Majority of the population in developing countries like India earn their livelihood in the rural sector. As such the interactions between agricultural development and demographic change are of obvious importance. The present study attempts to examine the relationship between different dimensions of agricultural modernisation of the rural population and their fertility behaviour, and gather information on agricultural, socio-economic and demographic variables with special reference to the benefits and costs of rearing children and family size preferences from rural households.

The importance of this work is that agricultural modernisation is now spreading in many developing countries, is rapidly raising food output and altering methods of production and economic inter-relations in the country side. The potential consequence of this agricultural modernisation for demographic developments particularly birth rates are of great importance. Sample surveys of individual farm households, providing agricultural and demographic information for the same would add greatly to our knowledge. This is essential if we want a clearer understanding of the implications of agricultural modernisation.
for the population problems. Such information has great potentiality for policy formulation and programme development in the field of fertility control and are useful to countries that wish to accelerate fertility declines. So far only negligible attempts have been made in this direction in India. In this background, the present study was undertaken with the following objectives.

OBJECTIVES

1) The general objective of the study was to collect detailed agricultural, demographic and socio-economic information from farm households with special reference to benefits and costs associated with raising a child.

2) The specific objectives of the study were:

   a) to examine the influence of agricultural modernisation on fertility behaviour across social strata of rural population,

   b) to identify the factors through which agricultural modernisation affects socio-economic and demographic changes,

   c) to study related socio-economic and demographic variables and their relationship with fertility behaviour,
d) to collect data on perceived costs and benefits of rearing children across the major social strata the population and study their relationship with differential fertility,

e) to examine how progressive advances in the standard of living and modernisation of farmers tends to lower fertility,

f) to know how the changes in agricultural modernisation influence a couple's attitude and behaviour towards aspirations for their children,

g) to analyse the attitude of couples towards contraception and its relationship with fertility behaviour,

h) to explore possible linkages between acceptance of agricultural modernisation and acceptance of family planning.

HYPOTHESES

Based on the above objectives, the following hypotheses were framed for testing:

1) Differences in the levels of agricultural modernisation significantly influences fertility differentially.
a) Agricultural modernisation and fertility behaviour are inversely related.

b) Larger the size of land holdings, lower will be the fertility.

2) Differences in benefits and costs of rearing children influence fertility behaviour differentially among different levels of agricultural modernity.

a) Higher the level of modernisation in agriculture, lower the perceived benefits of rearing children.

b) Costs of rearing children are positively associated with agricultural modernisation.

3) The value of son(s) decreases with higher agricultural modernisation.

a) The value of son(s) as a source of oldage security decreases with increasing agricultural modernity.

b) The value of son(s) as a source of income contribution to the family decreases with increasing modernity in agriculture.

4) Higher the level of general modernisation lower will be the fertility.
a) Differences in openness to change significantly influence fertility behaviour differentially between agriculturally more modern respondents (developed villages) and agriculturally less modern respondents (backward villages).

b) The respondents who are more likely to believe in hard work have less fertility than the respondents who have fatalistic attitude.

c) Status of women is positively associated with agricultural modernisation and negatively associated with fertility.

d) Agriculturally more modern respondents (developed villages) aspiration for children's education would be greater and their fertility would be lower as compared to agriculturally less modern respondents (backward villages).

5) a) Interspouse communication about family planning would be greater in agriculturally more modern respondents (developed villages) relative to agriculturally less modern respondents (backward villages).

b) Agriculturally more modern respondents (developed villages) tend to plan the timing of births of
their children and consequently have lower fertility than agriculturally less modern respondents (backward villages).

c) The adopters of contraception would be higher in the agriculturally more modern group (developed villages) as compared to the agriculturally less modern group (backward villages).

6) Higher socio-economic status effectively depresses fertility level irrespective of other factors. Among the socio-economic status variables, each one of them individually also influences fertility behaviour.

a) Higher the hierarchy of casts, lower the fertility.

b) Higher the levels of education and income, lower the fertility.

7) Demographic factors influence fertility behaviour in all social groups/classes.

a) Age at marriage and fertility are inversely related.

b) Duration of marriage is directly related to fertility behaviour.

CONCEPTUAL FRAMEWORK

Agriculture development and attendant improvement
THE IMPACT OF AGRICULTURAL MODERNISATION AND ITS ASSOCIATED FACTORS ON FERTILITY BEHAVIOUR
in the welfare of the farm households affects population growth through a number of possible linkages. As agricultural development occurs, farm incomes and other socio-economic, demographic and community characteristics undergo great changes. This transformation of the farm household socio-economic environment is postulated to have an ultimate effect on fertility decisions and adoption of contraception through changes in the perceived costs and benefits of children. In this context, the conceptual model outlined by Mueller (1975) was considered appropriate as basis for the present study. In addition, certain aspects from the conceptual model developed by Hoffman and Hoffman (1973) were also included. Combining the above two models, a simplified conceptual model was developed for the present study.

SAMPLE FRAME AND SIZE

The most suitable method for conducting a study of this type would be to take up longitudinal survey of the areas which have witnessed varying types and magnitudes of agricultural development in the past. This method however, is not operationable in the present doctoral programme, keeping in view the limited time at one's disposal. Therefore it was decided that as an alternative, two sets of villages, called the experimental and control villages may be studied on a comparative basis.
Villages which have witnessed significant agricultural development on introduction of irrigation at least 15 years back and has taken advantage of irrigation by changing the cropping pattern and by adopting mechanisation were considered as Experimental villages. Control villages were those which did not (selected from the same district) have significant irrigation or development through other means. For the purpose of present study the experimental villages were labelled as agriculturally developed villages and control villages were labelled as agriculturally backward villages.

Control villages were so selected as to share the same regional features (i.e., type of population, type of land, distance from urban centre etc.) as well as basic socio-economic structure (i.e., caste composition, primarily an agrarian society etc.) of the experimental villages but different from the latter in terms of irrigation availability and agricultural modernity. Selection of taking experimental and control villages from the same district will facilitate for comparison of agricultural modernisation levels, allowing for similar background conditions. When the background variables are the same for both sets of villages, so that the differences between the two sets with reference to agricultural modernisation and its influence if any on fertility could be brought out strikingly.
For selection of sample, Chittoor District of Andhra Pradesh was purposively selected as this district had characteristics more or less similar to other districts of Andhra Pradesh. Also this area was chosen to minimise time, cost and other resources available. Based on the information on agricultural and non-agricultural activities and socio-cultural aspects available in the latest periodical publications such as The Handbook of Statistics - Chittoor, Statistical Abstract of Andhra Pradesh, Season and Crop Reports, Statistical Appraisal and other Government publications and after consultations with relevant departmental and village officials, two mandals namely 'Nagari' from the western part of the district (as agriculturally developed mandal) and 'Palamaner' from the eastern part (as agriculturally backward mandal) were identified. In order to rank the villages in the order of adoption of modern technology, basic information was collected for all the villages in the two mandals separately. All the villages were ranked according to the magnitude of modernisation based on factors like percentage area under assured and effective irrigation, percentage area under high yielding variety per acre used, fertilizers, use of plant protection methods, use of improved farm machinery etc. Thus after ranking the villages, a set of top villages from the developed mandal and a set of bottom villages from the backward mandal were selected. The number of
MAP SHOWING CHITTOOR DISTRICT IN ANDHRA PRADESH—INDIA
MAP SHOWING PALAMANER AND NAGARI MANDALS IN CHITTOOR DISTRICT
villages from each mandal were selected till adequate number of sample population was obtained.

SAMPLING

The sampling unit for the study was a household having eligible couple with one or more living children and wife in the reproductive age group of 15-44 years, depending mainly on agriculture and having irrigated lands. All families cultivating less than 1.00 acre of land were excluded from the sample. A stratified proportionate simple random sampling technique was used.

A list of eligible couples in the sample area, satisfying the sample criteria was prepared for each of the developed and backward villages separately, based on the updated eligible couples registers available at the mandal offices. From these lists a total of 600 couples comprising of 300 couples from the backward villages and 300 from the developed villages were randomly selected by applying the weights to give fair representation to each village, the weight being the ratio of living couples in a given village to the total number of couples in the universe. The sample for each village was computed using the formula:

\[ n_i = \frac{N_i}{\sum N_i} \times n \]

where \( N_i \) = Number of eligible couples in the ith village,
\[ \sum N_i = \text{Total number of eligible couples in the universe,} \]

\[ n = \text{Sample size (600).} \]

In case of households having more than one couple satisfying the above criteria, only one couple was randomly selected, since several of the characteristics remain the same for all of them. Thus a total sample of 600 couples comprising of 300 couples from the experimental villages (developed villages) and 300 from control villages (backward villages) were selected at random for the present study.

DATA COLLECTION

Interview Schedule:

For collection of data on the various dimensions of agricultural modernisation and fertility behaviour of each one of the respondents a preliminary schedule was prepared. The preliminary schedule, very exhaustive both in coverage and length was tried out on a sample of 100 respondents, 50 from developed villages and 50 from backward villages at random. The responses given to each one of the questions in the preliminary study, were analysed for validity of content and the effectiveness of the questions in gathering the type of information intended. Based on discussion with the experts in the field and the type of answers received, the schedule for the main
study was modified where ever necessary. The final schedule was divided in to four broad sections consisting of seven parts. They included personal information, household particulars, income of the household, family size, contraception, landholding and land utilisation, modern methods of cultivation, farm labour, credit facilities, income and expenditure from agriculture, material possessions, costs and benefits of rearing children, aspirations for a male child, educational aspirations for children, exposure to media, urban contacts, social participation, status of women, openness to change and fatalism. Most of the questions were structured, a few of them were open ended and multiple choice statements. Three point and five point scales were used for measuring attitudes of the respondents.

Interview Process:

Data was collected using the schedule through personal interview method from a sample of 600 respondents. The interview technique was used as the basic method of data collection as the sample consisted of illiterates also. Both husband and wife as a unit were interviewed in the present study. Husbands were questioned about variables such as income, size of land holding and other farm operations, recent farm innovations, labour value on the farm, investment, expenditure on the farm, perceived economic
costs and benefits of rearing children. Demographic data was obtained from the wives. Both husband and wife together were asked about desired family size, their aspirations both for themselves as well as their children etc.

Analysis of Data:

The data was analysed with the help of the computer. The collected data was posted in to various contingency tables; one-way, two-way, three-way and controlled cross tabulations were carried out. Step-wise Multiple Regression analysis was also done to precisely understand the individual influence of major variables on fertility behaviour. Further different tests like means, percentages, analysis of variance, t-test were applied to study the association between different components of agricultural modernisation and fertility.

For wider meaningful generalisations in addition to cross tabulation of individual independent variables with dependent variable, several indices were developed and correlated with the dependent variable.

Measurement of Variables:

Total number of live births was the main dependent variable for the present analysis. Throughout the analysis, the type of villages (backward and developed villages) was controlled to see the differential influences of the
independent variables on total live births between these two groups. Further, desired family size was also presented to help predict the future fertility behaviour. All other variables were treated as independent variables.

Socio-economic Status Index (SES)

The combined effect of socio-economic variables such as education of the couples, type of the family, gross income, type of house, house electrification and modern durables was examined by developing an index. Based on the cumulative score of the individual on these variables, the respondents were classified into three socio-economic status groups. This procedure helped to make wider generalizations.

<table>
<thead>
<tr>
<th>Index</th>
<th>Score Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Level - I</td>
<td>(Low socio-economic status) 10-19</td>
</tr>
<tr>
<td>Level - II</td>
<td>(Middle socio-economic status) 20-28</td>
</tr>
<tr>
<td>Level - III</td>
<td>(High socio-economic status ) 29-37</td>
</tr>
</tbody>
</table>

Age of the Mother: $361.321 \div 739$

The present sample of 600 respondents did not facilitate controlling the age of the mother. When the data analysis was done controlling the age of the mother, sample deficiency was observed in most of the groups which does not allow one to draw extensive generalisations. Also,
at the time of the analysis, after examining the sample size, the distribution of the respondents, and age of the mother, it was found that a large proportion of the women were more or less in the middle age group. Due to limitation of time, a larger sample could not be undertaken. Further, the present study is peripheral in nature, the objective of which is to find out whether fertility varies significantly between backward and developed villages and identify the important process variables. So that a suitable design for in-depth studies may be evolved.

Due to the above limitations, it was not possible to control the age of the mother.

Index on ownership of modern objects (for domestic and farm use)

Ownership of modern durables and other farm assets as was considered an indicator of the modernity of the individual. According to Freedman (1976) the purchase and use of modern objects can itself be a modernising influence. In the present study an index on ownership of modern objects was constructed combining modern durables, farm assets and live stock. Each item of the selected asset was assigned a score value giving weightage appropriately. On the basis of cumulative score the respondents were divided into three groups.
Index | Score Range
---|---
Level - I (Low asset ownership) | 3 - 7
Level - II (Medium asset ownership) | 8 - 11
Level - III (High asset ownership) | 12 - 15

Index on educational aspirations

Aspiration is defined as "a desired future state of being" (Rogers, 1969). In order to study the parents educational aspiration, an index was developed. The index consisted of eight items - ideal education for sons and daughters, highest level of education willing to provide for sons and daughters, perception of financial burden for providing education for children and benefits from daughters education. The score assigned on these variables ranged from 8 to 32.

Index | Score Range
---|---
Low | 8 - 16
Medium | 17 - 24
High | 25 - 32

Index on openness to change

According to Inkles (1966) openness to change refers to the readiness for new experience and innovation and change. To measure the degree of openness to change, a few issues mainly related to agriculture (high yielding
varieties, new crops etc.) were used. The index on openness to change had a minimum score of 3 and a maximum of 15.

<table>
<thead>
<tr>
<th>Index</th>
<th>Score Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low</td>
<td>3 – 7</td>
</tr>
<tr>
<td>Medium</td>
<td>8 – 11</td>
</tr>
<tr>
<td>High</td>
<td>12 – 15</td>
</tr>
</tbody>
</table>

Fatality index

Wolman (1973) defined fatalism as a philosophical and religious belief that an individual's act are predestined and/or therefore, not subject to change by his own will, the act of another person, or changes in his environment. In order to assess the fatalistic attitude, an index was developed which covered various issues such as fate of human beings is decided by God, higher yield in agriculture depends on the will of God, the success in his life is predetermined by God, and irregular rains are due to God's displeasure. All the statements had five alternative responses. The total score ranged from 4 to 20.

<table>
<thead>
<tr>
<th>Index</th>
<th>Score Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low</td>
<td>4 – 8</td>
</tr>
<tr>
<td>Medium</td>
<td>9 – 12</td>
</tr>
<tr>
<td>Moderately high</td>
<td>13 – 16</td>
</tr>
<tr>
<td>High</td>
<td>17 – 20</td>
</tr>
</tbody>
</table>
Index on status of women

The status enjoyed by women in the family was an index of the standard of its social organization and it reflects a certain degree of modernisation. For measuring the status enjoyed by the women in the study area, an index was developed enveloping a number of dimensions as modernity (consultation on important issues, right to property, right to maintain cash allowances, political participation). The minimum score was 6 while the maximum was 15.

<table>
<thead>
<tr>
<th>Index</th>
<th>Score Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low</td>
<td>6 - 9</td>
</tr>
<tr>
<td>Medium</td>
<td>10 - 12</td>
</tr>
<tr>
<td>High</td>
<td>13 - 15</td>
</tr>
</tbody>
</table>

General modernity index

For measuring the overall modernity of the respondents a general modernity index was developed. This index covered various aspects such as educational level of the couples, type of family, possession of modern durables, exposure to mass media, urban contacts, contact with government and bank agency, and social participation. The respondents were differentiated as 'more modern', 'medium', and 'less modern' on the basis of total score secured by them on the above aspects. The minimum score was 13 and the maximum score was 48.
<table>
<thead>
<tr>
<th>Index</th>
<th>Score Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less modern</td>
<td>13 - 24</td>
</tr>
<tr>
<td>Medium</td>
<td>25 - 36</td>
</tr>
<tr>
<td>More modern</td>
<td>37 - 48</td>
</tr>
</tbody>
</table>

Value of children

The perception on costs and benefits of rearing children were broadly grouped into four categories, i.e., economic costs, non-economic costs, economic benefits and non-economic benefits.

The economic costs include perception of parents towards children as a financial burden, savings for children's future education, marriages, costs of child rearing precluding over all other purchases, pre-occupation with child rearing as a cause for not working now and higher child costs as a cause for taking up employment.

The perceived non-economic costs were like noise and disorder in the house, extra house work, general weariness to the mother, lack of time, sleep and worry to the parents and such other costs i.e., adverse effects of large number of children (4+) on the well being of a household.

Perceived economic benefits from children were the parents perception of instrumental assistances and old age security benefits from children. Instrumental assistance
refers to help on the farm, business, house work and the child's contribution to the families finances. Perception of oldage security consists of the extent to which parents expect to receive in the form of financial support and residence with their children, especially sons in their oldage.

Perceived non-economic benefits from children consisted of costs incurred by the parents as a source of joy and happiness, as a bond between husband and wife, for fulfillment of marriage, to attain adult status and social prestige, continuity of family name and tradition, producing heirs and performing of funerals.

It is difficult to measure and interpret variables based on individual perceptions. In order to enhance the explanatory power of attitudinal variables (costs and benefits), a better methodological approach using an index combining all the specific attitudinal statements was adopted. This was considered a better methodological approach as measurement was bound to improve when answers to several related questions are taken in to account. Further the analysis is much easier to carry out, when the number of variables is reduced by combining them into indices.

To measure the perceived costs and benefits of rearing children, an index was constructed based on the scaled response to attitude-statement reflecting each dimensions
of the costs and benefits of children. Each response of the attitude scale on perceived benefits and costs of rearing children was assigned a score value - 3 for 'agreement', 2 for 'uncertainty' and 1 for 'disagreement'. Scoring pattern and scaled response dimension used in the index construction for cumulative perceived economic and non-economic costs and economic and non-economic benefits of rearing children was derived from total sum of scores assigned to the respective costs and benefits of rearing children.

<table>
<thead>
<tr>
<th>Index</th>
<th>Score Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low</td>
<td>10 - 16</td>
</tr>
<tr>
<td>Medium</td>
<td>17 - 23</td>
</tr>
<tr>
<td>High</td>
<td>24 - 30</td>
</tr>
</tbody>
</table>

**Agricultural modernisation index**

In order to study the cumulative effect of all the independent agricultural modernisation variables an index was developed. This index was based on 10 important agricultural modernisation dimensions such as a) total land holding, b) source of irrigation, c) system of irrigation, d) value of the produce (rabi season), e) value of the produce (kharif season), f) usage of high yielding variety seeds, g) adoption of plant protection measures, h) total number of labourers hired, i) farm assets, and
j) live stock. Based on the composite score assigned to them, the respondents were stratified as agriculturally 'less modern', 'intermediate' and 'more modern'.

<table>
<thead>
<tr>
<th>Index</th>
<th>Score Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less modern</td>
<td>10 - 21</td>
</tr>
<tr>
<td>Intermediate</td>
<td>22 - 32</td>
</tr>
<tr>
<td>More modern</td>
<td>33 - 43</td>
</tr>
</tbody>
</table>