the positive relationship between farm size and fertility and the substitution of land for children as a security asset underlies the negative relationship between land owned and fertility (Cain, 1984).

Alauddin (1979) proposed a general analytical model for studying Bangladesh's rural fertility in relation to land holdings, development inputs and other factors. The model postulates that fertility variation in rural areas is influenced by the amount of arable land possessed. The influence of land on fertility is both direct and indirect through four sets of intervening variables. These intervening variables include access to and utilisation of available development inputs which in turn, social and economic gains, provide an occupation diversification with in the family and affect health care and family planning services utilisation.

Suchart Prasith (1979) found that the size of the area under cultivation is the most significant factor in explaining the variance in fertility. The two are positively correlated, that is, the larger the farm area cultivated, the larger the family size. It was also found that the land ownership is also a significant variable; those who owned larger plots of land had a larger desired
and actual family size. In all studies, measures of land quality show a consistent positive relation to fertility, and it is statistically significant in many cases (Kleinman, 1973; Hicks, 1974; Chernichovsky, 1975; Rosenzweig and Evenson, 1977; Latif and Chowdhury, 1977; Aghajanian, 1978; Chalamwong et al., 1979; Anker and Knowles 1980).

In a study of 20 Polish villages in 1948, Stys (1957) concluded that larger the land holding, greater the family size. On the other hand, an analysis of fertility and the Hungarian agricultural production by land holding showed that the standardized numbering children everborn increased from the landless group of small and medium size landholders (5.7 – 14.4 hectares) but decreased above this category (Thirring, 1969). In the Bangladesh study, it was found that the total fertility rate rises as the size of landholding increases, then drops and finally rises again as the size of landholding increases further (Samad and Ruzicka, 1976). Somewhat similar findings were reported from Bangladesh slaves, where the size of household increased sharply from the landless households only to those who owned about three acres of land; and above this size, the increase in the size of the household was much slower and did not keep pace with the increase in land holding (Acsadi, 1978). Victor Levy (1985) while studying the rural Egypt stated that land size assumed
to be complementary with child labour, also has a positive (though less significant) effect on fertility. Kleinman (1973) examined a 17 variable model of fertility for 315 districts in India; and found that cultivated average per household was positively related to fertility; land concentration was more weakly related to fertility, but in the negative direction. Latif and Chowdhury (1977) observed that the size of holdings were significantly and positively related to fertility in a Northern Bangladesh village but no relation was found in a Southern village. Rosengweig and Evenson (1977) studied the relationship of child-woman ratios with land quality measured by value per acre sown, mean land holding and landholding inequality for 189 districts in India. They concluded that the land size was positively related to child woman ratios as was the land quality measure and the inequality of land holdings was negatively related to fertility.

There are studies related to the size of land holding and age at marriage which shows either positive or negative relationship (U.N. 1961; Driver, 1963; Cain, 1976; Khuda, 1988). Cain (1978) found that there is a slight decrease in age at marriage for males and a slight increase in age at marriage for females with increase in size of the land holding. Khuda (1988) noticed a decline in age at marriage of males with the increase in land holding up to certain level and then increases again. Driver (1963)
found that the landless and those having 20 acres and more had higher age at marriage for both males and females compared to those possessing below 20 acres of land.

A few studies indicated a negative relation between land holding and fertility. The macro level analysis of 41 districts by Anker and Knowles (1980) showed negative land fertility relation. However, the same study finds positive land fertility relation for rural Kenya. Cochrane et al., (1977) while studying rural Nepal found negative relation between land worked per family member and live births. In another study Kleinman (1973) found a week negative correlation between the skewedness of land distribution and fertility in the Indian districts.

Thus, findings from the above studies reveal that land holdings play a significant role in differentially influencing the fertility behaviour. Therefore, in the present study, land holdings was considered as an important agricultural variable in determining the rural fertility of the study area.

IRRIGATION, CROPPING PATTERN, MECHANISATION AND FERTILITY

Irrigation, cropping pattern and farm mechanisation may have its effect on fertility either directly or indirectly. Victor Levy (1985) hypothesized that crop pattern
and mechanisation affect the demand for child labour and desired family size. He argues that in Egypt, cotton is highly labour intensive, and cotton weeding and picking is better suited to children than tasks connected with cultivating rice, fruit or vegetables. The change in cropping pattern is thus child labour saving leading to lower demand for children which affects desired family size. It was observed that a '10' per cent rise in cotton's share would increase fertility by '15' per cent.

Victor Levy as hypothesized, found that mechanisation to substitute for child labour has a negative effect on fertility. The mechanisation of land preparation and threshing is believed to displace considerable quantities of labour, as has been observed in India and the Philippines. An alternative view minimizes labour displacement effects, arguing that they will be partly offset by the need for repairs and service facilities and, more important, by increased multiple cropping and largest harvests. There is, however, wide agreement that mechanisation replaces child labour employed in such tasks as driving animals to power water wheels (mechanisation of water pumping), picking cotton and hauling freight borne by donkeys. If mechanisation, which primarily substitutes for animal power, leads to a reduction in the number of work animals, it may cause a further displacement of children employed
intending livestock. All this leads to reduction in the value of child labour which influences fertility (Victor Levy, 1985).

Nag and Kak (1984) concluded that in Punjab, the introduction of new technology and the success of green revolution have reduced the need for child labour in the number of ways. The introduction of new agricultural technology has however made all parents in the study area, conscious of the need for their children to learn more about it and hence to be educated in schools and colleges. It has also improved the economic condition of many villagers so that they have to depend less on children as a source of security in old age and against various types of risk.

Mueller (1975a) argues that "farm mechanisation may reduce the value of children's labour for two reasons (1) farm machinery is a purchase input, which, if desired by farmers may induce them to economise on child-rearing costs, (2) farm mechanisation reduces the value of child labour". According to her, some social scientists suggest that a successful experience with agricultural innovations such as the high yielding seeds will make rural families more receptive to other innovations such as birth control.

However, Veena Mazumdar (1979) states that the introduction of new technology, new methods of cultivation,
new crops, chemical pesticides and herbicides produce a negative impact on women's involvement in agriculture and thereby no effect on fertility. Rosenzweig and Evenson (1977) observes that technological progress in agriculture decreases the demand for children and thus reduction in fertility. Tripple cropping methods and mechanisation in agriculture would tend to reduce peak labour demand, including child labour (Stokes et al., 1979). Monica (1978) showed that the technological changes have reduced the demand for labour among both the land owning and landless castes.

Kurup (1979) in the analytical model examined the relationship between three broad sets of independent variables (rural development, agricultural practices, women's roles) and fertility in India during 1961 through 1976. Agricultural produce indicators include percentage of irrigated crop land, the use of multiple cropping etc. It was found that variation in fertility was explained by all the above sets of variables.

Karunatilake (1979) presents data on some agricultural factors that may explain part of the fertility decline. It was noticed that mechanisation of agriculture principally the tractor, has been progressive but has not displaced women from agriculture. Irrigation has markedly increased crop yields, thus improving income. The
use of fertilizer involves regular weeding, which is done mostly by women and thus has increased demand for female workers. The use of high yielding varieties of rice has also meant employment of more labour, particularly females. It was concluded that the all variables of agricultural modernisation led to decline in fertility.

Jaisaard (1979) examines some of the micro level impacts of an irrigation project on a village in Chaung Mai Valley in Northern Thailand. She states that the impact of irrigation led to increased use of land in the dry season, meant an additional demand for family labour, particularly of women. As a result of the new cropping, family income nearly doubled from a single rice crop compared to the previous value of crops for an entire year. In the village studied, the average family size was 3.7 children whereas the average family size of rural Thai was around 7. Thus clearly shows that in the experimental village, there were some preconditions, which reduced the family size.

Based on data collected in 1975 and 1978, Suchart Prasith-rathsint (1979) found that the use of modern technology and ground water was negatively correlated with family size. Those who are modern as shown by the use of two factors of production tend to have lower fertility,
The above studies clearly indicate that, the use of modern technology improved facilities for irrigation, and cropping pattern definitely reduced the family size in the rural areas. Hence this aspect was considered in the present study.

OWNERSHIP OF MODERN OBJECTS AND FERTILITY

Asset ownership is found to be better index of economic well being rather than income or socio-economic status. There are some empirical findings related to assets and the demand for children (Kleinman, 1973; Hicks, 1974; Chernichovsky, 1976; Rosenzweig and Evenson, 1977; McInnis, 1977; Latif and Chowdhury, 1977; Cochrane et al., 1977; Merrick, 1978; Aghajanian, 1978; Basu et al., 1979; Chalamwong et al., 1979; Anker and Knowles, 1980). Almost all of these studies examine this relationship in an agricultural setting where land is the major asset. Measures of land quantity show a consistent positive relationship to fertility, in most cases, except the studies of Cochrane et al., (1977) and the macro-level study of Anker and Knowles (1980).

In the two studies by Chalamwong et al., (1979) and by Rosenzweig and Evenson (1977) land quality is also measured and found positively significant in the latter studies but is not significant in the former. Anker and
Knowles (1980) by including livestock as a major asset for 1,605 rural married women in Kenya, observed negative relationship between children everborn and livestock holdings. No significant result was established between the farm machinery as a rural asset and the demand for children (Hicks, 1977).

Basu et al., (1979) studied the relationship between asset ownership and fertility. They constructed asset ownership index by giving a score, depending on their relative values or significance by including household and farm assets owned by the household. It is observed a sharp increase in the asset ownership index for the higher caste in developed villages compared to undeveloped villages, but no increase for the same index for tribals between two sets of villages.

The association between the possession of modern articles and age at marriage of the husband was observed highly significant, (Audinarayana, 1985) which will have its impact on fertility. Similar type of relationship was observed by Good et al., (1980) and Kanitkar and Sinha (1985) in Iran and rural and urban areas of Crissa, India respectively.

Thus the variable "ownership of modern objects" was found to be an important determinant of fertility. Hence it has been included in the present study.
ASPIRATION LEVEL AND FERTILITY

A number of studies conducted around the world showed that there exists a negative relationship between aspiration levels of the couple and fertility (Mueller, 1971; Lee and Sun 1973; Freedman, 1975; Johnston and Kilby, 1975; Alexandratos et al., 1977; Monica, 1978; Basu et al., 1979).

Mueller (1971) in her studies on fertility change in Japan and Taiwan provides an "aspiration hypothesis". She suggests that rising family incomes and the mass transformation of household preferences translate into "a desire for more educated children who will be able to leave farming for urban occupations, a felt need for farm equipment and other modern inputs, and a felt need for the savings necessary to achieve these goals". Most critically, however, rising aspirations involve the "desire to participate in modern forms of consumption" that "intensify the felt economic burden of bringing up children" (Mueller, 1971). There are research findings which point out that if the wealthier farmers raise their consumption standards as a result of income gains, consumption aspirations throughout the village may respond to the demonstration effect (Mueller, 1975).

Lee and Sun (1973) while reviewing the Taiwanese
development experience suggests that modernisation through agricultural development raises aspirations of rural families for consumption goods and children's education factors to pressure families to minimise family size. Taiwanese data indicate that variables which measure consumption levels and aspirations make an appreciable contribution to the explained variance in contraceptive use and ideal family size (Freedman, 1975).

Johnston and Kilby (1975) revealed that as a result of increase in income, changes occur in rural attitudes and motivations, which make parents more favourable to family planning. Monica (1978) in an anthropological study of a village, found that parents aspirations grew and there was a corresponding shift in their preference from larger families of uneducated children to fewer but more educated children. The numerous and complex connections between educational aspirations and attainment and fertility were discussed by Rich (1973), Kocher (1973), and Cassen (1976).

Improvements brought by different patterns of agricultural development will eventually leads to changes in attitudes to family size. Among the forces which may have brought these changes, the important role of raising aspirations emerges clearly. As development occurs, new goals, come in to view. Aspirations for more schooling
(children of higher quality) spread. New consumer goods and services become known and desired, purchased inputs are seen to increase farm incomes. Families realise that they must economise on everyday expenditures in order to satisfy these new aspirations and in this context large families are perceived as being expensive (Alexandratos et al., 1977).

Based on data collected in rural Gujarat, Basu et al., (1979) noticed that there is a general awakening of all classes, particularly in terms of aspirations. They observed that the aspiration level of the benefitted class had gone up significantly, leading to a higher perceived cost of children and a lowered desired family size. It was found that as high as 59 per cent of fathers in developed villages (compared to 32 per cent in undeveloped villages) want their sons to be graduates and above and most of the parents (67%) want their sons to be engaged in technical or white collar occupations. It was concluded that in raising aspirations for children for higher castes and also in increased cost consciousness of the higher class and finally in the lower average number of children for higher caste in developed villages compared to the same in undeveloped villages.

From the above review of the studies, it may be concluded that aspiration level is negatively related
to fertility. This variable was included for the present study as it expected to explain much of the variance in fertility between the respondents of backward and developed villages.

CONTRACEPTION AND FERTILITY BEHAVIOUR

In most of the developing countries, there is now a considerable and growing demand for family planning to restrict the population growth. There are several studies carried out in India and elsewhere which have shown that as a result of agricultural development, the adoption of family planning has increased (Khuda, 1988; Samper, 1988; Hackenberg 1988; Swaminathan and Subramanyam, 1986; Basu et al., 1978; Brown, 1971).

Based on data collected, in two blocks of Periyar district, Tamil Nadu, Swaminathan and Subramanyam (1986) revealed that a differential rate of adoption of family planning methods between an agriculturally developed block and agriculturally less developed block, confirming the hypothesis that agricultural development influences the adoption of family planning. Sterilisation was the most popular method adopted, and the proportion of women adopting this method increased with the number of living children. They also noted that the agriculturally developed block had a significantly lower level of fertility.
Nag and Kak (1984) revealed that agricultural modernisation has increased the use of contraceptive in Manipur village. It was found that 50 per cent of Manipur couples were using some contraceptive method—a proportion which is considerably higher than the Punjab and India as a whole. Similarly, Samper (1988) noticed that the knowledge and use of contraceptives was higher in the two capital sectors in comparison to small holding sector in Columbia. Brown (1970) has appropriately pointed out that "It is likely that those who adopt new agricultural technology will be more susceptible to changes in other areas including the planning of families. Once an individual breaks with tradition in one area, it becomes easier for him to accept other kinds of change".

Monica (1978) found that the motivation for family planning and the use of modern contraceptives had increased significantly as a result of technological changes in agriculture in the study area. Further studying the impact of various agricultural development programmes, Mathur et al., (1982) observed that the proportion of adopters of family planning method was higher among the beneficiaries than among the non-beneficiaries. Similarly Muthayya and Vijaya Kumar (1980) revealed that the family planning practices were more in the intensive agricultural district programme area than in the non-intensive agriculture district programme area in Karnataka and Tamil Nadu.
Alauddin (1979) states that the influence of land on fertility is both direct and indirect through four sets of intervening variables. These variables include access to and utilisation of available dependent inputs, which in turn affect social and economic gains, provide an occupational diversification with in the family, and affect health care and family planning services utilisation for rural Bangladesh.

A number of studies have found positive association between husband-wife communication and the practice of family planning (Sivaraju, 1987; Liu, 1979; Bertand et al., 1978; Hill et al., 1979; Keller, 1973; Sinquefield, 1974). Higher levels of family planning discussion have been associated with greater fertility regulation in many studies (Asia, ESCAP, 1974; Kim and Lee, 1973; Lee, 1979; Mukherjee, 1975; Shah, 1974).

The above review concludes that adoption of agricultural innovations has lead to adoption of contraception also. This variable was also examined in the present study.

VALUE OF CHILDREN AND FERTILITY

Value of children is a major and valuable research area within the general realm of the determinants of fertility. The first part of this section presents studies
on value of children in general followed by studies specifically focussing on economic value of children and oldage security value of children which have profound influence on fertility.

Children bring psycho-social and, in some cases, economic benefits to their families. The dimensions of those benefits have been outlined by Hoffman and Hoffman (1973) and Arnold et al., (1975). There are other allocative activities and opportunities also which bring rewards, some of which are similar in character to those provided by children (Turchi and Bryant, 1979). The socio-economic status levels and their associated life styles produce value orientations and family structure variations which in turn affect fertility attitudes and behaviour (Clifford, 1971). Socio-economic development may be considered as having its primary impact on the economic cost/benefits of children. Further, the rural residence and lower class status is associated with practical and economic values of children.

It is substantial that financial costs are the chief reason for wanting to limit family size and it becomes more important as parity increases (Bulatao and Arnold, 1977; Hoffman, 1975), traditional attitudes are associated with valuing children chiefly for family continuity, security and reinforcement of sex roles. These values are
associated with higher levels of fertility (Arnold and Fawcett, 1975). In traditional farming and rural settings, large families can lead to higher status and the enrichment of the family by adding land, animals and more intensive farming methods (Mazur, 1975; Simmons, 1977). There were studies which relate economic costs and benefits of children and fertility (Mueller, 1972; O'Donell, 1974; Cramer, 1975; Vlassoff, 1978; Usha Rani, 1983).

Balancing the decrease in value of children which accompanies the modernisation process is a shift in focus away from valuing children in terms of "quantity" and toward valuing them in terms of "quality" (Newland, 1979). The value of children declines when the families economic function disappear (Kasarda, 1971; Frenkal, 1976). Mueller (1976) by using aggregate data and life cycle models, concluded that the economic value of children is negative in peasant agriculture. Based on the study conducted in rural India, Vlassoff (1978) found that none of the comparisons showed an obvious association between fertility and economic utility. It was observed in the same study that oldage security and variation in labour contributions from children had no effect on villager's attitudes towards fertility. Nag and Kak (1984) by using the data collected from Manupur village in Punjab, revealed that the introduction of modern technology is one of the dimensions for the decline of the labour value of children. Monica (1978)
has observed similar technological and socio-economic changes causing a decline in the economic value of children in another Indian village near Delhi.

The value of children studies have reported in several instances that parents perceive their children as making significant economic contributions to the family (Caldwell, 1967, 1977; Arnold et al., 1975; Bulatao, 1975; Buripakdi, 1977). These perceptions of significant economic value are largely concentrated in the rural areas of Asia and Africa among the lower income farmers and agricultural labourers. There were several studies which found the economic contributions of children to be significant determinants of fertility (Kasarda, 1971; O'Donell, 1974; Cramer, 1975; Liberman, 1976; Cain, 1977; Nag et al., 1977; Aghajanian, 1978; Vlassoff, 1978; Usha Rani, 1983).

It is widely agreed that role segregation by sex and especially the restriction of women to the wife - mother roles, linked to fertility through the value of children frame work. The woman who is restricted to a maternal role, she will value children highly and deserve, desire and have a large family (Newland, 1979). The small differences in values of children of men and women is related to sex role differences (Arnold and Fawcett, 1975). For instance, fathers tend to be more concerned with economic costs than are mothers. It is also stated that women
with narrow role perspectives are more concerned with psychological benefits and expectation of economic help from children than are mothers (Simmons, 1977).

Several studies have documented the relationship between sex preferences and fertility behaviour (Westoff et al., 1963; May and Heer, 1968; Pohlman, 1969; ORG, 1971; Mamdani, 1972; Williamson, 1973; Narayan Das, 1984). Based on survey data of 1970 - 1980, in India, Narayan Das (1984) revealed that additional fertility is strongly tied to the sex of the children, a woman already has. At each family size level, the desire for additional children consistently decreases with the number of living sons, except when all living children are sons where there appears to be a slight increase in the desire for additional children. It was stated that "sex preference" will affect family size if the desired composition is not readily achieved (Westoff et al., 1963).

The opportunity cost of time spent in child care is argued to be significantly lower in rural areas than in cities (Concepcion, 1974; Goldstein, 1972). It was found by Maurer et al., (1973) that increased female wage opportunities related to decreased fertility in terms of labour force participation are negatively related for Philippine (Harman, 1970; Boulier, 1977). Studies in Taiwan and Japan by Schultz (1974) and Hashimoto (1974) have
tended to support the negative association of opportunity costs and fertility.

Several studies conducted throughout the world have found a strong relationship between some measures of the perceived satisfactions and cost of children and various measures related to family size and other practice of birth control (Arnold et al., 1975; Deven, 1977; Chang, 1979; Kagitcibasi, and Esmer, 1980; Meyer, 1981).

i) Economic value of children and fertility

Although the previous part of this section explores various dimensions of the value of children in general, it is worthwhile to examine studies on the economic value of children, in view of the important role it plays in influencing family size preferences.

Economic motives that influence fertility behaviour may be broadly categorised into economic costs and economic benefits of children (Leibenstein, 1957; Robinson and Norlachor, 1971; Mueller, 1972; Schultz, 1969). There is abundance of evidence which shows that western demographic transition is associated with increasing costs and decreasing benefits of children. Coale's (1969) summary of factors responsible for decline of marital fertility in Europe includes "the rising cost and diminished economic advantages of children in urbanized industrial societies."
In rural families children assist in production at an early age and are a source of support for parents in their old age; in an urban environment children contribute less and cost more, especially after the establishment of universal primary education and the prohibition of child labour, both characteristic of advanced industrialisation. Therefore, in the developed countries economic benefits are less important than economic costs of children. Hoffman and Hoffman (1973) conclude that "there is no evidence in the United States that children are raised for profit". It is further supported by the fact that in most of the recent studies on economics of family formation in United States the focus has been on costs rather than on benefits. Moreover, evidence shows that only indirect costs rather than direct costs are powerful in explaining fertility. Espenshade (1972) notes that the direct costs of children "possess no power in explaining cross-sectional variations in fertility." Most of the empirical studies on cost of children in relation to fertility have relied on the opportunity cost representing the value of mother's time which has been shown as the largest single cost component (Mincer, 1963; Benporath, 1973; Willis, 1973).

Formidable evidence on the economic value of children comes from the pioneering work done by Caldwell and his associates in Ghana and Nigeria (Caldwell, 1978; 1978; 1979). They have attempted to measure children's activities
and to analyse them by sub-divisions of sex, age, education and size of centre of residence; to measure parents' feelings about the balance of costs and returns on children; and to trace all money flows in each direction between parents and children. In rural Yorubaland, household work, usually done by machines in the industrialised countries, is being done by children (Caldwell, 1977). "In a partly subsistence economy" as Caldwell (1977) concludes, "children are not only producers for the market and for household consumption; they also provide subsistence services and make life for adults pleasanter and more gracious than it would other wise be. In a different sense from that in which the term has previously been used, children are, in deed, consumer durables." However, schooling reduces the number of children engaged in farming and marketing, and urbanisation reduces the number of boys engaged in farming (Caldwell, 1977). As regards the money balance of costs and returns on children, "most respondents say that children who are not at school bring in more than the cost they impose by the time they are about 15 years of age, while those still at school never do so".

Research in tropical Africa indicates that there is a net life-time flow of wealth from the younger to the older generation (Caldwell, 1977). The major flows of wealth include children's productive labour, children's household work; children's material and physical help in times of...
parental sickness and oldage; children's contribution
to the family and community festivities and ceremonies;
contributions from educated children employed in modern
sector; extended family of mutual obligations and community
help facilitated by high fertility and children's marriage.

Cain (1977) has attempted to analyse the economic
activities of children in a village in Bangladesh. His
analysis showed that "children of both sexes begin to
work and put in relatively long hours of work at young
ages. Male children appear to become net producers at
least by age 12, compensate for their cumulative consump-
tion by age 15, and compensate for their own and one sis-
ter's cumulative consumption by age 22. Male children,
in particular, may represent a means of supplementary
income and accumulating economic wealth with in their
parents life time."

In an anthropological investigation on the economic
value of children in Java and Nepal, Nag et al., (1978)
have attempted to estimate directly the contribution of
children's labour in terms of average time spent per day
in different types of activities. They demonstrated that
"the work input by children in Javanese and Nepalese villag-
ges is quite substantial", in contradiction to the Mueller's (1977) conclusion that "children have negative econo-
mic value in peasant agriculture. "They also suggest
that at the current rate of reproduction and under present circumstances, children probably have a net positive economic value to their parents in these villages, aside from the oldage security they provide them.

Although these studies unanimously purport to show that in rural, traditional, agricultural societies children have a net economic value to their parents, no attempt was made to relate it with fertility. It has been argued that "parental behaviour is obviously influenced by parental perceptions of the costs and benefits of child rearing rather than by economists' calculations" (Ware, 1978). This type of non-monetary approach has been considered as 'more realistic' and 'more modest' (Mueller, 1972). In consideration of this view Mueller (1972) studied the relationship between economic motives, measured by perceived utility of children and sensitivity to the cost of raising children, and fertility behaviour among Taiwanese husbands. She found out that perceived utility was positively related to the ideal number of children and negatively related to contraceptive use; cost sensitivity was negatively associated with ideal number of children and positively associated with contraceptive use. Further, the cost sensitivity displayed a stronger relationship to fertility than to perceived utility. However, one need not be surprised at this finding as it reflects a particular stage of the demographic transition in Taiwan. She herself has
acknowledged that "In countries which are at an earlier stage, the relationships studied here may well be diffe-
rent".

In an another cross-national study of value of child-
ren (Arnold et al., 1975) economic dimensions are studied 
within a broad spectrum of social-psychological dimensions 
of the value of children. "Among the most consistent find-
ings in this study was the emergence of distinctive profi-
les of values for the three socio-economic groups that 
were studied: urban middle class, urban lower class, and 
rural". Throughout the study it has been demonstrated 
that rural parents emphasized strongly the economic bene-
fits and security from children, while urban middle class 
parents stressed emotional benefits provided by children; 
whereas urban lower-class respondents showed somewhat 
greater concern about emotional benefits as compared to 
economic benefits. Some preliminary analysis of the rela-
tions between values of children and measures of fertility 
and family planning reveal that "both economic and non-
economic aspects of the value of children have an influence 
all their own on numerous measures of family size and 
fertility control. However, the perceived economic dimen-
sions of children appear to be of greater importance than 
their social-psychological dimensions" (Espenshade, 1977).
A more systematic relationship of perceived economic utility and cost of children with fertility behaviour was reported from Thailand (Arnold and Pajaranonda, 1977). High perceived utility of children was found to be associated with low education, low income, farming families. High perceived cost of children, on the other hand, was about equally common in all population groups studied. The multivariate analysis confirms that high fertility desires and low contraceptive use was related to husband's perception of high economic utility of children and low cost of children. The percentage of variance explained was generally not high but the economic indices of the perceived utility and cost of children each had a significant net effect in the expected direction on all of the fertility-related variables. Moreover, based on analysis of adjustment means, the economic indices were about as important as or even more important than a number of traditionally significant socio-demographic determinants of fertility such as education and urban-rural residence.

An econometric analysis of demographic survey data in Philippines shows "the strongest confirmation of the determinants of desired family size is displayed by the positive coefficients for child labour force participation, indicating that where opportunities exist for children to help provide support for the family, the parents desire a larger family" (Harman, 1970).
National Censuses conducted in many countries contain data on economically active population of various age groups. The activity rates for the ages below 15 years, given by the census data, are nothing but the manifestation of economic value of children. Based on census data (1946 - 1958), United Nations (1962) study reveals an inverse relationship between degree of industrialisation and child labour participation. It lends additional support to the contention that economic value of children is greater in agricultural societies than in industrial societies. Nag (1972) gives three reasons for the higher economic value of children in agricultural societies: (1) households, being the main units of production in agricultural societies, need and facilitate the unpaid labour contribution of children; (2) seasonal variation in the demand for labour in agricultural societies makes it necessary for children to join the labour force at an early age; (3) prolonged training necessary for effective participation in industrial production keeps children out of the labour force in industrial societies.

Economic analyses based on Census data also provide further support on positive child labour-fertility relationship. In an international cross-sectional study of 49 countries, Kasarda (1971) observes significant positive relationship between child activity rate and fertility measures. There are also country-specific studies showing
similar results. Schultz (1970) and DaVanzo (1972) with Arab Middle East and Chilean data, respectively, find significant positive regression coefficients for child labour participation rates and negative coefficients for child school-enrollment rates, with various measures of fertility as dependent variable. Although these findings seem to be impressive, they may not suffice for providing policy prescriptions to developing countries as they are based on second hand data devised for some other purposes (Leibenstein, 1974; Ryder, 1973).

Attempts have been made to assess the economic value of children in India. So far, on the costs side some attempts have been made to estimate the direct maintenance cost of children in India (Samuel, 1963 and 1964; Brahme, 1962; Indian Institute of Public Opinion, 1964; Kulkarni, 1979; Usharani, 1979). Though these estimates provide a crude indication of the expenditure on children, they are not useful for drawing valid conclusions for the reason that some of the studies estimates are based on rather low quality of secondary data collected for different purposes. The weights used for allocation of food expenditure, particularly for children, may not be uniform for all regions, sexes and cultures. Further, the needs of children vary by sex, age, residence, socialisation process, economic circumstances etc. Nevertheless, however genuine the estimates of direct costs may be, they are
insufficient to explain the nexus between "economics of children" and fertility without the knowledge of opportunity costs and economic benefits associated with children. In U.S. for example, the estimates of child costs reveal that "direct maintenance costs and opportunity costs are roughly of equal magnitude" (Espenshade, 1977). However, the role of opportunity costs in low-income countries like India seems to be insignificant; because the value of "mother's time is cheap" (Schultz, 1974) since majority of the women are illiterate and few work outside the home in non-traditional occupations.

The available evidences on the economic benefits of children and fertility in India are inconclusive; probably due to insufficient data base. In piece-meal they are scattered in demographic surveys while some others are indirect, "anecdotal" and census-based inferences. Conventionally, it is held that in low-income countries children are poor man's capital (Boserup, 1965; Clark, 1967; Schultz, 1973). For India, Mamdani (1972) has pioneered in making an important contribution on this score, following his interviews with few villagers in Punjab State. He maintained that: "A larger family means greater income during the busy season and higher savings for the slow season". "The farmer's children can be of considerable assistance, even while they are young". "Infact, primary responsibility for the cattle can be left to the children
and the adult's load lightened a little". "If a farmer's wife has no young children, it would mean intolerable hardship". "The seasonability of employment does not affect child labour since children are mostly employed looking after cattle or doing housework". "The longer the daughter stays unmarried, the more assistance she can lend her family". "For one thing, until a boy is fifteen or so, work and education are compatible". Convincing evidence on this argument can be found in the writings of D'Monte (1975), Sinha (1975), Mandelbaum (1974), Nadkarni (1976) and in the studies of Khan (1977) and Poffenberger (1968).

The above conclusions are further reinforced by evidence on perceived value of children. A study of the Operations Research Group (1973) concludes that in both agriculturally developed and undeveloped villages, parents were more value-conscious rather than cost conscious about their children. There are other studies which attempted to relate value and cost of children or child labour with fertility. In a recent study of Muslims in Kanpur City, Khan (1979) found significant negative relation between perceived benefit of children and number of children ever born, whereas, perceived burden of children has so significant explanatory effect. Mahadevan (1979) in his study in South India observed that the importance attached to the roles of children as sources of labour and income significantly explain the fertility variations in the
caste groups. The findings of a household time-allocative econometric model applied to the 1961 Census data pertaining to the rural population of India support the hypothesis that one of the basic conditions motivating Indian families to bear relatively large numbers of children was the high returns to the use of raw labour power of children compared to investments in skills obtained in schools (Rosenzweig and Evenson, 1977). A small-scale study of fisher women in Andhra Pradesh shows that the number of non-adult earners significantly correlated with fertility (Murthy and Rao, 1979).

Though the above review reinforces pronatalist effect of economic value of children, it has, however, come in for criticism (Vlassoff, 1979; Dandekar, 1979; Srinivas and Ramaswamy, 1977; Kulkarni, 1979) mainly on two accounts: underemployment of adults and non-availability of employment opportunities for children. The results of a study of Western Indian villages show low-levels of child labour participation coupled with adult underemployment and consequent substantial outmigration of sons in search of employment. Further, sensitivity to child costs was most pronounced than child utility attitude (Vlassoff, 1979). These findings are not unexpected from a poorly irrigated village around only one-sixth of cropped land is irrigated. As such, there is no need for large bullock force which is a main source of child employment elsewhere (Mamdani,
1972). Moreover, the researcher's probe into the remittances from non-resident sons seems to be peripheral.

The argument - "the more the sons, the smaller the share of each in the family holding" (Srinivas and Rama- swamy, 1977) - may not affect landless labourers and to some extent marginal farmers, who are proportionately higher. At the same time they can lease-in more land and economically utilise family labour. Among the land-owning upper castes, the attitude may be "more sons means more dowries". In a similar vein Mamdani (1972) says that "the only way out" to the problem of land subdivision, "is to have enough sons who can themselves work and buy more land". Another criticism raised is by Dandekar (1979) that "the number of working children is relatively small in this country and that many children simply idle away their time because adequate employment opportunities are not open to them". However, she did not mention that the increase in the percentage of idlers between 1961 and 1971, may be due to change in the census definition of worker. It is also worth noting that the statement "not available for work" is a function of age and sex as the proportion has reduced to half or even more between the age groups 0-9 and 10-14. Above all, for rural parents, if it is matter of choice between work, idling or school, probably the latter may be the last choice. Moreover, the demand for labour depends on intensity of cultivation.
Srikanthan et al., (1978) have found higher work participation of children and women in irrigated villages compared to rain-fed villages. Although the above studies are critical of the magnitude of economic value of children in India, how it alters the fertility behaviour has not been studied in detail. The section that follows economic value of children is oldage security value of children which is also considered an important variable in influencing fertility.

ii. Oldage Security and Fertility

Children are economically valued not only for labour or income but also for oldage security to the parents. Numerous attitudinal surveys have revealed that children are important for providing oldage security to parents. In Nigeria, as high as 95 percent of the parents felt that: "Children are important because of the help they give to parents when they are old" (Caldwell, 1976). The Value of Children Project has shown that in all countries more than 70 percent of rural respondents expect to rely on their children when they are old (Arnold et al., 1975). In Thailand, data on expected living arrangements of parents in oldage reveal that 84 percent of the respondents expected to live with children in their oldage (Arnold and Pejaranonda, 1977). An analysis of the residential pattern of elderly persons in the Nepalese village shows
that people depend more on their sons than their daughters for oldage security. In the Javanese village, however, the parents are almost equally dependent on sons and daugh-
ters in their oldage. This is attributed to the somewhat flexible pattern of marital residence in Java' (Nag et al., 1978).

The evidence on the oldage security-fertility rela-
tionship so far available is inadequate to rely on for policy formulation. However, in Japan's Case, "an almost simultaneous and parallel start of a change can be seen in the limitation of fertility and ..... the feeling of dependence on children in oldage" (Kobayashi, 1977). This striking Japanese experience was earlier reported by Freed-
man (1968) as an illustration of the relation between oldage dependence norm and fertility. With Taiwanese data, Harmalin (1976) finds a fairly strong relation between ideal number of children and the level of assistance expec-
ted from married sons. Neher (1971) believed that popula-
tion size can be significantly reduced if alternative pension schemes are made available. Similarly, Hohm (1975) has shown that social security programmes have had a nega-
tive effect on subsequent levels of fertility in a large number of countries.

Children are also considered as attractive invest-
ments, because "a child draws upon resources when they
are relatively plentiful and provides a return source of support in oldage" (Schultz, 1971). In a different context Caldwell (1976) emphasizes: "Investment in children is probably an investment in the real sense of the term". Educated children when they are employed in modern sector and reached their occupational heights, 'they will, in most cases, return more money and remit it more regularly". On the contrary, both Robinson (1972) and Ohlin (1971) believe that children are not a good investment for oldage. Further, Mueller (1976) points out that in low-income countries "older rural males continue to work on the family farm and thus may require little oldage support from their children". Favouring child investments, DeTray (1976) argues that the capital markets in developing countries are imperfect and in comparison with alternative investments child investments yield the least negative return. Opposing this, Repetto (1976) argues that the capital markets do exist and substantial transactions are taking place in rural areas of low-income countries. But all such arguments may not deny the fact that in developing countries a high proportion of older women are widows and their economic security primarily lies in their sons (Ridker, 1976). Likewise, older persons may do little "economic work" that justifies their economic self-reliance. Moreover, not only monetary support, but other forms of physical and emotional supports deserve equal attention for the
proper evaluation of oldage security investments on children. Perhaps, in developing countries, no investment is as attractive as a child until a considerable level of institutional sophistication has been achieved (Ware, 1978).

In countries like India that do not have a well-developed system of pensions, social security, unemployment compensation, and other insurance schemes, children particularly sons are the only reliable source of security for their parents in oldage. This "pension motive" is rather forcible in traditional societies characterized by strong family and kinship ties (Mueller, 1972; Chung, 1972; Repetto, 1976). The available evidence in India on the pronatalist effect of oldage support motive is mostly qualitative and indirect (Poffenberger and Pffenberger, 1973; U.N, 1961; Mandelbaum, 1974; Khan, 1977). From these studies it appears that son preference is synonymous with oldage security motive. An All India Sample Survey conducted in 1970 has shown that 56 percent of the couples desire a son "to support the family" (ORG, 1973). Mamdani (1972) maintains that "Since daughters must always marry outside the village, security for oldage depends solely on the number of sons a couple has."

Mukherjee (1973) notes that "the Indian people, on an average, desire two sons: one, at the minimum, to
look after them in their old age since most of them have hardly any savings to fall back upon, and the second as an insurance against death or any calamity befalling the other". Some have attempted to calculate the number of sons required to ensure the survival of at least one son in order to provide support to the parents in old age (May and Heer, 1968; Heer and Smith, 1967; Ridker, 1959). They have shown that in countries like India with 50 years of life expectancy a couple must bear five children to ensure with 95 percent confidence the survival of at least one son on the father's sixty-fifth birthday (Poffenberger, 1968; Poffenberger and Poffenberger, 1973; Mandelbaum, 1974).

Though all these studies state the importance of oldage security value of children in India, very few studies have attempted to study the strength of oldage security motive in influencing fertility behaviour. However, Mahadevan (1979) who has studied a number of roles of children in relation to fertility concludes: 'compared to the other roles, oldage support is considered to be the most common role'. Further an overwhelming majority of the respondents favour sons as oldage security providers as against daughters. It is also found that the importance attached to this role is associated with higher fertility particularly in the lower caste groups.
Against this scenario, some are sceptical about the direct linkage between oldage security motive and reproductive behaviour as the latter precedes much earlier than the former (Dandekar, 1975; Vlassoff and Vlassoff, 1980). Based on a study in rural Maharashtra, Vlassoff and Vlassoff (1980) have concluded that "economic resources, not an abundance of sons, are relevant factors that determine security in oldage". However, much credence need not be accorded to this finding as the economic status is not controlled in the analysis. Moreover, the same study revealed that for more than 90 percent of the widowed, separated and aged-respondents sons are a major source of oldage security. This is true particularly in the case of Indian widows. According to 1971 census, more than 60 percent of the women in the age group 60-64 were widowed. For these women, security lies principally in their sons, but not in daughters or sons-in-law for many reasons (Poffenberger, 1968; Poffenberger and Poffenberger, 1973; Mandelbaum, 1974).

From the review of literature on the value of children and fertility, it can be seen that benefits and costs of children and oldage security have a bearing on fertility behaviour of couples. Presently, there is awareness among individuals all over the world regarding the costs and benefits involved in having children, to some degree of other. In India, too, the intensity of this consciousness
is raising considerably breaking away from traditional beliefs and irrational reasonings. Hence, value of children was considered here as one of the variables for the present study.

MODERNISATION AND FERTILITY BEHAVIOUR

The inter-relationship between individual modernisation and fertility has become an important concern of demographers and sociologists. Modernity has been defined by a variety of indices, such as level of education, exposure to mass media, urban residence, type of occupation, ownership of modern household items or degree of adherence to religious or cultural traditions. When individuals or populations are classified on a scale of modernity, an inverse relationship between modernity and fertility is found. The shift in the life style from traditional to modern is expected to have profound influence on the fertility behaviour of the people. Studies classifying individuals or populations on the scale of modernity confirmed an inverse association between modernism and fertility.

Vlassoff (1980) in the study on 'Economic utility of children and fertility in rural India' revealed that all the measures of fertility is having significant association with the index of modernity. It is noted that the most modern respondents both prefer lower fertility
and have smaller families than the traditional families. Mueller (1975) opines that the new agricultural practices disrupt traditional norms and social relations in the village and hence facilitate all sorts of modern behaviour which will have its bearing on fertility. Epstein (1962) in a study on two Indian villages, revealed that economic changes which alter the source of livelihood available to a village, do produce extensive social change and modernisation in that village. In a rural study of India, Singh (1979) found higher levels of modernity associated with smaller actual and desired family size and more favourable attitude towards spacing of children and adoption of family planning devices. The study also pointed out that modernity values depress fertility by bringing about changes in the value system and helping to develop a rational outlook. Kocher (1973) reveals that as a result of agricultural development in Taiwan, Japan and South Korea, rural income increased and people's living conditions improved which led to a more modern life style and simultaneously decline in fertility was observed. Similarly Lee and Sun (1973) also opine that development in agriculture modernises the rural people and makes them to minimise their family size.

Lee and Bulatao (1983) in their critical essay on 'the demand for children' concludes that "children's economic contributions fall of considerably in modernising
societies, as education gains in importance, as the tasks children do become obsolete or unnecessary, as the labour force shifts out of agriculture, as children are replaced by other institutions in providing security against old age, and as greater social mobility and weaker family ties reduces dependence on children”. In another study Nag (1982) revealed that certain elements of modernisation viz., education of men and women, employment of females in non-familial activity etc., are associated with low fertility, while other elements viz., declining breast-feeding, improved health etc., often cause raise in fertility, atleast in the short run. Lindert (1980) suggests that the initial effect of modernisation may be to increase the demand for children, although this effect is soon reversed. Mukherjee (1979) while interviewing the married women in rural and urban strata of three Indian states found that the core dimensions of modernity - subjective efficacy, openness to change and propensity to plan all contribute in limiting the family size. Many studies found a negative relationship between fertility and an advanced level of modernisation as a social variable (Fawcett and Bornstein, 1973; Ryder, 1959; Adelman and Morris, 1966).

Two major studies, that have mainly dealt with individual modernity are Harvard Project which was carried out in six developing countries (Smith and Inkles, 1966) and the comparative study of modernism in Brazil and Mexico
(Kahl, 1968). Smith and Inkles observed that "modernity would emerge as a complex but coherent set of psychic dispositions manifested in general qualities such as a sense of efficacy, readiness for new experience, and interest in planning, linked, in turn, to certain dispositions to act in institutional relations as in being an active citizen, valuing science, maintaining one's autonomy in kinship matters and accepting birth control".

Kahl (1968) developed a scale of values that differentiated between modern and traditional men. A consistent inverse relationship between degree of modernism and ideal family size was shown for most occupational groups, but only a few of the differences were statistically significant. Similarly Williamson (1969) from the Harvard Project data also concluded that subjective efficacy and ideal family size function more as independent determinants than as intervening variables. The cross-cultural work of McClelland on the achievement motive is another attempt to understand an aspect of individual modernity (McClelland, 1961; McClelland and Winter, 1969).

There are some studies which relate to the dimensions of modernism and birth control practices. Khan and Parveen (1977) observed a significant relationship between family planning adoption status and subjective efficacy. Similarly, Pareek and Kothandapani (1969), while analysing
Harvard project data collected in Bihar, found a significant correlation between ideal family size and birth control on the one hand and some indices of individual modernity on the other. They revealed that education, personal modernity, political modernisation, overall modernisation and lack of fatalism accounted for about 10 percent of the variance in preference for a small family among 1,300 individuals. The study of Korean family planning behaviour by Chung et al., (1972) showed a positive relationship of modern attitudes to contraceptive practice. Fawcett and Bornstein (1973) presented three themes of modernisation reflected in personality orientation which are considered particularly relevant to family planning and fertility change: subjective efficacy, orientation towards time and openness to change. Freedman and Takeshita (1965) observes that more modern couples will have low fertility because of the greater use of contraceptives commencing from an early marital life than the less modern couples.

The findings of the studies reviewed indicate that individual modernisation have significant negative impact on the fertility. Hence, different dimensions of individual modernity were considered in the present study to examine their effect on fertility between the backward and developed villages.
EDUCATION AND FERTILITY BEHAVIOUR

Education is said to be one of the most robust indicators of the couple's fertility behaviour. Education is the aspect of development which is most consistently associated with decline in fertility level. The reasons why education lowers fertility are that it may contribute to raising age at marriage and schooling, also modernises the outlook of students, thereby enhancing their willingness and ability to control marital fertility. Another explanation is that more educated parents tend to come from higher status backgrounds, while growing up they may have had more contact than others with the modern sector of the economy, with the mass media, and with educated people - quite apart from their schooling (Mueller, 1975). There are studies which suggest that urban contacts and mass media exposure tend to reduce fertility (Inkles, 1966; Freedman, 1976; Basu et al., 1979).

A well established negative relationship between educational status and fertility was noticed at the national or regional level (U.N. Mysore Population Study, 1961; NSS, 1960-61; Rele and Kanitkar, 1966; Bhende and Rao, 1969; Usha Rani, 1983).

The Mysore Population Study (1961) in India shows that women with high school or college education have a small family than those with a lower level of education.
Bhende and Rao (1969) found that the average number of children ever born for those who were illiterate or had studied up to primary school level was 3.51, and for those who had secondary education and above that level was 3.45. Similar results were shown in a relevant study by the Registrar General of India (1972).

Faroqui (1984) observed that school enrolment is the single most important determinant of fertility for rural Pakistan both in terms of magnitude of effect and statistical significance. He found that a unit increase in the percentage of children enrolled in school, is associated with a decline of 20 units in the child-women ratio. Basu et al., (1979) noticed that the educational aspirations for sons for educated husband is markedly high in developed villages compared to backward villages. Liberman (1976) states that education may have a direct bearing on fertility behaviour through the process of taste formation and by improving access to information on contraception.

There are empirical studies which shows the positive relationship between educational status of the couple and age at marriage, thereby its effect on fertility (Mirallo, 1979; Smith, 1975; Bhatia, 1984; Srivastava, 1981; Audinarayana, 1985). Bhatia (1984) found that the relationship between the educational level and age at
marriage is linear for females, however, it is curvilinear for males. Miralo (1979) found that an year of one's education is associated with 3.5 months delay in age at marriage of that individual. Srivastava (1981) observed that higher level of education has a positive influence on age at marriage than relatively lower level of education for rural Uttar Pradesh.

Education, particularly of females is generally recognised as one of the most powerful predictors of fertility decline. Education of women can affect their fertility by delaying their entry into the fertile reproductive period and by influencing the number of children borne by them (Jain and Nag, 1985). The survey by the Registrar General of India (1982) show that women who are literate but had not completed primary school education had higher marital fertility than those who are either illiterate or those who had completed primary school education in rural areas of India. Zachariah (1984) observed that the mean number of children ever-born as well as completed and desired family size will decrease linearly with increase in schooling, but the relationship between schooling and total marital fertility was curvilinear for a sample survey of three districts in Kerala.

Recent evidence suggests that maternal education plays a major role in determining the levels of infant
and child mortality (Caldwell, 1979; Preston, 1980; D'Souza and Bhuiya, 1982). According to Jain and Nag (1985), one important mechanism through which education of women affects infant and child mortality is greater awareness among educated women of the need to use modern health facilities and, consequently they found higher utilisation of facilities by the educated than by non-educated women. Further the reduction in infant mortality leads to decrease in fertility through increased use of contraception (Jijeeshbhy, 1984; Jain, 1985). Increase in the level of mother's schooling has a negative effect on fertility and infant mortality and a positive effect on nutrition and children's schooling (Rosenzweig and Evenson, 1977; Schultz, 1981).

A study of infant mortality rate in India shows that the female literacy rate along with high family planning programme inputs is the most powerful variable in explaining the variation (Roy et al., 1979). The survey of 1979 showed that at the all India level, the infant mortality rate among rural women without education was 145 deaths per 1000 births in comparison to 71 among rural women with at least a primary school. Similar type of relations were observed by Caldwell et al., (1982) and by Registrar General of India (1983).

The relationship between education and demand for children on the one hand, and between education and the
use of contraception on the other is positive. The empirical data collected in a national sample survey conducted by operations research group in 1970 corroborate these relationships (Sarma and Jain, 1974). A similar relationship between educational level and use of contraception was observed in the studies of Khan and Prasad (1983), Zachariah (1984), Jain (1985).

It is observed that education decreases the demand for children by reducing the labour value, infant and child mortality and by increasing the age at marriage and the use of contraception. Therefore, education was considered as an important social variable in the present study, to assess its influence on rural fertility.

AGE AT MARRIAGE AND FERTILITY BEHAVIOUR

Age at marriage is the most important variable in determining the fertility in many societies. Age at marriage varies considerably between regions, between social and economic groups. Further, some of the studies conducted in India and abroad indicates, age at marriage will differ from country to country and region to region with in the country, based on the agricultural modernisation (Kleinman, 1973; Mueller, 1975; Miralo, 1979). It is claimed that the postponement of marriage and a shift in proportions ever married towards higher ages have played considerable role in reducing fertility. "Later marriage
reduces rates of population growth because it means: a shorter period of reproductive life exposed to the possibility of pregnancy and a longer interval between generations (P.I.P, 1979). Dixion (1971) states that in a society where the arranged marriage is general pattern, there, the marriages occur at a comparatively later ages. However Blake (1967) argues that marriage in which parental control is exercised are conducive to either extreme, very early or very late.

Mueller (1975) argues that employment opportunities for unmarried women and the economic status of parents may influence fertility in a more direct way - via women's age at marriage. She noted that in Punjab, which is the foremost state to experience agricultural modernisation in India. The mean age at marriage in rural areas has risen from 17 to 20 years due to rise in income of the farmers. Contrary to this, Kleinman (1973) by citing other parts of India, suggests that small farmers marry their daughters later than large farmers who are more traditional. He explains that small farmers may have to wait until they have accumulated money for the wedding and dowry; and while low status girls may work, higher status girls are less likely to do so.

Most of the studies conducted in both developed and developing countries have well established that the age at marriage is negatively related to fertility (U.N. 1961; Rele, 1962; Mukherjee, 1962; Driver, 1963; Agarwala,

Based on the world data on proportions married and total fertility rates, it was observed that late marriage and high proportion of unmarried people had long been characteristics of Western Europe (PIP, 1979). McDonald et al., (1981) have confirmed that the "completed fertility declines with increase in age at marriage" in their world fertility surveys for the countries of Asia and Pacific Latin America and Caribbean regions. Harman (1970) found that in all age groups below age 35, late age at marriage was statistically associated with lower completed fertility in all levels for Philippines.

Miralo (1979) while studying on female employment and age at marriage have noted that linkages between age at marriage and fertility patterns are well established for rural Philippines. Suchart Prasith (1979) also noted that women's economic independence was a major factor leading to an increased age at marriage and reduced fertility. Karunatilake (1979) states that social welfare programmes in Sri Lanka which led to higher levels of education for women and the increasing entry of women in to
the labour market, have served as a deterrent to early marriages and contributed to lower fertility. In rural Bangladesh, education has a substantial effect on age at first marriage of women; the women with secondary or higher education married at a later age. Similar type of relation was observed for men also (Kashem, 1984).

The Mysore Population Study (U.N. 1961) in India revealed that in both urban and rural areas, women who married lately got less children compared to that of who married early. In urban area, the average number of children born alive per woman was 4.4 for those who got married under 14 years of age, it was 3.5 for 14-17 years, 2.7 for 18-21 years and 2.2 for those who married 22 years and above. In rural areas, those averages were 4.3, 3.3, 2.7 and 1.2 respectively for each married category.

Driver (1963) in his study on "Differential fertility in Central India" found that the average number of children everborn as 6.5, 6.9 and 5.6 respectively for women whose ages at marriage were under 13 years, 13-17 years and 18 years and above. Agarwala (1968) stated that the Indian birth rate might be reduced to 29-30 percent by 1991-1992, if all Indian women married after the age of 19 or 20 years. Malaker (1972) is of the opinion that for 4 years of increase in age at marriage (from 15-19). The crude birth rate falls by 11 percent, the net reproduction rate by 9 percent and total fertility rate by 10
percent approximately. Estimated total births steadily declined with rise in age at marriage of 16, 18, and 20 not only in urban areas with school standard education but even among rural illiterate women.

The analysis of the above studies reveals that the use of modern technology in agriculture, techniques to use the available ground water in a perfect manner especially in the drought prone areas, and over all agricultural modernisation will improve the economic status, there by more exposure to the modern ideas which in turn increase the age at marriage. It is quite obvious that increase in the age at marriage will reduce the level of fertility. Hence this aspect was included in the present study.

INCOME AND FERTILITY BEHAVIOUR

The income fertility relation has played over the years a central role in the demographic transition literature. There is a good deal of historical evidence that income growth and economic development tend in the long run to reduce birth rates. Indeed, in the short run, income has often been shown to be positively related to the birth rates (Mueller and Short, 1983). As income rises, couples may choose to require less labour from their children, to give them more education. These changes, if they apply to incremental children as well as to those already born, increases the direct cost of children. This is a kind
of automatic increase in the price of children as income rises, and its effects have received intense theoretical scrutiny (Willis, 1974; Becker and Lewis, 1973; DeTray, 1972). Similarly Mueller and Short (1983) reveal that increase in income may lead to availability of alternative means of oldage support and insurance against risk. As household income rises, there is likely to be increased exposure to other new consumption goods (Radios, newspapers etc.) and to new pressures to consume (Freedman, 1976). The net result may be viewed as a change in tastes which reduces demand for children (Mueller and Short, 1983).

Mc Nicoll (1976) while discussing the uses and limitations of Coale and Hoover Models, state that a significant reduction in fertility about 50 percent over 30 years could be predicted by increasing per capita income perhaps from 25 to 50 percent over the same period. Paul Chan (1979) in the paper on "Rural development and fertility: A Review of some issues" describes the so-called "New Home Economics" which extends the theory of demand for durable goods in to the domain of household behaviour with respect to fertility. The theory postulated that because of an increase in income, there is a change in tastes and relative prices which influence household consumption away from children and toward other goods. Tentative evidence from Taiwan, Philippines and Thailand is presented to confirm the hypothesis.
An empirical investigation of the household behaviour model analysed by Farooqui (1984) in rural Pakistan indicates that rise in rural income of the farmers from agriculture has a depressing effect on fertility. It is observed that the zero order correlation coefficient between farm income and fertility is negative and statistically significant. Further, the association between farm income and male and female education is positive and significant. Similarly a number of studies have found negative relationship between farm income and fertility (Khuda, 1988; Samper 1988; Aramburu, 1988; Kocher, 1973; Lee and Sun, 1973). A few studies have documents that perceived economic benefits from children are negatively related to income and positively related to fertility (Mueller, 1972; Caldwell, 1978; Bulatao, 1979).

There are number of studies which shows that the income is a significant variable in explaining fertility (Ben Porath, 1973; Encarnacion, 1974; Chernichovsky, 1976; Mueller and Cohn, 1977; Anker, 1977; Schultz, 1981; Cochrane et al., 1977; Jaisasrool, 1979; Chalamwong et al., 1979; Khan and Sirageldin, 1979; Anker and Knowles, 1980). Anker (1977) studied 454 households for 11 Indian villages taking ideal family size as dependent variable and found positive income fertility relation. Anker's positive relation is consistent with the findings of Anker and Knowles (1980 in Rural Nigeria), Schultz (1981 for men's wages in rural Columbia), Mueller and Cohn (1977, Taiwan islands).
Khan and Sirageldins, (1979, Rural Pakistan), Encarnacion's (1974 for rural Philippines) and Chernichovsky's (1976) for agricultural income in India.

Studies by Mueller and Cohn (1977) and by Anker (1977) controlled such variables as educational aspirations, perceived benefits of children and consumption aspirations in an attempt to approximate a pure income effect and both the studies show a positive relation between income and fertility. Three of the household level studies, by Mueller and Cohn (1977) in Taiwan, by Anker (1977) in India and by Farooq (1979) in Nigeria, separately analyse actual and ideal number of children as dependent variables. The Taiwan and Indian studies show a positive relationship between income per adult and ideal number of children where as the Nigerian one show a negative relationship. Rosenzweig (1976) conducted another study in Philippines using expected additional children as the dependent variable which shows no significant relationship with husband's expected wage.

Mueller (1975) while discussing the direct effect of rising income on fertility observed that "the fertility of the poor is sometimes depressed unintentionally by poor health and intentionally by late marriages, long breastfeeding and other traditional means of family limitation, abortion and the like; while higher income removes
constraints on family size. Aspirations will rise when farmers experience sustained income increase over a period of time, which embraces the marginal utility of income, thus raising the opportunity cost of children. Further, she sights Taiwanese data which indicate that variables which measure consumption levels and aspirations make an appreciable contribution to the explained variance in contraceptive use and ideal family size (Mueller and Cohn, 1977).

Johnston and Kilby (1975) states that the critical mechanism leading to fertility decline is a threshold or standard of living effect. That is if income rises, fundamental change occur in rural attitudes and motivations including the appearance of new wants, new tastes for modern consumption goods which make parents more receptive to the family planning. Chalamwong et al., (1979) found a negative relation between income and fertility for eleven Thai villages. Cochrane et al., (1977) also found similar type of relationship in his study on Nepalese farms. Both of these studies were conducted by controlling the farm size.

In India too, the three rounds of the National Sample Survey (1950-60, 1960-61, 1961-62) fertility and family planning study conducted in Greater Bombay (1966), and the study of fertility differentials conducted by Registrar
General; all these studies showed an inverse relationship between income and fertility. However, Desai (1974) observes that the fertility surveys carried out so far, in the rural areas of India, have shown that there is a direct relationship between income and fertility.

Kutty (1976) in a study on rural community found higher live births in the case of the middle class relative to the lower and upper classes. A possible explanation could be that the poor because of their poverty and the rich by virtue of their great expectations in life, may have resorted to some sort of family limitation, while the middle class people lead the traditional way of life. Anand (1966) reveals that generally there is an inverse relationship between economic prosperity and fertility. Among the lower income groups, the size of the family is large, but with a rise in the income level, the size of the family decreases. The reason for this may be that among the lower income groups, the average age at marriage is comparatively lower as they do not have to spend and wait for the completion of their children's education. Moreover, for them an additional child is an asset as they start earning at a very young age. However, he concludes that the trend is irregular, showing the absence of any significant correlation between income group and fertility. The evidence taken altogether, shows that there is a strong reason to believe that income will exhibit
a negative relationship with fertility eventhough there are very few exceptional cases which exhibit a positive relationship (Simon, 1974).

Most of the studies conducted in India and abroad have reported that both personal and household incomes were positively associated with age at marriage (Audinarayana, 1985; Patnaik, 1981; Rele and Kanitkar, 1980; Good et al., 1980; Momeni, 1979; Smith, 1975; Chauhan, 1974; Saksena, 1973; Hussain, 1970; Carter and Glick, 1970; Jorapur, 1972). It is obvious that raising age at marriage may have depressing effect on fertility.

The above analysis, shows the impact of economic status on fertility behaviour. Therefore, income was considered as one of the variable in the present study.

From the above review of literature it may be observed that, very few studies have comprehensively examined the relationship between agricultural modernisation and fertility. However, their findings indicate that agricultural modernisation and its associated factors may have decisive influence on fertility. Studies on socio-economic factors also indicate the same. As such, an assessment of the review suggests the need for further empirical studies at micro and village level. Therefore, the present study was undertaken covering the following — agricultural modernisation variables, socio-economic variables, value of children, fertility and contraception.