S81 **Child Labour, Education and Fertility**

Le travail de l'enfant, instruction et fécondité

2. Agricultural Modernisation, Child Labour and Fertility : Rural West Bengal, India

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The growth of population has been the most vexing problem in the World, particularly in the developing countries (DCs). High birth rates are generally found to be the major cause of growing population in these developing countries. Why birth rates are so high in the DCs may be viewed from various directions encompassing economic, social, cultural, institutional and other factors. Demographers and social scientists all over the World, have built up various theories and models to explain human fertility. Many social scientists are in the opinion that economic motive of parents in the developing countries plays a major role in deciding the family size, -- i.e., child labour fertility hypothesis till now, has significant relevance in the DCs. Several studies reveal that there exists a close relationship between child labour and fertility, as a result high fertility in the DCs may be due to

high demand for child labour (Lindert 1983, Vlassoff 1979, Aghajanian 1978, Nag et. al. 1978, Cain 1977, Ajami 1976, Mamadani 1972, Kasarda 1971). Now crucial question is why farmers employ child labour? Probably the answer lies either on peak season shortage of adult labour (Nadkarni 1976) or, on subsistence agricultural and economic underdevelopment (Khuda 1991) or, due to application of labour intensive technology (Shariff 1991). Following these, many researchers have confirmed through their studies that modernisation of agriculture can reduce incidence of child labour (Hutaserani and Roumasset 1991, Murthy 1991, Levy 1985, Basu et. al. 1979, Rosenzweig 1977). Contradictory evidence of the above views are also prevailed -- i.e., mechanisation and agricultural development do not necessarily reduce demand for child labour and fertility (Vemuri and Sastry 1991).

In the above stated perspective, our aim is to explain the causes of high incidence of child labour and fertility in rural India in a situation when Indian agriculture have crossed some way towards modernisation since the introduction of HYV Programme in the mid sixties. At present, Indian agriculture is rapidly undergoing changes in techniques as well as in the character of factor and product markets. To some extent the present behavioural pattern of Indian agriculture is similar to that of industry. Profit or commercial motive is emerging very fast. Capital intensity in agricultural technology is increasing. At the same time, the prevalence of child labour in agriculture is increasing (R.G. 1987, 1978, 1976, 1964, GOI 1985, 1980, Rural Labour Enquiry 1980, Agriculture Labour Enquiry Report 1960, 1955, Kulshreshtha 1978). How can one explain this phenomenon? Our thinking is as follows : In industry particularly in small scale and cottage industries, employment of child labour greatly benefits the employers. In the face of strong competition to earn at least a minimum level of profit and thus to survive in the industry, they have to cut down cost by any means. Therefore they cannot adopt modern and sophisticated technology which requires huge investment. Thus the only option open to them is to employ cheap labour for reducing cost which is often done through employing a child labour which costs more or less one third of the wage of an adult labour (George 1990). Thus the same logic may be applied to agriculture to explain child employment. Before discussing that we need to review the existing logic how agricultural modernisation reduce child employment and in turn fertility. The logical sequence can be viewed from supply of and demand for child as labour.

Supply side argument : Agricultural development raises the productivity of land and labour and thereby income and standard of living, which in turn, stimulate in higher level of schooling, raising age at marriage, lowering rate of infant and child mortality, adopting universal contraceptives and more access to health facilities. Agricultural development also leads to a rise in educational aspiration, urban contacts, new tastes for modern goods and services. This development also increases the employment opportunities and the value of adult household member's time thus rendering child care more costly. In such a situation, couples prefer quality of child rather than quantity, because the return on investment in children (for human capital formation) increases. All these finally result in the reduction of fertility and in turn a fall in the supply of children as labourers.

Demand side argument : From the technological aspect of agricultural development, many researchers hold the view that labour saving innovations (-i.e., application of machines such as tractors, threshers, etc.) induced by higher wages, encourage farm households to introduce them in lieu of hired and child labour, thus opting for the application of less time intensive techniques. Agricultural modernisation also induces evolution of new institutions for organising production and the emergence of specialised labour teams for different type of work beginning from land preparation till threshing. The increased specialisation of labour makes it profitable for farm households to employ specialised labour in all types of works and thus leads to lower demand for child labour. In other words, as specialisation (gained through experience by adoption of modern methods) and mechanisation increases, child labour becomes a poorer substitute and this leads to a lower demand for children as labourers. Thus economic utility of children is reduced which ultimately encourages farm households to prefer smaller family.

Drawback on Previous Research

A few weaknesses in the logical sequence of the above stated argument from the demand side may be pin pointed. It is true that in the capital using stage of agricultural development (when land and labour saving innovations emerge rapidly) specialisation in work or division of labour becomes a common phenomenon. But at the same time, it is true that due to division of labour, there emerge some types of work in which children are equally efficient to their adult counterparts. Again employing of children is far less expensive than employing of adult members. If this is true, it cannot be said that child labour is a poorer substitute to adult labour either in terms of saving in time or in terms of profitability of farming.

Keeping this area of research in mind, in this paper an attempt is made to find out the causes behind the huge incidence of child labour through development of an alternative conceptual framework in Indian agricultural sector especially when Indian agriculture particularly in West Bengal is passing through the capital using stage of development.

An Alternative Conceptual Framework

Agricultural development of a country, from the beginning upto the present stage of development, can be divided into three stages (Hutaserani and Roumasset 1991). In the initial stage of development, the quantity of cultivated land expands faster than population. This stage is known as land using stage of development. 'Eventually the land frontier approaches closure and agricultural employment rises faster than the rise in the amount of cultivated land'. This is the labour using stage of agricultural development. The third stage is known as capital using stage. In this stage, capital accumulation and technological changes proceed rapidly to overcome the forces of diminishing return from rising employment on given land. This induces land and labour saving innovations. The application of various types of machines, use of HYV seeds, complementary chemical fertilizer, pesticides and controlled watering, the evoluation of new institution for organising production, specially the emergence of labour markets as well as the emergence of specialised labour teams are common features in this stage.

In the capital using stage of agricultural development, as mechanisation and specialisation in agricultural operations proceed, the scope of employment of children expands. This is because division of labour in agricultural operations generates a few types of job in which children are as efficient as their adult counterparts. For example, in potato cultivation, the whole work related to putting the seed in the bed -- can be divided into various parts : i) drawing the rows in the prepared bed; ii) controlled watering of the rows by jara (-- a specially built implement); iii) putting the potato seeds in the rows leaving a certain fixed space between two seeds along a row; and iv) then covering the seeds by dusty soil. Of course, the work of putting the seeds in the row is less laborious and does not require skilled labour. In this work children are equally efficient to their adult counterparts. Similarly, the whole work related to harvesting of potato may be divided into several parts : i) opening of potato bed along the rows by plough or other implements; ii) collection of potatoes from opened bed by removing soil from the potatoes and gathering them into baskets or jute made bags; iii) loading of baskets/bags filled up with potatoes into cycle van (-- one kind of goods carrier), and iv) driving the loaded van to storehouse with a helper. Among these, the work of collecting potatoes

from opened bed is suitable to children because in this work children are no less efficient than the adult labourers. Besides this, relatively elder children are often seen to be engaged in acting as helper in driving cycle van. During watering of the potato bed in a controlled way through pump set (-- water machine) along the rows, it is necessary to watch the water level in the rows. This work is non laborious and does not require any special skill. The employment of children in these works are beneficial in terms of cost. In cultivating various vegetables like chile, cabbage, cauliflower, brinzal, tomato, etc., children are often seen to act as helper at the time of watering and picking of crops. These types of employments become possible due to division of labour and application of machines.

In paddy cultivation, the work related to threshing by thresher machine, can be divided into different parts : i) gathering the bundles of straw full of paddy on both side of the machine; ii) operating the thresher machine; iii) removing loose straw from the mouth of the machine, when it is operating; iv) final clearing of dusty straw from paddy by air; v) carrying the paddy full bags from threshing place to store house; and vi) carrying the bundles of hay to preserving place. Among these steps, children are often seen to be engaged in step number (iii) and (vi) because children are no less efficient than adults in these works.

In jute cultivation, the work related to procurement of raw fiber can be divided into several categories : i) work related to the process of separation of jute fibre from jute sticks in the work; ii) drying of jute fiber and jute sticks; iii) carrying them into the house. The second and third categories of work are often seen to be performed by children. Besides these, in weeding and in picking up of different crop, children are often seen to be engaged to a large extent. Many more such examples may be cited for various other crop cultivations.

The employment of children in such works greatly benefits the farmers in the DCs. It reduces the burden of total cost on labour and thus provides some kind of relief in the face of steep and strong competition in the crop markets, for those who cannot adopt upto date technology in full package owing to lack of sufficient capital, sufficiently large farm size as well as farm asset. In other words, it can be said that most of the farmers in the DCs are not capital rich and therefore they are unable to adopt modern technology in toto which might have prevented them from more produce at smaller cost per unit. Actually the farmers in the DCs adopt a technology which is neither a fully modern one nor a traditional one but a mixture of both. Thus, generally they combine various inputs sub optimally. In

such a situation, of course, the farmers are not in a position to produce crops at sufficiently low cost for survival in the face of steep and strong competition in the crop markets. That is why, they need to reduce cost by employing children, which is the ultimate alternative open to them.

Thus it may be argued that competition compels farmers to employ child labour in a situation when survival is the major concern on one hand and technological improvement to some extent, on the other hand, provide them the scope of child employment in agricultural operations. All these may explain the increased demand for child labour (A-1), in agricultural operations with the agricultural modernisation in the DCs and this, in turn, motivates the farm households to have a large family.

Survey and Methodology

To establish the above stated conceptual framework, a field survey was conducted in two agriculturally diversed Blocks of West Bengal, India from July to December, 1995 with a reference period between July '94 and June '95. Relevant informations have been collected from 681 rural households, residing in 36 villages in the two Blocks by a combination of direct observation and interviews through structured schedules, benefiting from the advantages of both, while at the same time, minimising the weakness of both the methods. In this paper, analysis by logit regression has been presented and in this analysis, instead of using indirect/proxy variables, direct variables (which are best fitting for explaining the relevant dependent variables) have been used. For example, capital intensive technology is here represented by capital labour cost ratio. Often the said technology is represented by the amount of chemical fertilizer application or by employment decline rate (Rosenzweigh 1977, Hutaserani and Roumasset 1991, Vemuri and Sastry 1991). In our thinking, each said measure has considered only one component of modern technology. So to cover the whole aspect of the technology, all costs incurred for capital and labour inputs have been considered here. Another example is that agricultural modernisation/development is generally represented by farm productivity and it is often measured by considering the production of one major crop such as paddy per acre (Roumasset and Smith 1981). However, such a measure does not reflect the whole picture of development. To capture whole picture, the amount of production of all crops cultivated in a year has been considered for measuring farm productivity and hence agricultural modernisation/development. Multiple cropping is another indicator of agricultural modernisation, which represent intensity of cultivation. It is often measured by the number of crop cultivated in a year. But this measure does

not represent the actual intensity of cultivation. In this paper, it is measured by considering not only the number of crop cultivated but also by considering the areas under each crop cultivation. Thus an attempt has been made to measure the relevant variables more directly and realistically.

Analysis through logit regression

Our conceptual framework has been verified through logit regression, because our interest is to observe the behaviour of a certain response (-i.e., dependent) variable in a certain intermediate range of a predictor (-- i.e., independent) variable. The logit regression analysis is helpful in observing how a predictor variable affects a response variable in between groups or sub groups of the predictor variable (Retherford and Choe 1973). Results of our analysis have been presented in two sections. In section-A, our response variables are i) demand for self field work active child labour ($SFCL^d$) [A 2]; ii) demand for child labour hired against wage ($WgCL^d$) [A 3]; iii) demand for child labour in total (TCL^d) [A 4]. But in section-B these response variables have been treated as predictor variables, and only response variable considers here is fertility (F) [A 5]. For logit regression analysis of all response variables are grouped into binary form. Farm households who employ child labour are labelled as 'demand for child labour' and who do not employ any child labour are labelled as 'no demand for child labour'. Similarly, fertility(F) is grouped into binary form as high fertility (range = more than three children) and low fertility (range = three or less children) [IIPS 1995, IIPS 1995a]. Predictor variables considered here are quantitative in nature and they are grouped into three strata --- i.e., low (gr-L), medium (gr - M) and high (gr. - H). The same logic has been followed for grouping all the predictor variables under the study (A-6).

The logit model is derived from the usual log linear model through computer SPSS Programme (Norusis/$SPSS^{-x}$, 1990, 1991). Results obtained through logit regression analysis are displayed in terms of frequencies of respondent in various tables against the different group in the predictor variable scale (A-7). Figure in any cell of a table shows the odd ratio. It is the ratio of occurrence to non occurrence of a certain event. A certain cell figure indicates the number of respondents favouring occurrence of a certain event -- i.e., a certain character of a response variable. If a certain cell figure is greater than one, it can be said that most of the respondents belonging to a certain group are in favour of occurrence of the event.

Results

Section - A : Effect on Child Employment

In this section four indicators of agricultural modernisation ---- namely farm productivity (Agd) [A-8], farm technology (AgT) [A-9], mechanisation in agricultural operations (MECH) [A-10] and multiple cropping (MCR) [A-11], have been considered as the predictor variables and the response variables are $SFCL^d$, $WgCL^d$ and TCL^d as stated earlier.

How demand for child labour of each type are affected by each predictor variable has been considered at first. Results obtained through logit analysis have been displayed in Tables 1, 2, 3 and 4 by group scores in the scale of MCR, AgT, MECH and AgD respectively. Table 1 shows that there exist positive relationship between demand for child labour of any type and multiple cropping. In other words, farmers demand more child labour as and when more and more lands come under multiple cropping. Table 2 also reveals positive relationship between demand for child labour and farm technology. That is, as the degree of capital intensity in technology rises, the number of farmer demanding child labour increases.

Table 1 : Log of ratio of probabilities of demanding and non demanding child labour by multiple cropping

Predictor Variable ➔	**Rank in multiple cropping scale**			**Statistical Measures of Association**	
Response Variable ⬇	**Low**	**Medium**	**High**	**Entropy**	**Concentration**
Demand for child labour in total (TCL^d)	0.59 (373)	2.03 (288)	4.99 (020)	0.0730	0.0986
Demand for self field work active child labour ($SFCL^d$)	0.19 (373)	0.37 (288)	0.83 (020)	0.0259	0.0283
Demand for child labour against wage ($WgCL^d$)	0.33 (373)	0.92 (288)	1.00 (020)	0.0445	0.0577

(Figure in ( ) = Group Sample Size).

A positive trend is also revealed in Table 3. It indicates that as the level of mechanisation increases, the number of farmer demanding child labour of any type increases. Closer look at the table shows that demand for child labour of any type at medium level of mechanisation is relatively high. Thus it can be said that mechanisation in agricultural operations, capital intensive technology and intensive cropping are responsible for higher demand for child labour.

Generally by farm productivity, the extent of agricultural modernisation/development is represented. How farm productivity - i.e., AgD affects child employment is shown in Table 4. It shows that as agricultural development gets momentum, demand for child labour increases. Most of the farmers belonging to Gr-L.

Do not demand child labour in total (TCL) while most of the farmers belonging to gr-M and gr-H demand TCL. In other words, among farmers belonging to gr-L, while for every 100 farmers do not demand TCL but another 54 farmers demand them. But in gr-M, 212 farmers and in gr-H 199 farmers demand TCL, while for every 100 farmers in the respective groups do not demand them. This implies that agricultural development induces higher demand for child labour and as agricultural development reaches the middle stage from lower stage, the demand for child labour

Table 2 : Log of ratio of probabilities of demanding and non demanding child labour by agricultural technology

Predictor variable ➔	**Rank in agricultural technology scale**			**Statistical Measures of Association**	
Response variable ⬇	**Low**	**Medium**	**High**	**Entropy**	**Concentration**
Demand for child labour in total (TCL^d)	0.52 (227)	1.41 (356)	1.79 (98)	0.0439	0.0600
Demand for self field work active child labour ($SFCL^d$)	0.15 (227)	0.36 (356)	0.29 (98)	0.0210	0.0208
Demand for child labour against wage ($WgCL^d$)	0.32 (227)	0.65 (356)	0.89 (98)	0.0235	0.0298

(Figure in ( ) = Group Sample Size).

Table 3 : Log of ratio of probabilities of demanding and non demanding child labour by mechanisation

Predictor variable ➔	Rank in mechanisation scale			Statistical Measures of Association	
Response variable ⬇	Low	Medium	High	Entropy	Concentration
Demand for child labour in total (TCL^d)	0.68 (409)	2.67 (144)	1.51 (128)	0.0535	0.0223
Demand for self field work active child labour ($SFCL^d$)	0.23 (409)	0.47 (144)	0.25 (128)	0.0159	0.0177
Demand for child labour against wage ($WgCL^d$)	0.37 (409)	1.00 (144)	0.83 (128)	0.0347	0.0455

(Figure in ( ) = Group Sample Size).

Table 4 : Log of ratio of probabilities of demanding and non demanding child labour by agricultural development (AgD)

Predictor variable ➔	Rank in agricultural development scale			Statistical Measures of Association	
Response variable ⬇	Low	Medium	High	Entropy	Concentration
Demand for child labour in total (TCL^d)	0.54 (341)	2.12 (172)	1.99 (168)	0.0768	0.1045
Demand for self field work active child labour ($SFCL^d$)	0.17 (341)	0.54 (172)	0.29 (168)	0.0386	0.0418
Demand for child labour against wage ($WgCL^d$)	0.31 (341)	0.71 (172	1.13 (168)	0.0513	0.0665

(Figure in ( ) = Group Sample Size).

increases sharply and as it crosses the middle stage and reaches to higher stage, demand for child labour falls relatively. This indicates that higher level of development may lead to reduced demand

for child labour. Similar trend can be observed in case of $SFCL^d$. But in case of $WgCL^d$ there is a rising trend throughout the scale. There is no declining trend even at the third stage of development. One can argue following our logic that at a certain higher level of development where the problem of survival in cultivation is no more -- i.e., when the application of modern technological package with optimum inputs combination is possible, the work of children will not be needed. At that stage of development one can expect that there will be no demand for wage child labour. Thus all these findings indicate that suboptimal agricultural modernisation may explain the child employment which establishes our conceptual framework.

Now motive behind the employment of children in agricultural operations has to be discussed. For this purpose, here a concept - wage disadvantage of child employment (WgdisA) has been developed. By this concept, disadvantage associated with child employment in financial term has been tried to measure. It is defined in terms of wage paid to a child labour relative to wage paid to an adult labour and is measured by the ratio of weighted average wage of a child labour to that of an adult labour and expressed in percentage term. The disadvantage associated with child employment rises with the rise in the value of the ratio and reaches maximum level as the value reaches 100. There is a problem of calculating this wage ratio for those farmers who do not employ child labour and who are unable to provide relevant data. Hence a proxy value relating to the ratio for the said farmers is required to include them all in the analysis and to get an overall picture.

Now one relevant issue, here, is why the said farmers do not employ child labour? One view emerges from this field survey that the child labour is too costly against adult labour to the farmers. So it is not illogical to assume that farmers who do not employ child labour -- i.e., who have no (zero) demand for child labour face maximum wage disadvantage for employing child labour. Hence it has been assumed in this paper that each farmer of said category have no (zero) demand with WgdisA equals to 100.

After developing the concept - WgdisA, the impact of WgdisA on child employment has been assessed as agricultural development gets momentum. Table 5 shows the effect of WgdisA alone. Observation along wage disadvantage scale shows that the number of farmer demanding child labour increases upto medium level from low level of wage disadvantage and afterwards it declines. In other words, at medium level of wage disadvantage the said number is highest and at high level, it is much

less compared to other two levels. These findings can be explained in the following way that upto a certain high level of wage paid to a child labour compared to that of an adult labour [A-12], farmers demand more and more child labourers paying higher and higher level of wage to them. Because upto that high level of wage, farmers can save a considerable portion of wage cost by employing child labour in place of adult labour, but after that level, farmers are in the opinion that wage cost for a child labour is more or less equal to that of an adult labour after comparing their respective productivities. Hence at high level of wage disadvantage, farmers are relatively less interested for child labour. Thus one can say that farmers employ children in cultivation mainly due to cost consideration.

These results can also be found if both variables -- WgdisA and AgD have been considered simultaneously in logit regression. The results of logit analysis as depicted in Table 6a, 6b and 6c show that overall Agd has positive and WgdisA has negative effect on demand for child labour. At middle stage as well as high stage of development and at medium level of wage disadvantage, the number of farmer hiring child labour against wage is comparatively more. But at high level of wage disadvantage and at high level of development, the said number is quite small. Diagonal observations of the tables, from left top to right bottom clearly show that the number of farmer demanding child labour increases along both scales upto medium level but the said number declines quite sharply at high level in both scales. All these confirm our views that as agricultural modernisation takes place farmers demand child labour for reducing cost of cultivation and thus to survive in cultivation as mentioned in our conceptual framework.

To complete the logical basis of our conceptual framework, the behaviour of farmers having small and insufficient asset base, regarding child employment in the face of agricultural modernisation has to assess. For this purpose, farm asset (AgA) [A-13] has been considered as a predictor variable. Result as shown in Table 6 reveals that as holding of farm asset increases the number of farmer demanding wage child labour (WgCL) and child labour in total (TCL) increases upto gr.-M and afterwards it declines. However, the number of farmer demanding family child labour (SFCL) declines throughout. It indicates that farmers having relatively large asset but not sufficient amount to adopt modern technology in full employ more children. Results also indicate that increase in asset base can reduce the demand for child labour.

Table 5 : Log of ratio of probability of demanding and non demanding child labour by wagedisadvantage of child labour

Predictor Variable ➔	Rank in wagedisadvantage scale			Statistical Measures of Association	
Response Variable ⬇	Low	Medium	High	Entropy	Concentration
Demand for child labour in total (TCL^d)	16.98 (044)	156.02 (235)	0.22 (402)	0.5598	0.6296
Demand for self field work active child labour ($SFCL^d$)	0.77 (044)	0.81 (235)	0.06 (402)	0.2153	0.2166
Demand for child labour against wage ($WgCL^d$)	1.19 (044)	2.25 (235)	0.16 (402)	0.2440	0.3067

(Figure in ( ) = Group Sample Size).

Table 5a: Log of ratio of probabilities of demanding and non demanding child labour in total by agricultural development and wage disadvantage of child labour

Predictor Variable ➔ ⬇		Rank in agricultural development scale			Statistical Measures of Association	
		Low	Medium	High	Entropy	Concentration
Rank in wage disadvantage of child labour scale	Low	15.52 (015)	24.69 (018)	27.83 (011)	0.5730	0.6391
	Medium	166.33 (066)	260.34 (085)	298.27 (084)		
	High	0.18 (260)	0.27 (069)	0.31 (073)		

(Figure in ( ) = Group Sample Size).

Table 5b : Log of ratio of probabilities of demanding and non demanding self field work active child labour by agricultural development and wage disadvantage of child labour

Predictor Variable ➔ ⬇		Rank in agricultural development scale			Statistical Measures of Association	
		Low	Medium	High	Entropy	Concentration
Rank in wagedis-advantage of child labour scale	Low	0.70 (015)	1.03 (018)	0.51 (011)	0.2274	0.2316
	Medium	0.78 (066)	1.16 (085)	0.57 (084)		
	High	0.06 (260)	0.08 (069)	0.04 (073)		

(Figure in ( ) = Group Sample Size).

Table 5c : Log of ratio of probabilities of demanding and non demanding child labour against wage by agricultural development and wage disadvantage scale

Predictor Variable ➔ ⬇		Rank in agricultural development scale			Statistical Measures of Association	
		Low	Medium	High	Entropy	Concentration
Rank in wage-disadvantage of child labour scale	Low	1.03 (015)	0.99 (018)	2.08 (011)	0.2580	0.3214
	Medium	1.83 (066)	1.76 (085)	3.70 (084)		
	High	0.13 (260)	0.13 (069)	0.27 (073)		

(Figure in ( ) = Group Sample Size).

Table 6 : Log of ratio of probabilities of demanding and non demanding child labour by agricultural asset

Predictor variable ➔	Rank in agricultural asset scale			Statistical Measures of Association	
Response variable ⬇	Low	Medium	High	Entropy	Concentration
Demand for child labour in total (TCL^d)	0.80 (272)	1.13 (200)	0.84 (209)	0.0094	0.0130
Demand for self field work active child labour ($SFCL^d$)	0.40 (272)	0.23 (200)	0.18 (209)	0.0183	0.0192
Demand for child labour against wage ($WgCL^d$)	0.25 (272)	0.70 (200)	0.25 (209)	0.0032	0.0040

(Figure in ( ) = Group Sample Size).

All these findings support our view that due to insufficiency in farm asset holding, farmers cannot adopt modern technological package in toto and as a result, it costs their production relatively high. On the other hand, application of capital intensive technology to same extent, provide better scope for child employment. In such a situation farmers employ children for the reduction of cost and thus survive in cultivation.

Section B : Effect on Fertility

After the above discussion, how increased demand for child labour affects fertility behaviour of rural households, has to be analysed in this part. For this purpose, $SFCL^d$, $WgCL^d$ and TCL^d have been considered as predictor variables and fertility (F) as response variable in this section. At first, farmers are classified into two groups in the demand for different child labour scale : 'non demanding' and 'demanding' group. Results deduced through logit analysis have been shown in Table 7. Along each demand for child labour scale, observation from non demanding group to demanding group shows that the number of farmers preferring high fertility rises. In case of $SFCL^d$, the result is much more convincing. All these findings indicate that farm household demanding child labour prefer large family size. Thus it may be concluded that by raising demand for child labour, agricultural modernisation leads to population growth.

Table 7 : Log of ratio of probabilities of preferring and non preferring high fertility by demand for child labour of different type.

Predictor variable ➔ ⬇	Rank		Statistical Measures of Association	
	Non Demanding	Demanding	Entropy	Concentration
Demand for child labour in total (TCL^d)	0.39 (333)	0.67 (348)	0.0131	0.0167
Demand for self field work active child labour ($SFCL^d$)	0.42 (535)	1.09 146)	0.0288	0.0385
Demand for child labour against wage ($WgCL^d$)	0.51 (440)	0.55 (241)	0.0002	0.0003

(Figure in ( ) = Group Sample Size).

The effect of increased demand for child labour on fertility can be seen more clearly by another way as depicted in Table 8. Here demanding group of farmer for child labour is divided further into three groups -- i.e., low, medium and high demanding group. Thus in total, four groups are there. Table shows that as demand for TCL and SFCL rises from non demanding level along respective scales, the number of farmer preferring high fertility increases and at the high group most of the farmers prefer high fertility. It also confirms our previous findings.

Table 8 : Log of ratio of probabilities of preferring and non preferring high fertility by demand for child labour of different types

Predictor variable scale ➔ ⬇	Categories of predictor variables				Statistical Measures of Association	
	Non Demanding	Demanding				
		Low	Medium	High	Entropy	Concentration
Demand for child labour in total (TCL^d)	0.62 (333)	0.76 (159)	0.77 (118)	1.07 (071)	0.0205	0.0273
Demand for self field work active child labour ($SFCL^d$)	0.65 (535)	0.88 (007)	0.89 (018)	1.08 (121)	0.0298	0.0399
Demand for child labour against wage ($WgCL^d$)	0.71 (440)	1.27 (016)	1.00 (018)	0.68 (207)	0.0089	0.0122

(Figure in ( ) = Group Sample Size).

Observation along the scale of $WgCL^d$ from low to high demand level shows that the number of farmer preferring high fertility decreases. This finding is apparently contradictory to our earlier findings. Probably the reason is that farmers having lower demand for WgCL, use more family child labour (SFCL) and hence prefer large family size. On the other hand, farmers having higher demand for WgCL, do not use SFCL to a large extent and hence they do not prefer large family size. Thus one can conclude that independence on labour market -- i.e., dependence on family child labour can explain high fertility in the face of agricultural modernisation.

No clear link among demanding group and non demanding group of farmer for wage child labour (WgCL) has been established. Reason may be that among the non demanding group for wage child labour, there may be a few farmers having no demand for child labour of any type while a few other farmers may have demand for family child labour (SFCL), but not having any demand for wage child labour.

Conclusions

Our analysis reveals that farmers who are in the middle group in farm asset scale and who are at the middle stage of agricultural modernisation, demand more child labour in cultivation and farmers having higher demand for child labour prefer large family size.

As we know that success of modern technology in raising production and in reducing cost of production largely depends on the timely application of various inputs in optimum combination. Due to insufficient farm asset holding, fragmented and small farm size, farmers in India cannot apply various inputs in required proportion timely. As a result lower produce and higher cost of production make it difficult for a farmer to earn a marginal profit for survival in cultivation in the face of strong crop market competition. In this situation, farmers have only one option left - i.e., they have to reduce cost by employing children against lower wages. All these support our view that modern technological package applied sub optimally can explain the higher demand for child labour in the capital using stage of agricultural development and this increased demand for child labour motivates rural people to have a large family. Thus sub optimal agricultural development leads to population growth in the LDCs like India.

Economically viable farmsize, adequate financial support to acquire sufficiently large volume of farm asset for adopting modern technology and controlling of fluctuation of crop prices may work in positive direction for removing the problem of child labour in agriculture and high population growth in developing countries.

Appendix

A-1 Demand for child labour : It is defined as the number of child labourers required by a farm household to operate farm activities. Here it has been assumed that requirement is an observed henomenon and it is measured by the number of labourers aged upto 14 years employed by a farm household for cultivation of one acre of land in a year.

A-2 $SFCL^d$: Children who are directly engaged in the cultivation of their own family farm are considered. It is measured as the percentage number of self field work active child labour to total labour employed per acre of land in a year.

A-3 $WgCL^d$: It is measured by percentage number of child labour employed against wage for performing different agricultural activities to total labour employed per acre of land in a year.

A-4 TCL^d : It is the proportion of child labour employed in various agricultural activities out of total labour (= adult male + adult female + child) employed in cultivation per acre per year.

$$TCL^d = SFCL^d + WgCL^d$$

A-5 F : It is measured as the average number of living children per couple in a household.

A-6 Logic is that for each predictor variable, the mean is estimated first and then the effective range of a certain predictor variable is worked out. By doubling the mean value, the upper end value is estimated. In some cases where the observed maximum value of predictor variable is lower than the estimated value, the observed upper end value is considered as estimated upper end value. In the same way lower end value is estimated. The difference between upper and lower end value provides the effective range.

A-7 The effective range of a certain predictor variable can be thought as a scale in the process of ranking a sample respondent among others.

A-8 AgD : Improvement in productivity of land reflects the extent of agricultural development. It is measured in value term in a year and is the weighted average gross income per acre of land, generated from cultivation considering all crops cultivated in a year.

A-9 AgT : It is the ratio of capital cost to labour cost incurred for cultivation in a year and is expressed in percentage term.

A-10 MECH : It is the ratio of weighted average cost incurred on tractor (mechanised plough) to weighted average cost incurred on plough (traditional bullock driven) per acre of land cultivation in a year.

A-11 MCR : It is the ratio of gross cropped area to net cropped area of a farm.

A-12 In case of assigning of different proxy value other than 60 to WgdisA for those who have no (zero) demand for child labour, it is found by multiple regression analysis that farmers who employ child labour paying 75% or more of adult labour's wage have some profit motive behind the employment of children but farmers who employ them paying 60% or less of adult's wage have cost reduction motive. This is because upto the wage limit (= 60) the relation between wgdisA and demand for child labour of any type is positive which is contrary to the profit maximisation principle.

A-13 AgA : It includes cultivatable land, farm house, farm machinery and implements and livestocks. It is also measured in value term.

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