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**Rural Development, Land,  
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State-of-the-Arts Paper**

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RURAL DEVELOPMENT, LAND AND HUMAN FERTILITY  
A STATE-OF-THE-ARTS PAPER

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## RURAL DEVELOPMENT, LAND AND HUMAN FERTILITY

### Introduction

A dominant feature of any agrarian society is man's relationship to land. The dominance of the man-land relationship holds at both the aggregate and individual household level. Nations, and regions within nations, are classified as having an extensive or intensive agriculture according to land use patterns. Individuals within rural areas are often grouped according to their relationships to the land base. Landless labor, tenant, small holder, large land owner and landlord define relationships between individuals and land. Each relationship also tells us much about the relative economic and social status of the individual being discussed.

Given the importance of the land, and of man's relationship to it, it is not surprising that this relationship receives considerable attention as a possible predictor of human behavior. Similarly, given the social and economic implications of the relationship, it is also not surprising that empirical findings are difficult to interpret and translate into policy prescriptions. This state-of-the-arts-paper or SOAP attempts to contribute to both the above.

The overall purpose of the SOAP is to review two bodies of literature. The first deals with the relationship between the man-land ratio and human fertility in rural areas of the developing nations. The second, as a step in the formulation of fertility sensitive agricultural and rural development policy, looks at the literature on rural development policies and programs and the man-land ratio. In brief, the logic of the SOAP is that, if the man-land relationship influences human fertility in rural areas, then agricultural and rural development policy may influence human fertility by altering the man-land relationship.

Land is not a homogeneous factor of production, nor are constant the institutions governing access to land for productive purposes. As a result, it is necessary to define land so as to incorporate at least three major dimensions: (1) the physical availability and quantity of land; (2) the institutions which govern access to land; and (3) the quality of the land.

In the following section (Part I) the literature regarding the influence of the man-land relationship on human fertility is examined. While the literature is neither extensive nor geographically balanced, a number of tentative conclusions or research hypotheses can be derived. It should be noted, however, that the dominance of historical studies of Western Europe and North America, and the multi-dimensions of land noted above preclude a systematic review segregated by geographic regions of the developing world.

Rural analysis is likewise a complex concept requiring partitioning for analysis. For purposes of the SOAP the rural development literature is reviewed in terms of the directness of the policy instrument to the man-land relationship. There are rural development programs which seek to directly alter the man-land relationship--specifically agrarian reform and colonization schemes. Equally important are those rural development programs which indirectly influence that relationship. In short, many rural development activities are directed at increasing agricultural output and/or the quality of life in rural areas through means other than alterations in the man-land relationship. Such programs, however, often have an indirect impact on the land-man relationship. Most of AID's rural development assistance goes to activities with indirect yet important implications for land distribution and access. Thus, for purposes of the SOAP it was necessary to consider rural development programs with either direct or indirect impacts on the man-land ratio. These are dealt with in Part II.

The final section of the SOAP (Part III) is directed at summarizing the

status of the existing knowledge base (as reflected in the literature reviewed) as the basis for policy analysis and the design of fertility sensitive agricultural and rural development programs. Specifically, tentative hypotheses are advanced regarding the impacts of rural development programs operating both directly and indirectly through the man-land relationship to influence human fertility in rural areas. Second, a number of unanswered questions which appear critical for further policy analysis are outlined. Third, a number of methodological limitations of the existing literature are discussed. That discussion, in combination with the discussion of unanswered questions, provides guidelines for the design of further analysis directed at obtaining a clearer understanding of the impact of rural development programs on human fertility in rural areas of the developing nations. The SOAP appendix contains an annotated bibliography of the relevant literature.

PART I  
LAND AND HUMAN FERTILITY

This section examines the relationship between land and human fertility. The fundamental question underlying the review of literature presented here is: Does human fertility respond to variation in the man-land relationship? As noted above, land is a complex concept requiring partition for analysis. For purposes of this review, land is considered to have three dimensions: (1) quantity or physical availability; (2) institutions which govern access to land; and (3) quality of the resource. In the sections below the literature regarding the relationship between each of the dimensions of land and human fertility are examined.

The body of research explicitly dealing with the relationship between land and fertility is relatively small, and disproportionately composed of studies dealing with the historical situation in the more developed countries. This literature is important and may yield insights applicable to the LDCs, but interpreting these results in terms of conditions facing many developing areas presents difficulties (Tietelbaum, 1975). Because of the problems involved in generalizing the historical pattern of the MDCs to currently developing nations, the literature reviewed includes a number of studies in LDCs not primarily concerned with the land-fertility relationship but which included land as one of a number of variables. The relationship between land and fertility in these studies often had to be inferred from other data presented. Nonetheless, work of this type was deemed important because of its applicability to the situation in LDCs. Because the literature is limited and devoted extensively to historical studies of the developed world, no attempt is made to present a discussion by geographic region.

Availability of Land

The dimension of land that has received perhaps the greatest attention is the availability of land. A number of scholars have proffered the notion that

shortages of land were related to a later age at marriage and lower marital fertility in Western Europe (Demeny, 1968; Goldscheider, 1971; Braun, 1978). Conversely, the availability of land either through expansion into unsettled territory or fragmentation of holdings has been suggested as contributing to earlier and more frequent marriages and subsequent higher fertility (Connell, 1965; Leet, 1975, McGinnis, 1975).

While effects of the availability of land may seem obvious, the complexity of the relationship should be noted (Beaver, 1975; Merrick, 1978). The physical availability or supply of land does not operate away from the access to this resource by ordinary people. If land is concentrated in the hands of a wealthy elite, its effects on nuptiality and marital fertility may be markedly different than in areas with a more equal distribution. Similarly, various systems of inheritance, possibility of land, and land tenure arrangements have different implications for fertility.

Issues involving access to land are reserved for a later section of the paper. The availability of land and its effects on fertility have been subjected to comparatively more research. Thus, while some research has focused on the relationship of access to land and fertility, this relation is much less clear than the evidence on the influence of the availability of land.

Two research foci dominate the literature on land availability and fertility. One examines the relationship between the availability of farm sites, that is, the number of individual units or parcels of land available for settlement. A second issue is the relationship between farm size and fertility among landholders--either owners or tenants. The availability of farm sites is usually postulated to influence fertility through delaying marriages and reducing the number who eventually marry, and secondarily, through a reduction in marital fertility. Variation in farm size is thought to affect fertility primarily by altering the demand for child labor. Some argue that

increasing farm size should be negatively related to fertility due to the downward shift in the marginal revenue of children, associated with increased complexity of tasks performed, usually of nonfamily labor, and laborsaving machinery (deJanvry, 1976). This argument, however, would appear to rest on a changing technological base, increases in farm credit, markets, etc. Without such concomitant changes, the postulated relationship between farm size and fertility is less clear and, in fact, empirical findings tend to reveal the opposite (Driver, 1963; Kleinman, 1973; Rosnezweig and Evenson, 1977). Interestingly, a neglected issue is the extent to which farm size influences fertility through changes in income. Since land is the primary determinant of rural income in LDCs, the possibility exists that the association between size of holdings and fertility reflects differences in income. Historical studies in the U.S. and Canada have tended to focus on land availability, while work in LDCs has been more concerned with farm size.

#### Supply of Land

The influence of land availability on fertility has been extensively documented in a series of historical studies in the United States and Canada stimulated by the early work of Yasuba (1962). Evidence is also available from a number of additional regions and countries, although the central position given to land availability in historical U.S. studies is not replicated elsewhere.

The rationale for examining these relationships in the U.S. as a means of understanding what might happen in the LDCs rests on several bases. First, fertility in the U.S. in the period immediately before, and in the decades just after the turn of the nineteenth century, was considerably higher than that found in Europe. Further, the decline of fertility in the U.S. appears to have begun at least by the beginning of the nineteenth century--some fifty to seventy-five years before similar declines in most of Europe, with the

exception of France and Ireland. Moreover, the decline was initiated well before major changes in urbanization and industrialization occurred.

Yasuba (1962) examined the relationship between fertility and land availability among states and territories in the U.S. during the period 1800 to 1860. He reasoned that as settlement within an area proceeded, land became increasingly difficult and costlier to acquire and the distance to new areas where land was available became greater. Thus fertility may have been lowered directly in response to a decreased demand for children, or indirectly through raising the age at marriage and decreasing the proportion married (1962:159). An analysis of states and territories for the decades between 1800 and 1860 revealed a positive relationship between land availability and fertility. Although the strength of the relationship declined somewhat during the last half of the period, fertility appeared to be significantly related to the availability of land. Moreover, Yasuba argued that land availability appeared to be more important to the decline in fertility than either urbanization or industrialization, particularly in the early decades of the nineteenth century.

Subsequent work in the U.S. and Canada has focused primarily on developing more precise measures of Yasuba's notion of land availability or agricultural opportunities, and extending his work to smaller units of analysis such as counties, townships, and households. Forster and Tucker (1972) replicated Yasuba's analysis with a different measure of land availability and lagged the fertility measure by 10 years. These changes did not alter the finding that easily available land was related to higher fertility. Additional research supporting this thesis has been reported by Easterlin (1971, 1975, 1976a, 1976b), Leet (1975, 1976, 1977), Vinovskis (1976a, 1976b), McGinnis (1977), Rosenzweig (1977), and Lindert (1978). One study failing to support Yasuba's thesis in the U.S. was Modell's (1971) analysis of fertility on the

Indiana frontier. And, he did not have a direct measure of land availability, but used population density as a surrogate. Easterlin (1975) attributed Modell's negative findings to his concentration on frontier counties to the exclusion of older, more settled areas.

Similar findings on land availability and fertility have been reported for Hungary (Demeny, 1968), Poland (Stys, 1957), France (Goldscheider, 1971), and England (Lorimer, 1954). Lorimer (1954) notes that in England limitations on land through inheritance within the nuclear family operated chiefly through delayed marriage or avoidance of marriage. In fact, "the old English word for hired man indicate(d) the close association between propertyless status and nonmarried status: the hired laborer was the 'anilepiman'--the 'only' or single man" (Lorimer, 1954:166).

Stys (1957) examined nuptiality and fertility among two generations of Polish peasants. He noted that "rich" peasant girls--those whose fathers controlled larger landholdings--married sooner, began childbearing sooner, and bore children more frequently and to a later age than "poorer" peasant girls. The exception to this was among landless peasants, who had slightly higher fertility than those who held less than one hectare. Stys attributed this finding to the practice of large landholders recruiting labor from the landless rural population, thus permitting some landless peasants to marry early and have children. Mazur (1975) also reported a positive relationship between landholding and fertility using 1970 Polish census data, although he argues for reverse causality, i.e., size of family as a determinant of farm size--a point to which we shall return later.

The negative impact of land scarcity on fertility was cited by Demeny (1968) as a major factor in the decline of fertility among Hungarian peasants around the turn of this century. Perhaps more importantly, Demeny (1968:518-519) states:

it can be positively shown that the decline of fertility originated in and among the peasantry [and] the lack of appreciable urban-industrial development in the area suggests that the single most important factor regularly invoked in explanations of transition is inapplicable here.

Similar arguments have been advanced to explain the early decline of French fertility (Goldscheider, 1971).

Recent work on land availability in the LDCs is consistent with the historical work in Europe and North America. Beaver (1975), for example, examines land availability and fertility among 24 Latin American countries for each five-year period between 1950 and 1969. Although his primary interest was in testing a model of demographic transition, he included as a measure of land availability the natural logarithm of the total land area per 1,000 rural population, weighted by the percent of the population that was rural. The weighting was employed to reflect the assumed decreasing importance of land to fertility with increasing urbanization. He found the effects of land availability on fertility were "strikingly confirmatory" and suggested that this variable be included in transition models (Beaver, 1975:130).

Beaver's finding of the declining importance of land with increasing urbanization is consistent with the historical work of Yasuba (1962) and Vinovskis (1976b) in the United States. Further, Beaver suggested that (1975:133):

a country with plentiful land should have high initial natality followed by rapid decline if and when development and urbanization take hold especially if economic conditions are poor during the period.

This would seem to imply that the initial effect of a land reform that makes land more available to broader segments of the population would be to raise fertility. This effect was suggested earlier by Chaplin (1971:227):

in land-scarce areas in Latin America, where there are many small holders or sharecroppers rather than wage peons, fertility has been reduced by late or foregone marriages. In the event of a land reform program, whether it took the form of division of large estates

or the colonization of new areas, it is possible that...the age-at-marriage could drop, the percent married rate rise, and thus considerable increase in fertility result.

These interpretations are consistent with the data, but until more longitudinal work examining these processes over time is completed, caution should be exercised in generalizing from cross-sectional and cross-national analyses.

Sub-national analyses on this topic in Latin America include the work of Hicks (1974) on rural and urban areas in Mexico during 1950 to 1970, and Merrick's (1978) recent analysis of 155 micro-regions in six Brazilian states in 1970. This work addresses the issue as to whether findings on land-fertility connections at the national level apply for smaller units of analysis. Hicks used the arable land per worker in agriculture as a proxy for the profitability of children or wealth in 31 rural areas in Mexico. Regardless of the interpretation given to the land/worker ratio, greater ratios of land per worker were associated with higher fertility in rural areas, and Hicks (1975:414) takes this to mean that "fertility is likely to decline in response to a decrease in arable land per agricultural worker."

Merrick also found land scarcity to be an important factor influencing fertility in his analysis of Brazilian data. However, he goes on to examine the mediating effects of literacy and child survival differentials on the land-fertility relationship. In addition, he suggests that the policy on access to land is perhaps more critical to a fertility decline than the actual scarcity or abundance of land.

### Size of Holding

Size of holding has been related to fertility in a number of LDCs. The theoretical rationale for the connection is not given in most studies, but usually involves a changing value and demand for child labor although the hypothesized direction of the effect is unclear (de Janvry, 1976; Rosenzweig

and Evenson, 1977). Rosenzweig and Evenson (1977:1075) found that land size, which they assumed to be complementary with child labor, had a positive and significant effect on fertility within a sample of 189 districts in India in 1961.

This finding was supported by individual-level data collected by Driver (1963) in Central India. Driver found greater numbers of children ever born to the largest landowners, and lower numbers of children in the landless and small landholding class. Similarly, Kleinman (1973) used an index of cultivated acreage per household dependent upon cultivation as a measure of landholdings for 315 districts of India in 1961. He found the cultivated acreage per household to be significantly and positively related to fertility in a 15-variable regression model.

Studies of limited scope in Bangladesh report conflicting findings on the relationship of size of holdings to fertility. Latif and Chowdhury (1977) report a significant positive relation between size of landholdings and fertility in a northern Bangladesh village, but no relationship in a southern village. Stoeckel and Choudhury (1969) found landholdings to be negatively related to actual fertility in the Comilla-Kotwali thana of Bangladesh, yet a later report found lower desired family size and greater approval and knowledge of contraception among those of low landholding status (Stoeckel and Choudhury, 1973). Resolution of these different findings must necessarily await further empirical work.

Three studies which included data on landholdings and fertility in rural Iran show more consistent results (Ajami, 1969, 1976; Aghajanian, 1978). Aghajanian views the family as the basic unit of production in rural communities, and family labor and land as the major inputs to the productive process. Thus, with size of landholdings as a fixed factor in production, larger holdings were expected to relate to larger family sizes. The empirical

results supported this expectation. Size of holdings was strongly and positively related to fertility among a sample of 505 rural households in southern Iran. Ajami (1976) found a similar pattern among rural households in six villages north of Shiraz.

The contribution of child labor to the positive relation between size of holdings and family size received indirect support from the 1975 Survey of Fertility in Thailand (SOFT). As a part of a larger fertility survey, respondents were asked about the need for children's help in a family enterprise. Replies were categorized into perceived advantages of a large family or disadvantages of a small family. The percentage of respondents mentioning children's help as an advantage of a large family increased directly with the size of holdings, ranging from a low of four percent among families with no farm or business, to 50 percent of those with holdings of 21 rai or more (Arnold and Pejaranonda, 1977:8). Farmers with employees were slightly less likely to mention a large family as an advantage, indicating that where non-family labor can be utilized, one incentive to higher fertility may be reduced. Whether such perceived advantages were related to actual higher fertility among farmers with larger holdings is not examined in the report.

An earlier study by Hawley (1955) of fertility in Central Luzon, the Philippines, did find significant differences in fertility by size of holding. Fertility was positively associated with size of farm regardless of tenure status. This relationship held with both age and education of wife controlled. Additional evidence of a positive relationship between size of holdings and fertility includes McGinnis (1977), Stys (1957) and Mazur (1975).

In summary, research on land availability, either in terms of the supply of farm sites or size of holdings among farm operators, is extremely diverse. Studies include a variety of disciplinary perspectives, theoretical orienta-

tions, and methodological procedures. Similarly, units of analysis vary from nations to individual households. Given this diversity to the study of land availability-fertility relationships, the relative consistency of the findings is somewhat surprising.

Regardless of the measure of land availability utilized, greater land availability was related to higher fertility. This relationship was found for areas as diverse as the historical U.S. and Canada, Latin America, India, the Philippines, Iran, Poland, and many countries of Western Europe during the eighteenth and nineteenth century.

Farm size was also related to fertility. Farm households with larger holdings tended to have higher fertility although exceptions were found (Easterlin, 1975, 1976a; Rosenzweig, 1977). There appears to be disagreement as to the expected direction of this effect, but the majority of studies reviewed here showed a positive influence of farm size on fertility. Part of the disagreement over the postulated direction of the effect seems to center around assumptions concerning the level of technology employed and the use of nonfamily labor.

If a low level of technology is employed, and labor is primarily drawn from the family--as was often the case in the studies reviewed--farm size will be positively related to fertility. A shifting technological base coupled with greater use of hired labor would lead to a different prediction (de Janvry, 1976). Rosenzweig's (1977a) work in the U.S. and India (Rosenzweig and Evenson, 1977b) illustrates this point. In India, farm size was positively related to fertility, but in the U.S. during the period 1939-1969, it was negatively related.

#### Institutional Patterns Affecting Access to Land

Research on the relation of access to land and fertility is even more

diverse and less systematic than that on land availability. Yet access to land is practically and theoretically important in understanding connections between the economic and social organization of rural societies and their fertility patterns. One of the problems plaguing research in this area is the complexity of the issues involved and their interrelationship which obscures the analysis of any one factor. A limited discussion of these interrelationships is included in a later section of the paper. For purposes of identifying some of the major issues involved in access to land and their relation to fertility, the interrelations of the various dimensions of access are largely ignored.

One dimension of access to land is obviously its distribution. Problems of inequality of landholdings occupy a central place in the development literature, and have been related to a variety of problems in the agricultural sector. The relationship between inequality of holdings and fertility has received much less attention. While distributional issues are undeniably important, the influence of other institutional arrangements that govern access to land may be equally influential in their effects on fertility. These factors include aspects of land tenure, inheritance systems, partibility or impartibility of land, preferential testamentary rights, formal and informal rules regarding land use privileges, as well as numerous other practices which affect landholdings directly or indirectly. The emphasis of this section is on a limited set of these possibilities. Much of this literature is historical in nature and does not lend itself to quantitative estimates of relationships.

#### Inheritance Systems

Berkner and Mendels (1978) note that rules of inheritance have been used repeatedly to explain variations in nuptiality and fertility among Western European peasant populations. The partibility of land has been used to ex-

plain widespread marriage, progressive subdivision of farms, and the impoverishment of peasants whose lack of capital prevented investments required by modern agriculture. Conversely, they note, the adoption of the Civil Code in France which restricted testamentary freedom and encouraged equal inheritance, has been suggested as contributing to the decline in French fertility (Goldscheider, 1971). "Thus partible inheritance has been used to explain both population growth and population decline, depending on whether it is supposed to affect nuptiality or marital fertility." (Berkner and Mendels, 1978:210).

These authors go on to argue against the "simple" effect of inheritance systems on land fragmentation, nuptiality, and fertility. They state (Berkner and Mendels, 1978:212):

It may appear that the degree of equality of inheritance rights is directly related to the extent to which landed property becomes fragmented at every succession, but equal inheritance does not necessarily lead to equal division of the land.

The extent to which inheritance patterns lead to fragmentation is dependent upon a series of other factors. Economic opportunity in the nonfarm sector, land tenure arrangements, and the presence and nature of markets for farm products, all may interact to influence the actual manner in which land would be passed to heirs. If most of the land is operated on a cash rent or tenancy basis, then it may not be largely affected by the rules of inheritance. Thus the equality or inequality of land ownership, rules of inheritance, and partibility, would all interact to govern the transmission of land. Similarly, the impact of partible inheritance may be greatly modified by the presence of economic opportunities in the nonfarm sector. It is exceedingly difficult, given the complex interrelations among these factors, to speak of the effects of an inheritance system on fertility.

Braun (1978) examined a related issue in the growth of cottage industry in the canton of Zurich during the seventeenth and eighteenth century. He argues from an historical analysis that most of the early population involved in the cottage industry in Zurich were persons forced off the land by, among other factors, testamentary obstacles to establishing new households in agricultural communities. Many lowland agrarian communities had strict rules governing access to common property and community membership. These rules were used to require fees from newcomers who then had to gain access to a house with its vested rights of common property. In some areas, rules required that "no new house could be built either in the village settlement or outside, unless an old one was torn down" (Braun, 1978:299).

These regulations not only limited growth from outside the community, but from inside as well. Moreover, such regulations were inimical to the fledgling cottage industry which developed first in highland communities where agricultural land was generally poorer and community organization was not nearly as rigid. Areas of cottage industry were characterized by earlier and more frequent marriages, higher fertility, and subsequent greater population growth. Thus the initial effect of industrialization was to raise fertility (Jaffe and Azumi, 1960).

The work of historians such as Braun, Berkner, and Mendels has done much to increase our understanding of inheritance systems and their effects on family structure and fertility. The application of cliometric techniques to this area would appear to hold promise. Likewise, greater effort is warranted on the part of population students from various disciplinary perspectives on the connections between inheritance systems and fertility.

#### Land Tenure

The relationship of tenure patterns to fertility is no less complex than those involving inheritance systems. In fact, the direction of influence is

often not even apparent. Does a given land tenure system lead to higher fertility? Or does high fertility lead to a different system of distributing landholdings?

In a review of the economic value of children in Asia and Africa, Ware (1978) finds the system of land ownership to be an important determinant of the material value of children. This is thought to be particularly true of areas with no individual ownership of land. While this system was more widespread in precolonial tropical Africa than at present, vestiges remain. The relationship of family size and land use under such conditions may be direct. "Access to the use of communally-owned land was determined, often annually, on the basis of the size of the available labor force, which effectively meant family size" (Ware, 1978:6). Thus increasing family size heightened a family's claim to communally-owned land.

Although land is not communally controlled, Mamdani (1972) argues that a similar process operates among Indian farmers in the Punjab. High fertility (many sons) represents a means of acquiring land, holding on to land, and reaping maximum benefits through the elimination of hired labor. This process operates among those with the smallest holdings as well as among those with more sizable holdings. Small holders need many children in order to acquire land either through rent or purchase. Villagers feel that landowners will not rent land to a man without many sons to work it. Thus many sons are needed in order to acquire access to more land. Conversely, large holders need family labor to retain land and minimize non-family labor production costs.

Fragmentation of land takes a back seat to higher production costs. As one Jat farmer related to Mamdani (1972:78):

I am worried about the fragmentation of my land. But even before I worry about my land being divided up tomorrow, I must worry about making a living on it today. Just look around: no one without sons or brothers to help him farms his land. He rents it out to others with large families. Without sons, there is no living off the land.

The more sons you have, the less labor you need to hire and the more savings you can have.

This reasoning occurs in a tenure system in which a farmer rents land for a year, pays all production costs, then shares the crop with the owner on a fifty-fifty basis.

Tenurial arrangements are singled out by Connell (1965) as an important factor in nuptial and fertility patterns in Ireland before the potato famine, and particularly during the period 1780 to 1845. During this period, each peasant's holding could be divided into two segments: one producing rent crops, and the other the family's subsistence.

By the 1780's dependence on the potato had reduced the subsistence segment to a tiny area; the swing towards arable farming, because of the greater productivity of cornland than pasture, was likewise reducing the rent-producing area. Greatly reduced holdings became physically possible; the landlords wanted them because they were a prerequisite of advanced rents. For this reason the peasants, long needing them to provide for their children, were now able to have them. Subdivision of holdings allowed earlier marriage which led to the necessary increase in the labour force.

The evidence then from areas as diverse as tropical Africa, the Indian Punjab, and eighteenth century Ireland, reveals a connection between land tenure systems and fertility. A greater specification of how these systems affect marriage and childbearing should be an important item on the research agenda in LDCs.

Partial evidence on land tenure and fertility is available from three studies in the Philippines. Hawley (1955) analyzed fertility data for Central Luzon gathered incidentally as part of the Philippine Rural Survey of 1952. He shows data on fertility by age of women and tenure of husbands. Farm tenants had higher fertility in all groups but one, women 35-44 years of age. Moreover, the fertility of farm owners was more similar to farm laborers than tenants. Whether these findings would have been obtained in a multivariate analysis with additional controls is not known.

Two later studies in the Philippines report somewhat different results (Schutjer et al., 1978; Hiday, 1978). Schutjer et al. examined tenancy as one variable in a path model of fertility among 68 barrios in Cavite Province of Luzon. They report that the direct effect of land ownership on fertility was positive. However, the indirect effects, operating through female education and village-level traditionalism, were negative. More importantly, the indirect effects were relatively more powerful than the direct effect, revealing an overall negative relationship between land ownership and fertility. Hiday (1978) also reports a negative relationship between land tenure and fertility among farm families in two Mindanao communities. Owners and owner/tenants had the lowest fertility, and Hiday suggests that the negative impact of land tenure operated indirectly through age at marriage.

Land tenure and fertility is an almost overlooked variable in historical studies of fertility in the U.S. and Canada. This may have been due to the relatively easy availability of land with the result that tenant status was often only a step in the process of becoming an owner. Easterlin (1976b) implies that tenancy may have been related negatively to fertility in the U.S., but rejects this as an explanation of fertility differences between "old" and "new" areas. One analysis of county-level fertility in the U.S. in 1960 found a negative relationship between the proportion of farmers and farm managers in the rural-farm population and rural-farm fertility (Hathaway et al., 1968). This finding was attributed to the negligible value of children's labor. This same analysis found a positive relationship between the proportion of farm laborers and foremen in the rural-farm population and fertility, a finding thought to reflect the lower socioeconomic status of farm laborers. While these two groups do not precisely reflect differences between the owners and tenants, part of this differential is undoubtedly caught up in this analysis. Unfortunately, the data did not permit a more

detailed breakdown so that the separate effects, if any, of land tenure and child labor could be estimated.

One of the more recent and stimulating analyses of land tenure with direct implications for fertility is the work of DeVany and Sanchez (1977; n.d.) in Mexico. They examine the effects of the ejido system of land distribution on the fertility of women in 48 rural municipalities in the state of Mexico, which surrounds Mexico City. The study does not deal with "collective" ejidos in which cropland is farmed collectively, but focuses on ejido land held by individual families.

DeVany and Sanchez (1977) argue that the ejido system of granting rights to land on a usufruct basis creates a series of pronatalist incentives which raise fertility. These incentives included (DeVany and Sanchez, 1977:743-744):

(1) Production. Children are productive at an early age, their direct labor services may augment those of the parents; to increase the total product attainable from the family's small plot.

(2) Intertemporal Allocation. The uncertainty of rights in the land, including the lack of salability, limits the degree to which the family will depend upon investment in its farm or in crops and other assets tied to land as a means of distributing present production forward to the future. [Further] uncertainty will make lenders reluctant to lend to ejidatarios, since the loan cannot be secured by the land.

(3) Land Retention. Given the political nature of the ejido, a large family is an asset as a political base. The more members a family has who are of voting age or of an age to acquire more land, the larger is the coalition of families and allies who would block discretionary enforcement of the law that may deprive the family of its rights to its land or other resources of the ejido.

They found that a high ratio of ejidatarios per woman within a municipality was related to a greater incidence of marriage and higher fertility. Regardless of the measure of the ejidatario effect used, all were positively related to fertility. DeVany and Sanchez (1977:761) suggest reducing the uncertainty associated with ejido land, restoration of the land market,

and initiating steps to improve markets which would reduce the ejidatarios' incentive to high fertility. Replication of this model on individual peasant households would seem to be an important next step in extending this line of research. Whether additional empirical support is sound for this model is perhaps not as important as the underlying principle it illustrates: rural and agricultural development policies should not be made without an awareness of their demographic implications.

### Land Distribution

Land is obviously only one resource which may be differentially distributed among the population in rural areas. Income, literacy and health levels are three additional issues usually included in discussions of equity (Rich, 1972; Kocher, 1973). Because land is usually the primary determinant of rural income, it may play a central role in the distribution of other goods and services. Although there is a disagreement as to whether the distribution of factors such as land or income exert an effect on fertility independent of their actual or relative level (cf. Repetto, 1977; Birdsall, 1977), some studies have examined the effects of land distribution on fertility.

Rosenzweig and Evenson (1977) used the Kuznets index of landholdings inequality as a measure of the distribution of landholding in 189 Indian districts in 1961. They included measures of land size as well as inequality of holdings in a model relating fertility, schooling, and the economic contributions of children in rural India. As noted earlier, they reported a positive effect of land size on fertility. The Kuznets ratio was significantly and negatively related to fertility, suggesting that "reducing the inequality of holdings would increase family size in India" (1977:1075). Further, "a land redistribution program aimed at promoting equality, un-

accompanied by other changes would both increase fertility and depress school enrollment rates" (1977:1078). This interpretation is similar to that made by Chaplin (1971) for Peru. Kleinman (1973) also found an index of land concentration to be negatively related to fertility in India.

The effects of land distribution should be examined in other settings where the level of technology, land quality, and labor requirements are different than those found in India. Beaver (1975) and Merrick (1978) both discuss the importance of land distribution, but were unable to secure adequate measures of this variable in their research. Merrick is one of the few researchers to discuss the possible importance of land quality to fertility. Qualitative features of land such as soil fertility, climate, suitability of terrain for agricultural purposes, and competing uses of land for various agricultural or nonagricultural purposes have been largely ignored (Merrick, 1978:323).

### Land Quality

The extant research provides little information on the relationship between land quality and fertility. For example, the influence on fertility of the demand for labor (family or nonfamily) on lands of varying quality is unknown. Similarly, the effects of the level of technology in mediating the demand for labor on different quality lands needs careful attention.

A few of the historical measures in the U.S. included measures of farm value (Vinovskis, 1976b; Leet, 1976, 1977), but this more than likely measured the demand for farmland for nonagricultural purposes more than it reflected differences in land quality. The one study we found which attempted to directly measure "quality" of land in terms of its productivity, reported quality to have a positive effect in one regression and no effect in another (Rosenzweig and Evenson, 1977). The available evidence affords no basis

for generalization about the relationship between land quality and fertility.

Institutional patterns affecting access to land encompass a broad range of factors. Three sets of such factors were singled out for attention in this discussion: inheritance systems, land tenure patterns, and land distribution and quality. Complex interrelationships were noted within each of these categories as well as between them.

Inheritance systems were found to have an effect on nuptiality and fertility. Such effects were found to be extremely complex and tied to other aspects of social organization such as the land tenure system and economic opportunity in the nonfarm sector. Thus while characteristics of inheritance systems may well influence marital and reproductive behavior, it is not possible to delineate uniform effects of such systems. Instead, a more appropriate strategy would be to examine such systems within a given society, or at a minimum, within a given level of technology and/or stage of development.

Studies of land tenure and fertility revealed significant connections between tenure patterns and fertility. Historical work in Western Europe, as well as in the Philippines and Mexico, found land tenure to exert both positive and negative effects on fertility. The ejido system of land tenure in Mexico was found to encourage marriage and childrearing, while recent work in the Philippines indicated that land ownership was negatively related to fertility through its influence on other factors such as age at marriage and education. The paucity of work on this topic limited generalization. Nonetheless, the existing work is sufficiently suggestive, and the area is so central to development policy, that further research is clearly indicated.

Considerations of land distribution and quality are central to issues of equity in developing areas. The dominance of the man/land ratio and its importance to rural economic organization are well known. The effects of

the differential distribution and quality of land on fertility are not as clear. To the extent that the concentration of land within a privileged elite blocks improvement in the income, education, and particularly, the health and nutritional status of large segments of the rural population, higher fertility may result (Rich, 1972; Kocher, 1973). However, it is worth noting that the two studies reviewed which included measures of land concentration found that greater inequality of landholdings was associated with lower fertility (Kleinman, 1973; Rosenzweig and Evenson, 1977).

The resolution of this apparent inconsistency will depend upon further empirical work, although two sets of factors may operate to confound the relationship. Improvements in the distribution of land--as well as other material conditions of life--can affect fertility by operating through two channels of influence: a biological effect and a behavioral effect. If the absolute level of living of a population is low, changes in the distribution of land and other resources may influence fertility primarily by improving the biological conditions of life and thus initially increase fertility. However, among populations living at or above this level, a more equitable distribution of resources may indeed depress fertility by altering the number of children desired through changes in the value of child labor, the price of children, and so forth. Research on the effects of land distribution (or other resources) on fertility should distinguish between these two alternatives.

#### Nonfarm Influences on the Land--Fertility Relationship in Rural Areas

The focus of the relationship between land and fertility in rural areas is appropriate given the importance of land to almost all aspects of rural life. It would be an oversimplification, however, to examine this relationship in isolation from the larger society in which it occurs. The nature

and extent of interaction between the farm and nonfarm sectors may substantially alter aspects of the land-fertility connection.

Several possible effects of the nonfarm sector have been briefly identified in preceding sections. Two major areas of influence originating in this sector merit special consideration: (1) economic opportunities in the nonfarm sector and (2) the level of technology. While other examples could undoubtedly be included, these two should serve to illustrate the type of considerations that must be taken into account.

Opportunities in the nonfarm sector refer to conditions which may alter customary relationships between the various dimensions of land availability, access to land and fertility. The existing level of urbanization and industrialization may lessen pressure on the availability of land by providing off-farm employment opportunities. This may not only operate to increase migration off the land, but also by effectively increasing the number of persons who can be supported by a given quantity of land, since some members would work outside and bring in cash income. Berkner and Mendels (1978:216) state:

As a rural society becomes increasingly industrialized subsistence is no longer in direct proportion to the size of the landed property. The formation of new households will depend primarily on the conditions of labor demand in the rural industry, not on the inheritance system.

Economic opportunity not only affects household formation and fertility through alterations in the demand for labor, but through other effects as well. The creation and growth of markets may "induce changes in agricultural specialization and thus create or remove constraints on holding size" (Berkner and Mendels, 1978:215). The Irish system of land tenure, coupled with widespread adoption of the potato, permitted the subdivision of landholdings and the support of households on increasingly smaller parcels of land (Connell, 1965). Improvements in technology, of course, often play a significant part

in these processes.

Perhaps technology's most apparent effect is to increase the effective use of land without additional area being brought under cultivation, although the latter obviously occurs. More subtle effects of technology include influencing access to land by sharply reducing the impact of partible inheritance on land fragmentation. Berkner and Mendels (1978:218) again provide an illustrative case for eighteenth century Flanders:

land became very fragmented except for the region of the Polders where subdivision of the large commercial farms was curtailed. What determined this difference was not the inheritance system, which was strictly egalitarian in both cases. [Instead] The heavy soils of the Polders required large plows pulled by several horses which were expensive and practical only on large holdings. The sandy light soils of the interior of Flanders, however, were well suited for labor-intensive agriculture on small family farms.

These conditions, coupled with involvement of peasants in the interior in home linen production, led to fragmentation except in the Polders. In addition, population growth in the interior was twice that in the Polders. In this example, characteristics of land quality (type of soil) combined with technology requirements to greatly alter the impact of the inheritance system.

Many of the rice growing regions of the world currently may exhibit such relationships. The technical and labor requirements of high yielding varieties, variations in irrigation and cropping patterns, availability and cost of nonfamily labor and alternative technologies, may all influence fertility in LDCs. At present the state of knowledge about these relationships is rudimentary. A fruitful strategy for research might be to combine the farm management study techniques of the agricultural economist, with the fertility research perspective of the demographer.

## Tentative Conclusions and Research Hypothesis

The present state of knowledge about land-fertility relationships greatly restricts the ability to generalize. Nonetheless, some tentative generalizations may be advanced as a guide to further research and policy analysis. Such statements will of course require modification when applied to specific country situations.

1. Evidence on the effect of land availability on fertility is the clearest of any of the dimensions we reviewed. Two dimensions of land availability were identified: the abundance or scarcity of land for farm sites and the size of holdings among farm operators. The presence of available land was almost uniformly related to higher fertility. This effect seemed to operate through both encouraging marriage and the formation of new households, and by higher marital fertility.

Although the amount of research was considerably smaller, findings on the size of holdings and fertility also revealed a positive relationship. The possibility of reciprocal influence between family size and size of holding should be noted (Mamdani, 1972; Mazur, 1975; Ware, 1978). Larger holdings not only permit larger families, but in some instances, larger families appear to be a means of acquiring land and increasing the size of existing holdings.

2. Institutional patterns affecting access to land were more complex in their relationship to family formation and fertility. Inheritance systems, land tenure arrangements, and land distribution and quality were identifiable dimensions of access to land with import for fertility. Inheritance systems were shown to have complex effects on fertility primarily through regulation of family formation. No simple or uniform predictions of the effects of these practices can be stated in isolation from the larger society in which

they are found. A number of considerations in the nonfarm sector as well as the farm sector impinge upon inheritance systems.

3. Land tenure arrangements were shown to exert both positive and negative effects on fertility. The Mexican ejido system suggested that pronatalist incentives could accompany a land redistribution policy, and that the conditions under which land is held may well influence fertility. Recent work in the Philippines has found land ownership to be negatively associated with fertility through its influence on other factors such as female education and age at marriage.

4. The paucity of research on land distribution or quality and fertility prevents even the most tentative of generalizations. Theoretical reasons abound for expecting these factors to influence fertility, but empirical work has virtually ignored these dimensions of land. General discussions of equity in development argue that greater quality in the distribution of rural resources should be related to lower fertility (Kocher, 1973). The partial evidence on land reviewed here indicated the opposite; higher concentrations of land ownership were related to lower fertility. It was noted, however, that this effect might include biological as well as behavioral components, and research should be designated to separate these effects.

## PART II RURAL DEVELOPMENT AND LAND

### Introduction

The review of the literature on the relationship between land and fertility presented in the previous section of this report summarizes the mechanisms by which the various dimensions of land (availability, access, quality) are related to the reproductive patterns of rural populations. But if the associations stipulated are to have policy relevance, these observations must be placed within the broader context of the agrarian sector itself. More specifically, if we assume that land is related to fertility we must necessarily deal with the prior question: "What factors influence the availability, quantity, quality, and access to land in developing countries?"

This question implies a formidable problem quite the opposite of that which characterized the review of the literature on the land-fertility relationship. In Part I the analysis was hindered by the marked paucity of research dealing specifically with the influence of land on reproductive behavior. But the moment that the focus is upon factors which determine patterns of land tenure, the literature is vast and complex.

In order to present a general overview of the relevant issues, Part II is divided into two sub-sections. The first deals with policies that are designed to directly influence the availability and access of land, and includes a discussion of agrarian reform and colonization schemes. The second half of Part II focuses on the various mechanisms that indirectly affect land tenure arrangements. In this case, attention is given to technological change, a topic that serves to organize the discussion of a broad range of interrelated factors that influence the availability, quality, and access to land in LDCs.

In order to keep the review of the literature on rural development and land to a reasonable length, Part II is structured around two principles. In the first place, the material reviewed was generally published since 1970. This decision is based on the observation that the literature on rural development and its effect on land tends to be cumulative in nature. Secondly, we approach the topic in terms of policies designed to directly influence the man-land relationship and those which indirectly, both intentionally and unintentionally, affect the relationship as the literature on rural development and land divides consistently into these two categories.

#### Direct Intervention: Agrarian Reform

There are two rural development programs which have direct consequences for the land-man relationship in agriculture. They are agrarian reform and supervised colonization or settlement.

Agrarian reform in the 1960s was viewed with much sympathy as a tool of agricultural development. Such is not the case today. Even so it is appropriate to review the recent literature on agrarian reform for several reasons. First, it is the most direct way to affect the man-land relationship, especially in those countries of the developing world where there is little if any unoccupied land suitable for colonization. There are many definitions of agrarian reform but essential to all is the redistribution of land and access to land. Also agrarian reform may be distinguished from simple land reform by the fact that it couples the redistribution of land with other activities designed to consolidate the new tenure system and increase agricultural production. Such a conceptualization leads to the following more or less typical definition:

Agrarian reform implies a set of public policies designed to: (1) re-adjust land tenure arrangements so as to limit land holdings through expropriation or consolidation of land holdings or both--actual ownership of the land may rest with individuals or the public sector; and

(2) improve or maximise land utilization, facilitating the application of efficient farming methods to increase agricultural production (Laporte, et al., 1971:474-5)

This combination of land redistribution and related rural development suggests several justifications for evaluating agrarian reform as a policy option. Throughout the recent literature one finds the assertion that agricultural development cannot succeed, either in alleviating rural poverty or in increasing agricultural productivity without the redistribution of land and water. Nor can land redistribution succeed without comprehensive assistance for the small farmer beneficiary (Adams, 1970; FAO, 1979; Griffin, 1974b, 1976). Consequently successful rural development and agrarian reform remain inexorably linked in the eyes of many experts, especially where alleviating rural poverty is an objective. Certainly, as the rest of this section will demonstrate, there is little evidence in the literature that anything other than agrarian reform would make land available to the landless, tenants, and smallholders. In short, if there is to be any significant fertility-related revision of the man-land relationship in terms of a more equitable distribution of land it is only likely to come from agrarian reform.

A third justification for reviewing the literature on agrarian reform is that there are a number of countries in the developing world which have and are currently undergoing significant reform programs. From studies of China, India, Iran, Sri Lanka, the Philippines, Korea and Taiwan in Asia (FAO, Special Committee on Agrarian Reform, 1970; Ahmed, 1975); Algeria, Egypt, Syria, Ethiopia, and Tanzania (Lotchie, 1976) in Africa; and Mexico, Bolivia, Cuba, Chile, Colombia, Peru, and Venezuela in Latin America (Dorner, 1971), we can derive impressions about changes in the man-land relationship which are likely to occur (see FAO, 1979, for recent worldwide review of agrarian reform). It is these countries that provide the documented changes in the man-land ratio from which revised fertility behavior might be derived.

These and other considerations suggest that agrarian reform remains a viable policy option in the rural development strategy of governments interested in improving the welfare of its rural population and increasing agricultural production. It may be the only means of effectively altering the distribution of land in favor of the rural poor. Following its exhaustive Spring Review of Land Reform, AID reaches these following conclusions (Carter, 1970:3-4):

1. Land tenure is a significant dimension of a country's overall development, and should be considered in preparing future Country Field Submissions or agricultural sector analysis.
2. Support of land reform need not be withheld for fear of adverse economic results of land distribution.
3. Where a dominant indigenous political will for land reform is lacking, A.I.D. should take careful cognizance of what probable effects its assistance program may have on either prolonging or ameliorating existing inequities in land ownership and use. Particularly, A.I.D. should try to discourage (a) mechanization which is clearly labor substitution and (b) further consolidation of land holdings in LDC's where factor costs are so different from those in the U.S. and therefore "efficiency" in U.S. terms is not applicable. (The problem of microforms is a special case.) A.I.D. should try to assure that assistance reaches the small farmer.
4. A.I.D. should not support a "land reform" scheme which is basically just window-dressing.
5. When a dominant indigenous political will for land reform exists, external assistance may be constructively applied on many aspects of the reform. USAID's should let it be known that they are ready to consider proposals if asked and orally encourage government and private land reform measures where appropriate.

Three types of programs are included under the rubric of agrarian reform. The first and most important is the redistribution of private holdings, taking land from those who have a lot and giving it to those rural dwellers who have little or no land. The second government program properly classified as agrarian reform concerns the regulation of tenancy, a dimension of particular importance in the densely populated Far East (FAO, 1979:99). Here the thrust is on securing the access to land for those who already farm it. Finally,

there are a few examples of programs designed to consolidate excessively small holdings into more viable, enlarged plots. A related development strategy in this section is the directed settlement of unoccupied land. In order to tie this section to the previous one on land and fertility, the literature on agrarian reform and settlement policies is approached from the perspective of how these activities affect the availability and quantity of land, access to land, and the quality of land.

#### Literature on Agrarian Reform

Although there has been a great deal published on agrarian reform, much of it by individual authors, there are two institutional repositories of information on the subject, the Food and Agriculture Organization (FAO) and the Land Tenure Center (LTC) at the University of Wisconsin, Madison. Since they have compiled much of the information dealing with agrarian reform, the reader will find frequent references to the work and publications of both organizations. FAO is a specialized United Nations agency which generates knowledge about agrarian reform through staff and country reports; LTC is a university-based research center which has received considerable A.I.D. support since its inception in the early 1960's. In evaluating the publications of these two institutions, it is important to keep in mind that both are identified as institutional proponents of agrarian reform. Many of the individuals writing in favor of reform have at one time or another been associated with FAO and/or LTC. In effect they serve to support the small coterie of agrarian reform specialists who both do research and writing on the topic and advise Third World governments and foreign assistance programs. This holds true for most of the authors listed in the bibliography.

FAO's activities and publications cover the gamut of agricultural issues throughout the world, only some of which are directly related to agrarian reform. Its most comprehensive and influential publication on agrarian reform

is a series of reports on Progress in Land Reform (FAO, 1954, 1956, 1966, 1970, 1976). First published in 1954, the series' most recent addition is the sixth report published in 1976. Recent Progress reports have been jointly prepared by FAO and the International Labour Organization, whose interest in agrarian reform relates directly to employment questions. The Progress reports contain the analysis of replies by government to a United Nations questionnaire on agrarian reform. In this sense, it applies expert analysis to government supplied data which then forms the basis for generalizations about the progress of agrarian reform throughout the world. The Sixth Progress Report supplements the traditional regional analyses with a discussion of the "Major Dimensions of Development Problems and their Close Relationship with Agrarian Structures." In addition to this authoritative, comprehensive, and periodic up-date of agrarian reform in the world, FAO also produces regional and country studies (for example, FAO/Regional Office for Africa, 1971, and FAO/Special Committee on Agrarian Reform, 1970). This SOAP relies heavily on an FAO background document (Review and Analysis of Agrarian Reform and Rural Development in the Developing Countries since the Mid-Sixties) prepared for the World Conference on Agrarian Reform and Rural Development to be held in Rome, 12-20 July 1979 (FAO, 1979). This conference will undoubtedly generate a great deal of additional literature on agrarian reform.

LTC sponsors several types of publications, including a Newsletter, Available Publications List, Library Accessions List, LTC Reports, Research Papers, Training and Methods Series (including bibliographies), and LTC Monographs. In 1977 it hosted the International Seminar on Agrarian Reform and Institutional Innovation in the Reconstruction and Development of Agriculture at which an impressive array of experts from around the world presented papers.

### Issues in Agrarian Reform

The literature on agrarian reform discusses a number of issues which must be understood if we are to be able to link changes in land to human fertility behavior. The most important controversy surrounding agrarian reform concerns its impact on development, more specifically, its impact on economic growth and the distribution of wealth. By definition, agrarian reform speaks directly to the question of the distribution of rural wealth since it is designed to take land from those who have a lot and give it to those who have none or little. The redistribution of land, the principal agricultural resource in predominantly rural societies, is assumed to have far-reaching social and political as well as economic consequences (Huntington, 1968; Tuma, 1965). Flores (1970) stresses that, "Land reform is a redistributive measure which transfers power, property, income and status from one group in the community to another." This emphasis on the broad ripple effect of agrarian reform suggests that the fertility implications of any significant change in the man-land relationship may lie, in part, in its secondary effects. For example, the reallocation of power and influence triggered by land redistribution may lead to a shift in public spending and public services in favor of the poorer, higher fertility rural population.

The impact of agrarian reform on agricultural production, productivity, growth and overall economic development has generated much controversy but little empirical research. Opponents of reform (Rogers, 1966) maintain that the overall economic effects of reform are negative because it is disruptive and destructive of efficiency and economies of scale. While admitting the short term dislocation of reform, often due to increased peasant consumption (e.g., Roland Clark, "Agrarian Reform: Bolivia" in Dorner, 1971:129-164), the proponents argue that reform favors rather than retards growth by break-

ing up large, inefficient land holdings and creating smaller, more efficient farms where the owners have strong interest in maximizing production, productivity, and income. While we do know that output per hectare tends to be higher on small farms than on larger, the economic results of reform have yet to be proven beyond question. Furthermore, increased output is often attained by applying additional labor to the land. This may encourage higher fertility.

Within many landless laboring and small-holder environments, an increase in the family labour force in the form of more children may seem quite logical. Paradoxically, new land allocations too large for the family labor supply might well have a similar effect (FAO, 1979:88).

In spite of the incomplete, often contradictory findings on the economic effects of agrarian reform, there seems to be a consensus re-emerging in the literature which holds that agrarian reform may be necessary for meaningful agricultural and overall economic development. This conclusion is derived from the failure to achieve equity and sustained growth through urban, industrial based development strategies, and more from the failure of recent rural development programs for the small farmers and landless. In the words of one recent study, "If the goal of development is growth with equity--nationally and internationally--then it can be seen clearly that the struggle is not being won, and that the main burden of present trends falls on the rural poor" (FAO, 1979:1). The fundamental obstacle to effective rural development in most instances remains, in the view of many experts, the land tenure system.

To declare that agrarian reform is desirable, even necessary, is one thing, but to indicate how it is to be achieved is another. There is a large body of literature, mainly authored by political scientists, on the political conditions and strategies conducive to agrarian reform (Huntington, 1968; Laporte et al., 1971; Lehman, 1974, 1978; McCoy, 1977; Tai, 1972, 1974;

and Tuma, 1965). This literature, although somewhat peripheral to the central focus of this SOAP, consistently emphasizes the point that agrarian reform is not easy to accomplish. Thus we are left with the enigma of a public policy which is essential for development, yet very difficult to enact and implement in practice. This may be true of any attempt to alter the land tenure system.

Beyond the two large issues of agrarian reform and development and the politics of agrarian reform, there are several other issues significant in shaping the impact of changes in land on fertility behavior. Once a reform is decided upon in principle, the reformers face the question of which land should be redistributed. The easiest to take is vacant, underutilized, foreign owned, and excessively large plots, in that order. But many experts point out that to be effective the reform must begin with productive high quality land (Flores, 1970:33). Likewise they stress that a successful reform rests on expropriating on the basis of excess size alone rather than some productivity or efficiency criterion (FAO, 1979). Related to the issue of which land should be taken is the question of compensation to the former owner. It is now almost universally agreed that the only viable strategy is to provide a small payment in cash with the balance paid in long-term bonds. Aside from the fact that no government could afford to conduct a serious reform program on the basis of cash compensation, there is the necessity of accompanying land distribution with a wide variety of expensive services for the beneficiaries (Adams, 1970; Flores, 1970:33). A serious, effective reform requires the

reorganization of credits to meet the multiple needs of peasant producers as well as improvements in marketing facilities and creation of new delivery systems which favor low income services. Moreover, integration at the village level of various services, such as extension, delivery of inputs, credit and marketing, are important. (FAO, 1979:48).

In short, government services to agriculture must be reoriented to meet the

the needs of an expanded group of small holders. Various authors point out the obstacles to doing this.

Few developing countries have enough agricultural land to go around. Therefore, one of the dilemmas facing any reform effort is deciding who gets what land to be distributed and how much do they get. Those peasants working the land as tenants, sharecroppers, or resident laborers tend to be favored by the reform. The selective nature of redistribution often creates a kulak or smallholder elite among the peasantry. In order to avoid stratifying the peasantry and to spread the benefits of reform as broadly as possible, even to include the growing mass of landless rural dwellers, some reform programs such as those in Chile under Frei and Allende and in Peru under Velasco (McCoy, 1977), have experimented with various kinds of collectives or cooperatives designed to integrate the entire population in a given area into the reform process. In practice, however, most reforms affect a relatively small minority of the peasantry. This of course restricts their fertility relevant potential. The major exceptions to the generalization are the reforms of the socialist countries.

In carrying out an agrarian reform, there are three other questions which directly concern the role of the peasants. First, should the beneficiaries of the reform pay for the land? Most reforms, and most experts concur, require payment, in long-term installments. The justification for this requirement being both philosophical (those who receive land should pay for it) and pragmatic (the need to generate revenue for the reform). Conversely, peasants prove reluctant to pay for land on the grounds that it is rightly theirs to begin with, and because it is economically difficult for them to do so as well as politically difficult to make them pay--even if they can afford it. Secondly, what should be the role of peasants and peasant organizations in the reform process? Despite the commitment to

peasant participation in every phase from drawing up the law to managing reform projects, there is usually strong bureaucratic resistance to it, and the ideal is seldom realized. Finally, what is to be the nature of the post-reform tenure systems? Generally speaking, government leaders and agricultural bureaucrats, as well as international experts, favor some form of cooperative, communitarian, collective, or even state ownership in order to maintain the efficiency and productivity of large plots. Such arrangements facilitate greater government control and the integration of broad segments of the peasantry. Peasants, on the other hand, prefer to own and farm their own plots. Reforms which try to mix the two often lead to intensive cultivation of individual plots at the expense of the collective land. Regulations governing family participation and inheritance are important components of the post-reform tenure arrangement.

Thus far we have discussed the major issues found in the agrarian reform literature as though they applied uniformly throughout the developing countries. In fact there are important regional and sub-regional differences clearly identified in the literature which are relevant to any consideration of the impact of changes of man-land relationship on human fertility. In the following subsection these differences are briefly outlined. Special attention is also given to the results of reform.

### Latin America

Rural Latin America has been and remains dominated by an extraordinary degree of concentration through the latifundia-minifundia pattern. The persistence of this concentration has served as the focal point for the demand for agrarian reform. The first Progress in Land Reform report (UN/FAC/ILO, 1954:283) remarked that, "In Latin America, although the defects in the agrarian structure of several reporting countries admittedly prevents social and agricultural progress, the need for reform policies in the in-

terest of the landless, small and medium farmers is only now beginning to gain recognition." In the early 1960's the Comité Interamericano de Desarrollo Agrícola conducted a series of intensive country studies which thoroughly documented the latifundia-minifundia pattern (Barraclough and Domike, 1966). With the findings of these studies, the financial and moral support of the Alliance for Progress, and the fear of other Cuban-type revolutions, most Latin American countries adopted some kind of agrarian reform legislation. But little has come of this legislation. The Sixth Report on Progress in Land Reform (UN/FAO/ILO, 1976:84) summarized the results as follows:

These laws were, with few exceptions, enacted with the purpose of complying with the agreement reached at Punta del Este in 1960 but not with the serious intention of carrying out the reforms called for. Therefore much of the legislation has either been inadequate or it has not been implemented.

The major exceptions to the paper reforms of the last decade have been those in Chile and Peru where significant amounts of land were redistributed in efforts to break the hold of the traditional latifundia and create innovative new tenure systems. Despite the progress made in these two countries, and it was considerable (McCoy, 1977), recent events in both, which have tended to roll back the advances made, vividly illustrate the political vulnerability and economic complexity of agrarian reform. Even the more radical reforms of Mexico, Bolivia, and Cuba have not solved the fundamental dilemma of reconciling growth and equity needs. Throughout the rest of Latin America man-land relationships remain fundamentally unaltered, except as affected by the seemingly unalterable march of commercialization. Thus the most recent FAO study (1979:3) concludes that

Despite the achievements of agrarian reform in some countries as late as 1973, 85 million people constituting 70 percent of the farm population in Latin America lived at the subsistence level. Of this enormous mass, 45 million were agricultural wage earners and 45 million were small farmers.

### Near East

The special characteristics which mark agriculture in the Middle East and affect the path of agrarian reform are aridity, customary laws conducive to fragmentation, and nomadism (FAO, 1979:23). In spite of these conditions and the variety in political regimes, this is a region which has experienced significant reform. Turkey in 1945 and Egypt in 1952 were two of the earliest countries in the post-war era to redistribute land on a significant scale. They were joined by Iraq, Syria, Iran, and Algeria in the 1960's. With varying degrees, the governments of the region have experimented with various post-reform tenure arrangements designed to prevent the emergence of a landed peasant elite and landless rural mass. Because of its long history the Egyptian experience underlines the long-run problems associated with reform in the Middle East: (1) while eliminating the landlord class the Egyptian reform consolidated the power of the middle-income and rich peasants; (2) after declining, the concentration of landholdings actually increased; (3) the proportion of landless likewise declined and then increased; and (4) both the poverty and the concentration of income worsened in the latter stages of reform (FAO, 1979:22-25).

### Africa

Africa is both the poorest region and the region to most recently emerge from colonial domination. The first UN Progress in Land Reform Report (1954) based on reports submitted by the colonial governments, stressed that the problem in Africa was not land tenure but productivity. Independence and the drive to modernize led to the discovery of serious structural problems in agriculture. A 1971 report by the FAO Regional Office for Africa warned that agrarian reform was a politically explosive issue that would be forced on the agenda by technological change.

The agrarian structures of Africa reflected a dualism inherited from colonialism (UN/FAI/ILO, 1976:28). On the one hand there was a fairly efficient export-oriented commercial agricultural sector with a few owners employing wage labor. On the other, most of the population depended on subsistence level plots where access to land was protected by customary tenure practices. The customary tenure institutions could not stand up to the onslaught of modernization, commercialization, and reorientation toward export (FAO, 1979:26). Thus Africa found itself faced with a configuration of problems common to other developing areas: a widening gap between rich and poor rural dwellers and growing landlessness and rural unemployment (FAO, 1974:16). The challenge became "to define rights to land and determine the relative emphasis on individual as against communal rights in changing technological and socio-economic conditions" (King, 1977:329). Although it is too early to evaluate these results, divergent approaches have been made toward resolving the contradiction between the concentration fostered by commercialization and the equity of customary tenure arrangements. Directed settlement of unoccupied land is an alternative for many countries where man-land ratios are low (Uma Lele, 1975), while the Tanzanian version of agrarian socialism is touted as an appropriate indigenous form (Lotchie, 1976).

### Asia

Asia is the largest and most diverse developing region. Despite its size and heterogeneity two characteristics are shared by the countries of Asia which influence agrarian reform--a high man-land ratio and hierarchical patterns of land tenure. Ethnic pluralism also complicates attempts to revise man-land relationships.

Because of population pressures on the land and the prevalence of tenancy, early reform measures adopted by most countries in the region sought

to control rents and secure tenant access to the land. Failure of these regulatory steps subsequently led to legislation limiting farm size (UN/FAO/ILO, 1975:52). Under most reform programs little land was redistributed, and the agrarian reform generally gave way to developmental assistance designed to increase production. The Green Revolution, concentrated in Asia, tended to produce a concentration in land ownership. There were countries, however, which did experience rather profound transformation of their agrarian sectors. The Chinese case is perhaps the most dramatic, not only in Asia, but the entire world. Japan, Taiwan, and Korea, have also undergone significant reform, all under the tutelage of the United States. A longitudinal analysis of the Korea case pointed to the following factors for its success: (1) the reform was radical and covered a large area and significant proportion of the peasantry; (2) it gave ownership to former tenants and did not disturb operational units; (3) it resulted in a substantial redistribution of assets and income; (4) centered enforcement of a 3-hectare limit and the prohibition of the emergence of tenancy prevents the growth of new inequalities; (5) off-farm employment opportunities help hold down landlessness; and (6) foreign assistance in the production of agriculture in the initial stages were generous (FAO, 1979:31). In the face of the impressive success of a few countries, the continuing problem in Asia is how to effectively utilize the region's most abundant resource, labor.

### Conclusions

On the basis of this overview of the recent literature on agrarian reform, it is possible to suggest several tentative conclusions about its impact on the man-land relationship in developing countries. In evaluating the results of agrarian reform for the specific dimensions of the relationship of interest here, it is necessary to keep in mind a fundamental contradiction. On the one hand, there is a consensus that neither agricultural

development nor the amelioration of rural poverty is possible in most countries without significant changes in the land tenure systems. Yet, on the other hand, such change is clearly very difficult to accomplish, and there are relatively few real world examples of successful agrarian reform programs. Those that do exist offer support for the proposition that reformed land systems are more equitable and more productive, but the literature is not very helpful as a guide for achieving reform.

Agrarian reform and settlement and colonization schemes, even recognizing the gap between theory and practice, rarely make land more widely available. The nature of access to and limited amount of land raise questions about the relevance of the hypothesized relationships between land availability and fertility derived from historical studies of frontier situations. The man-land ratio in reformed areas is invariably high, although many reforms attempt to mediate this by establishing collective ownership. In theory the quality of land distributed under a reform should be high; in practice it appears that the best land remains unexpropriated. These generalizations suggest that the real significance of reform lies, first, in how it governs access to land, and, second, in the fact that it is generally unable to affect a large percentage of the rural population who increasingly join the ranks of the landless.

#### Direct Intervention: Colonization and Settlement

Colonization programs have been viewed both as a supplement and as an alternative to agrarian reform. In many countries it is difficult to separate colonization schemes from reform policies. The term is most frequently used to mean the settlement or occupation of virgin or empty lands, often in the public domain. Two distinctions are relevant to this definition: "Directed" colonization refers to the process whereby colonists are selected

through a formal procedure to be settled in a colony that has some degree of outside control and supervision. Such control and supervision varies with the nature of the colony and the origins of the colonists. It could come from national governments, local governments, international agencies, or religious institutions. Directed colonization programs usually provide varying amounts of technical, educational and medical assistance as well as land clearance and housing for the colonists. This is in contrast to "spontaneous" colonization whereby colonists have or are given access to an undeveloped area which they colonize without control, supervision, or selection. A detailed discussion of the various connotations of the term "colonization" can be found in Smith (1969). With few country exceptions, the land area cleared and developed in government assisted settlement is far less than that through purely spontaneous settlement. A recent estimate of the present annual rate of settlement is 4 million to 5 million hectares of which 75 percent is spontaneous and 25 percent organized land development (cited in World Bank, 1978:15).

The extension of the agricultural frontier via direct colonization programs is largely a phenomenon of the post-World War II period. These policies continue today, but with much less enthusiasm than in earlier years. In tropical Africa areas are being brought under cultivation spontaneously without promotion or interference by governments. Studies of both directed and spontaneous settlement schemes in Africa are presented in de Wilde (1967). These analyses conclude that "in social and economic terms" the record is discouraging, as serious implementation problems plagued all types of projects ranging from smallholder schemes to large state farms. The record in Latin America is no better (See Nelson, 1973). In Indonesia the government-sponsored "transmigration" programs designed to settle the "outer islands"

have had a negligible effect on rural poverty in Java. A conspicuous exception in Asia seems to be the Sri Lanka program where nearly 500,000 rural families were settled in lands short distances from the original residences. Although unit costs were high, a large proportion of the rural poor have benefited (Esman, 1978:35).

The opening up of new territories, whether through directed or spontaneous colonization programs, is a development strategy that is distinct from agrarian reform. Settlement schemes have often been adopted to siphon off excess population in areas of high demographic density, and to divert pressure for land redistribution. Colonization in this sense is a politically expedient "solution" to over-crowding that avoids confrontation with entrenched rural elites who control large tracts of land (Domike, 1970).

The literature on settlement and colonization programs suggests several conclusions. The first, and perhaps most obvious, is that colonization is not a viable option for many countries. In many areas where density is very high, as in most of South Asia, Java, and Egypt, the arable land frontier has been used up. Expansion of the land base would require heavy investments, or moving to lands which are now incapable of supporting agriculture or even pasturage under known technologies.

A second generalization that seems warranted is that colonization efforts rarely attain the goals they set out to accomplish. While any development program formulated and carried out within a political context invariably contains references to targets that are essentially rhetorical, colonization schemes frequently suffer from a more fundamental misconception. Faced with the contradiction between the pressure for agrarian reform on the one hand, and the resistance of landed elites on the other, the assumption emerges that new territories can be opened up for small farmers thereby

creating an agrarian structure that is different from the already settled regions. Implied in such a strategy is the idea that the unexploited frontier represents opportunities for "social engineering" that are not complicated by vested interests and the power conflicts that characterize the urban or traditional rural areas. This reasoning assumes that the process of colonization can be carried out in a way that is unaffected by the socio-economic and political environment. This premise is untenable as colonists, particularly those engaged in spontaneous efforts, are subject to the same forces that are at work in the society of which they are a part (See Wood and Schmink (1979) for an analysis of the Brazilian colonization efforts in the Amazon). In many areas both small farmers and wealthy investors are attracted to newly opened lands that end up in the hands of large corporations who employ migrants as laborers rather than settlers, with few benefits accruing to the rural poor as a result.

Finally, the expense involved is among the most limiting factors. If land were to be provided for half of the low-income families in Latin American rural areas over the next decade between 600 and 700 thousand families would have to be involved each year. If 90 percent of them were included in colonization type programs the unit cost would probably be in the range of \$2,000 to \$2,500, thus requiring an annual total outlay of between \$1,360 and \$1,550 million. Similarly the World Bank (1978) estimates that the project costs per direct beneficiary family, in terms of U.S. dollars, range from less than \$1,000 in small-farm rainfed settlements in Rwanda's Mutara and Ethiopia's Lower Adiabo projects to more than \$20,000 in Malaysia's Keratong project.

In terms of the objectives of this review, the most significant conclusion derived from the literature is that colonization and settlement schemes, because of the cost factor and the other dimensions cited above, have generally

failed to absorb significant proportions of the rural population relative to the number of potential beneficiaries.

### Indirect Intervention: Technological Change

The review of the literature on agrarian reform presented in the previous section suggests that attempts to alter the distribution and access to land in most developing countries through direct policy intervention have had relatively minimal impact. At the same time, it is evident that the agricultural sector in many areas is undergoing significant change as a result of a variety of indirect factors.

In principle it is clear that forms of land tenure, as well as their geographical distribution and prevalence among different types of producers, are the final outcome of an exceedingly complex set of interactions. The original patterns of land distribution and land tenure, as well as the factors that contribute to changing these patterns, are conditioned by the socioeconomic and political context, historical events, factor prices, inflation, government policies, the international market, down to such variables as topography, soil quality, and the availability of water. The particular constellation of factors that have contributed to change in the agricultural sector, and the consequences of the trends that are taking place, vary in Latin America, Asia, and Africa. Even within national boundaries there are regional differences that demand attention. Under these circumstances, globalistic generalizations simply cannot do justice to the variety and complexity of the real world.

But diversity does not imply that every situation is unique. The objective of this section of the report is to carry out a broad review of the literature on the factors and variables that indirectly affect the quality, quantity, and access to land in developing countries. The review is necessarily

nonexhaustive, and should be interpreted with the strong caveat that the generalizations put forth are inevitably oversimplified with respect to any particular country or region. These weaknesses notwithstanding, the summary that follows provides insights relevant to the future direction of research on the relationship between land and fertility behavior in rural areas.

Among the most important factors that affect the quality, quantity and the access to land is technological change. Biological innovations such as the introduction of high yield varieties (HYV) and increasing use of mechanized production processes have a significant impact on the structure of the agricultural sector. This section focuses on the factors that influence the adoption of new technologies, and on the consequences of these trends in developing countries particularly as they affect land tenure arrangements. The emphasis on technological change thus serves as a way to organize the discussion of a broad range of interrelated factors that influence rural population.

#### The Adoption and Diffusion of New Technology

The adoption of mechanized farm processes and HYVs is influenced by market forces and factor prices. In addition, the access to new technology is conditioned by the institutional structure of the society and development policies pursued by governments. The theme common to a large proportion of the literature on agricultural change in the Third World stresses the unequal access among different classes of farmers to more sophisticated technology. The tendency for the larger, more affluent farmers to benefit disproportionately from the availability of machinery and HYVs is documented in Latin America, Asia, and Africa. Notwithstanding regional differences and the characteristics of particular countries, the forces that contribute to the unequal distribution of technology include combinations of elements likely to be found in most developing areas.

Since buying machinery requires capital, those with greater resources are at a comparative advantage. In addition, factor prices have tended to be distorted so that the private entrepreneurs have had to pay for capital at less than its opportunity cost to society as a whole (Ambercombie, 1972; 31). In Latin America the foreign exchange component of the cost of imported agricultural equipment may actually be less (in terms of local currency) as exchange rates tend to be overvalued. The maintenance of overvalued currency is chronic in India and Pakistan, which together with liberal tractor import policies, reinforced by cheap credit, contribute to stimulating the trend toward greater mechanization (see Ahmed, 1976; Gotsch, 1973).

In countries where modernization is equated with mechanization the priorities embodied in development policies imply that machines can be obtained at a favorable exchange rate, and with various forms of credit subsidies. In many Latin American countries, domestically produced machines are tax exempt and credit for the purchase of a tractor or other farm equipment is obtainable from government institutions for 70 to 100 percent of the purchase price at much less than the commercial rate of interest. In conditions of rapid inflation the average rate of interest effectively charged has been negligible, even negative. The latter implies that farmers have to pay back only 50 to 80 percent of their loans (Ambercombie, 1972; Thiesenhusen, 1971; Griffin, 1974). A discussion of similar issues in Asia can be found in Gotsch (1973), Griffin and Khan (1972) and Frankel (1971).

The impetus toward greater mechanization as a result of artificial reductions in the cost of capital is further reinforced by the increases in the cost of labor. The latter frequently comes about as a result of minimum wage and fringe benefit legislation ironically designed to benefit

lower income groups in the rural sector. Aside from the cost factor, mechanized processes may be preferable to wage labor as machines are more dependable and reduce the risks of worker's strikes. In addition, aid from developed countries sometimes comes with "strings" that make it mandatory for recipient countries to buy equipment in the nation that provided the aid.

The adoption of sophisticated technology at one point in the production system may also have the tendency to foster the introduction of machinery at other levels. Thus Feder (1976) argues that the penetration of multinational corporations in the agricultural sector stimulates the transfer of technology at all levels of the vertically integrated organization of production. Since both capital and technology are highly correlated, Feder (1976:426) maintains that it is appropriate to speak of a "sequential capital-technology package."

The same principle may also be at work within the farm unit itself. When a power source becomes available at the farm in the form of a tractor, it will be relatively inexpensive to mechanize other farm operations as the cost of adding implements is probably marginal when the investment in a tractor has already been made (Theisenhusen, 1978; Ambercombe, 1972:26).

But the factors that stimulate the adoption of innovations do not operate homogeneously. Studies in Latin America, Asia, and Africa indicate that it is the large landowners with greater economic resources and political influence that are the first to mechanize and to adopt high yielding strains when it is topographically and biologically feasible to do so. In the case of Sri Lanka and India, Raj (1972) argues that it is the land tenure system itself which most strongly influences the patterns of mechanization. In his view, the underpricing of scarce resources such as capital and foreign exchange have played a role but it is the distribution of land ownership that

is most significant. This leads the author to the important conclusion that the unequal pattern of agricultural growth would require more than a mere "correction" of factor prices since a change in the pattern of land ownership is also essential.

In situations where credit institutions have been specifically designed to extend resources to small farmers there is a tendency to gradually exclude them from the beneficiaries. This results from the bureaucratic complexities entailed in extending credit to numerous smallholders, the loaning of small amounts that do not significantly increase farm productivity (see Hatch, 1974), and a tendency for those most in need to default on their loans which, depending on the terms of the contract, can mean that the farmer loses his land, or access to further credit, or both. Over time such programs allow their portfolios to "creep upward" to serve those that present lower credit risks. Evaluations of small farmer credit programs in Latin America indicate that they chiefly operate to benefit the large landowners and middlemen (Soles, 1978; de Janvry, 1973; Nisbet, 1967; Hatch, 1974). AID's 1973 Spring Review papers provide a summary of these problems, as does Gordon's (1976) book on credit for small farmers in developing countries. That credit is diverted to non-agricultural use, substitutes for private savings, and ends up in the hands of the economically secure is widely documented in the numerous publications included in the regularly updated Newsletter on Rural Financial Market Research and Policy, published by the Department of Agricultural Economics and Rural Sociology, Ohio State University.

#### Consequences of Changing Agricultural Technology

As the previous discussion suggests, the adoption of technological innovation does not automatically take place evenly among different classes

of producers, but rather is conditioned by the social structure within which these events take place. In highly stratified societies, characterized by the concentration of land, wealth, income, and political power typical of most developing countries, the process of technological change, and the consequences of these trends are substantially different compared to the historical experience of earlier periods in the now developed countries of the world, and compared to recent experiences in countries like Taiwan that are characterized by less extreme socioeconomic inequality. As Theisenhusen (1978) put it, in North America and Western Europe land simply responds to market forces as any other factor of production and therefore tells us little about social class or stratification.

The combined effect of generally plentiful jobs in the industrial sector, expensive labor, cheap capital, and relatively inexpensive food was to enlarge family farms...But we cannot say that as farms got larger a new elite appeared...The Mill-Marshallian treadmill with cost-saving innovation leading to lower farm prices and ever larger farms came to prevail. That is, early adopters got high profits before the vast majority came to use the technology, whereupon price and profit dropped for all, and small farmers went to work in town as machinery on bigger farms replaced them ...It worked itself out the way neoclassical equilibrium models say it will...(Theisenhusen, 1978:4-5).

Another example of successful agricultural development is the case of Taiwan. In the post-war period income distribution was sharply changed by the land reform program that increased the proportion of owner-cultivators and reduced the number of tenants. At the same time market mechanisms and profitability stimulated small farmers to adopt new technologies. Autonomous growth in the agricultural sector was accomplished in such a way that the abundant resources of labor and scarce capital combined appropriately to increase output and contribute to industrial expansion through a system of taxation and financial institutions that effectively mobilized capital out of the agricultural sector into the urban-based industrial sector that

provided productive employment for labor released from the rural areas (Lee, 1971).

This is a far cry from the situations prevailing in most LDCs today. Mechanization takes place primarily among large landholders and results, in the absence of specially designed policies, in an increasingly skewed distribution of income in rural areas. An authoritative study by Abercrombie (1972) concludes that "...although mechanization raises the productivity of labour, in the conditions prevailing in most Latin American countries its benefits have gone mainly to swell the profits and the rents of the large landholders...so that it has tended to have a regressive effect on income distribution." Similarly, a summary of the ILO findings from a series of case studies (cited in Thiesenhusen, 1978) concludes that "...whatever benefits may have accrued from 'uncontrolled' mechanization in the form of higher yields attributable to improved technical standards or the removal of labor bottlenecks (and these remain debatable) they are small compared to the windfall profits realised by a privileged group of farmers who have been able to take advantage of heavily subsidized machinery." A number of other studies of the impact of mechanization in Third World countries come to similar conclusions (Clayton, 1974; Theisenhusen, 1978; Ahmed, 1976).

Estimates of the labor replacement of tractors vary widely. McInerney and Donaldson (1973) found that the use of four-wheel tractors in Pakistan (1966-70) reduced labor use per cultivated hectare by 40 percent, resulted in 4.2 tenant families replaced per farm, and a net overall destruction of approximately five jobs per tractor. Bose and Clark (1969) using field survey data for Pakistan reported that farmers in the Punjab who have mechanized were remarkably consistent in their estimate that the labor force per acre had been reduced by 50 percent from the pre-mechanization period.

The employment reduction appears to be proportionately less on large farms. Using data from Colombia, Abercombie (1972) estimates that as many as 18.9 workers could be displaced per tractor on the average for farms in the 50 to 199 cultivated hectare range. The substitution ratio for farms with over 200 cultivated hectares, however, drops to about 2.3 workers per tractor. In contrast to these findings, other researchers report a larger labor replacement effect for tractors used on large farms. As Merrill (1975) notes, what may happen is that when tractors are first introduced on large farms, workers are initially provided other on-farm employment opportunities, but the number of new opportunities diminish rapidly with increased mechanization.

Other factors contribute to the differential impact of mechanization on employment, such as the mixture of crops grown. Mechanization appears to reduce labor requirements for potatoes only 6-19 percent, compared to a 50 to 90 percent reduction for wheat (Abercombie, 1972). Similarly, it has been argued that the impact in terms of employment is different comparing four wheel and two wheel tractors. Basically the argument is that small two wheel tractors replace animals rather than farm workers (Hamid, 1973). A study of rice farmers in the Philippines, however, fails to support this conclusion (Bautista and Wickham, 1974). The labor inputs of primary and secondary tillage are estimated to be 7.4 man days per hectare using carabao compared to 4.0 for farmers using small two wheel tractors. This represents a 46 percent reduction in labor use for land preparation alone. McFarquhar and Hall (1970), using data on cotton production in Uganda, reported a 57 percent reduction in man-hours per acre for mechanized as compared to hand-hoe cultivation.

Whether the use of mechanized processes will increase labor requirements or not depends to some extent on the farming techniques that are tra-

ditionally used. In a study of Thailand, Inukai (1970) found that if the traditional combination is broadcast rice with buffalo farming, labor use per rai will increase from 8.8 man days to 10.5 man days if farmers shift to transplanting rice with tractors; labor requirements will be reduced to 5.5 man days if the change is to broadcast rice with tractors.

Counter arguments by proponents of mechanization maintain that it is beneficial for employment from two standpoints: One approach is to emphasize the off-farm employment effects of mechanization. Here it is argued that labor inputs are required to build and maintain the machines and that these inputs may more than offset the reduction in farm employment. It is hard to imagine how this employment generating mechanism applies to most underdeveloped countries that import tractors from abroad. But even in countries that do produce agriculture machinery the employment benefits are small. Estimates for the eleven countries in Latin America indicate that the total employment in agricultural machinery and related activities was less than 150,000. This represents about 0.5 percent of the number of persons employed in agriculture and only 0.2 percent of total employment. Moreover, rough estimates using data for Brazil and Argentina indicate that an investment of up to US\$10,000 is required to create one job in tractor manufacturing which will produce two to five tractors each year (Abercombie, 1972).

The second approach is to treat mechanization as a shift in the production function. Machines enable farmers to increase yields, utilize land more intensely, and increase labor productivity. The major difficulty with studies that take this view is generally the failure to separate the employment impact of mechanization from other technological or institutional changes that may occur simultaneously with mechanization. Thus Stout and Downing (1974), analyzing data from India, maintain that increases in employment

ranging from 10 to 32 percent were due to tractor mechanization. But as Merrill (1975:25) argues, the effect of tractors per se is unclear given the changes in farm structure which occurred simultaneously (reclaiming wasteland, increasing irrigation, increase in double cropping, etc.). The question, according to Merrill, is "Could these changes (in employment) have taken place...without the introduction of tractors?" Were tractors essential to reclaiming wasteland? Did tractors cause a change in cropping patterns or did the changes reflect changes in relative prices and costs? Was the increase in area double cropped as the result of tractors or due to the increased availability of irrigation water? Since these questions are rarely dealt with effectively, Merrill (1975:25) concludes that much of the data presented to support the argument that mechanization leads to an increase in farm employment is misinterpreted and reflects a failure to separate the employment effect of machinery from that of other technological changes occurring at the same time.

On the basis of other data from India, Binswanger (1978) makes much the same point but puts the issue in somewhat different perspective by stressing the opportunity cost involved. He concludes that tractor farms in the Indian subcontinent generally do not have much labor use per hectare than bullock farms but that this does not imply that they are not labor displacing. "What counts is, first, that the frequently higher levels of output on tractor farms on account of their better capitalization are generally produced by equal amounts or even less labor. Second, even if the tractor investment left unemployment unaffected we must count the foregone employment of not investing the capital into employment-creating irrigation or even nonagricultural investments as an employment cost of tractors."

The weight of existing evidence seems to be on the side of those who argue that the net effect of mechanization in less developed countries is

to create more unemployment and underemployment. This does not imply that mechanization cannot be utilized in such a way as to be employment generating, a goal that is universally accepted as socially beneficial. Those with a more sanguine appraisal of the employment-generating possibilities of mechanization generally draw a distinction between sophisticated and highly mechanized processes (which are admittedly employment-reducing) and more modest forms of technological change. Several terms have been used to refer to the latter, including "intermediate technology," "appropriate technology" (Bhalla, 1976), "rational mechanization" (Voss, 1974), and the notion of "selective farm mechanization" (Rao, 1972; Massey-Ferguson, 1974; Inukai, 1970; Stout and Downing, 1976).

Selective mechanization is taken to mean the type of mechanization that "fits" a country's economic, employment, production, and cultural needs. A more specific definition, according to Stout and Downing (1976:174) is "any form of mechanization that does not decrease the demand for labour per unit of land." It is assumed that the choice of less sophisticated (and less expensive) forms of mechanization caters to the needs of small farmers. Thus, in India hand pumps, pedal pumps, and other simple implements "far from denying facilities to the smaller people, may open out new possibilities for their benefit" (Venkatappiah, 1972). Writers in this tradition object to the tendency to characterize mechanization as "tractorization", as there are alternative strategies available. "There is no reason to believe that...different levels of mechanization are mutually exclusive; certain jobs (pumping water, tillage, etc.) might be performed more efficiently through the use of mechanical power, whereas others (weeding, spraying, harvesting, etc.) might continue to be performed entirely or in part by hand. By combining different levels of mechanization, cropping intensity and yields may be raised (through double cropping) and total employment increased at

the same time" (Stout and Downing, 1976:179). Mechanization should therefore be adopted for particular stages of the production process "concentrating on those stages of the crop production cycle where labour shortage is a genuine limiting factor to increased production, or where human and animal power is inadequate for optimum results. This can increase total production, facilitate the diversification of farm enterprises and create additional demand for labour" (Massey-Ferguson, 1974:3).

Few would argue with the desirability of adopting technologies that minimize indirect social and economic costs. But the feasibility of restricting mechanization in the less developed countries to what is "appropriate," "intermediate," or "selected" according to certain criteria is open to question. Several factors militate against accomplishing the goal of "selective mechanization." For one thing most of the agricultural equipment used in the Third World is imported from the developed countries. This implies that the machinery is highly labor saving because they have been developed to match the factor proportions that characterize the country of origin. These arguments are elaborated by Thiesenhusen (1978; 1971). Feder (1976) is more emphatic, referring to the "sterile" discussion of sophisticated vs. intermediate technology on the grounds that there is no transfer of intermediate technology in the sense of technology adapted to the conditions of underdevelopment. "Under present conditions transfers of technology into underdeveloped agricultures are made into sectors which are precisely predestined and adapted for the acceptance of all types of modern, including the most sophisticated, know how and equipment or else they do not take place." He goes on to argue that the transfers are guided by the profit motive of firms producing inputs and that modernization takes place principally in the large landholding sector which is suited to all such transfers in terms of enterprise size, quality of land, availability of water, mono-

poly subsidies and ability to secure labor (Feder, 1976:427).

The interaction between mechanization and other technological changes makes the assessment of the impact on labor requirements difficult. This is particularly true with the introduction of high yield varieties. Evidence from India and Pakistan, for example, shows that, where traditional power sources are used employment increased by 50 percent or more when an acre of a traditional variety of wheat was replaced by a high yield strain. The greater demand for labor resulted from increases in the need for manpower to weed, fertilize and harvest. However, a change from traditional power to partly mechanized ones adversely affected the employment absorption of the new varieties of grains. Inukai (1970) reports that a number of studies in India have shown a decline of some 11 to 15 percent in the labor requirements per acre on partly mechanized high yield variety wheat fields. This is clearly demonstrated in a study of various levels of mechanization on an irrigated 10-acre farm in the Punjab (cited in Merrill, 1975). They found that the introduction of high yielding grain varieties produced with conventional power sources in 1968-69 would have increased labor use by 6 percent. HYV with pumpsets would increase labor requirements by only 2 percent, while the use of HYV pumpsets, wheat threshers, tractors and reapers would reduce total labor requirements by about 6 percent. Projecting the impact of mechanization to 1983-84, HYV with a high level of mechanization resulted in a 17 percent net reduction in labor use.

But even if technological change in the agricultural sector generates an increase in the absolute number of jobs (which is open to question), for this trend to have a significant impact it must be sufficiently great to absorb new entries into the rural labor force. This is doubtful under the conditions in many LDC's where the rate of natural increase in rural areas averages 3 percent per year. A study by the International Rice Research

Institute of a village in the Philippines, for example, notes that the adoption of high yield varieties of rice and the expansion of the irrigation system resulted in a significant gain in income and production. But the population expanded rapidly and the proportion of landless laborers is growing. The report concludes that if present trends continue, farm size will decline, the proportion of landless laborers will increase, real wages will fall, and the value of tenancy rights will rise. (International Rice Research Institute, 1978:85).

The introduction of mechanized processes by larger landowners may also have important social and political consequences as it contributes to increasing the economic and political bargaining power of those classes with greater power to begin with. In most countries landlords are organized into national associations and organizations that look after the interests of the class as a whole. In some cases banks and government credit institutions have been created specifically for large farmers. In addition, landowners usually have close links, or participate directly in urban financial, commercial and industrial undertakings and play an active role in established political parties (Griffin, 1974a:194-5). The emergence of the "progressive farmer" has significant political implications in terms of development priorities and public policy. In the case of Asia, Ahmad (1972:18-19) notes that "economic success enables him to gain political power, both at the local and national levels, so that he exercises sufficient control in the legislative bodies to ensure that no direct measures are taken against his interests." Barraclough (1973) reports the same trend in parts of Latin America.

#### Technological Change and Access to Land

The foregoing discussion has focused upon the factors that influence the adoption and the distribution of technological innovation, and has stressed

the employment consequences of current trends observed in less developed countries. The following section is essentially an extension of the discussion of the consequences of technological change. The difference is that here the focus is more specifically on the issue of land tenure. The connection between land tenure arrangements and technological change is indirect. For the most part they can be viewed as second round effects of the tendencies that have already been discussed in the earlier section of this report. The various mechanisms that potentially affect land tenure will be discussed separately, followed by an attempt to elaborate a scheme or model that reflects the complexity of the relevant interactions.

If it is assumed (as the tenor of the literature already reviewed strongly suggests) that the adoption of HYV's and mechanized processes takes place primarily among the better-off large landowners, then a number of consequences are implied. Among those affected are the mass of tenants and sharecroppers whose position vis-a-vis the landowner is likely to change. The introduction of high yield strains, and the efficiency provided by machines results in greater productivity and profits, and contributes to substantially increasing the value of land. As the net worth of real estate rises, and if renting is a common form of land tenure arrangement, the landholder will probably be able to prevent the appropriation of these windfall profits by the tenant. The tendency widely documented in both Asia and Latin America is for landlords to simply reclaim the released property and evict tenant farmers. In other cases, the owner of the land, being the strongest party to the bargain (given the number of potential renters), can successfully increase the rental payments he requests (Thiesenhusen, 1971, 1978). In a discussion of Pakistan, India, and the Philippines, Ahmed (1976:92-3) concludes that the result of tractorization has been the concentration of land

ownership, a return to owner cultivation resulting in direct tenant eviction, and land renting by large farmers causing indirect eviction. Ladejinsky (1970) makes the same point with reference to Indian sharecroppers: "The share-croppers are, if anything, worse off than before because as ownership of improved land is prized very highly there is mounting determination among owners not to permit the tenants to share in the rights of the land they cultivate. Their preference is to get rid of them."

In addition to the impact on tenants and sharecroppers, the increasing value of land can also contribute to a greater concentration of land ownership and control by jeopardizing the viability of smallholders in the region. The rise in land values in the Punjab was related to the speculative buying and selling of agricultural land. "With increased land values, small farmers have been encouraged to sell their holdings to join the ranks of landless farm workers. The trend is thus in the direction of concentration of good quality, especially irrigated, land in the hands of farmers practicing modern techniques of farming, while the subsistence farmers are left with poor quality and unirrigated land" (Ahmad, 1972:19). This tendency is further stimulated by the chronic inflation, which has afflicted most developing countries as land ownership under these conditions becomes a sound and secure investment.

This encourages urbanites, including businessmen, military officers and senior civil servants to put their savings into land. Their willingness to buy at high prices encourages local money lenders to foreclose and indebted small holders to sell. The result is a greater concentration of land ownership, less efficient use of scarce land resources, and the conversion of small holders to tenancy and landlessness (Esman, 1978:19).

The smallholder may also be threatened as a result of changes in the prices for commodities they sell to the local market. "Farmers who have not been able to adopt the new technology may find that their meager crop will eventually have to be sold at lower prices. Since they cannot make up

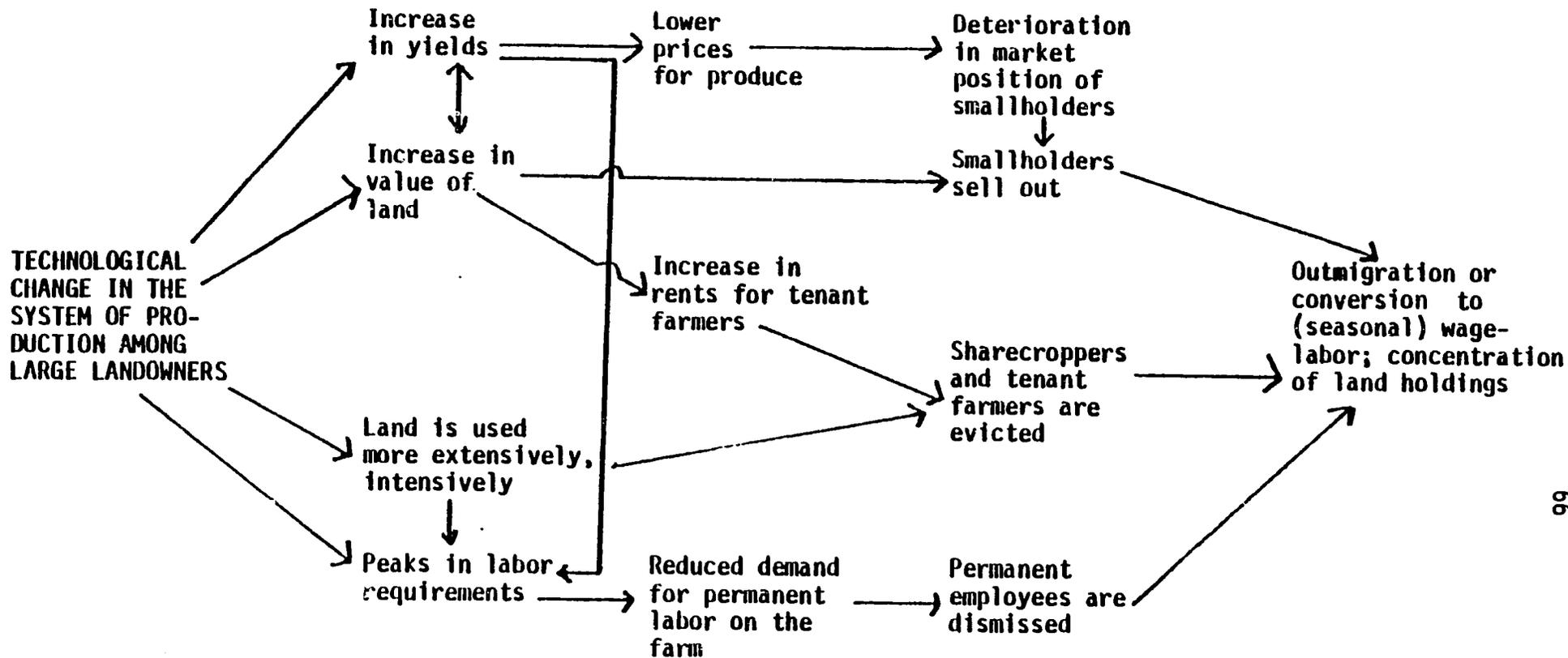
in quantity what they lose in price, their income will be less than previously" (Thiesenhusen, 1971:14). But even in cases where smallholders are the beneficiaries of specially designed programs to transfer to them capital and technology, some analysts are skeptical about the long-term consequences (Feder, 1975:21).

The disadvantages to the landowner of maintaining a permanent labor force also come about as a result of the changes in the nature of labor demand that are related to the adoption of mechanized processes and HYV's. To the extent that mechanization reduces labor requirements net of possible employment generating aspects of the adoption of HYV's, fewer workers will be needed, except on a seasonal basis. Under the traditional system in Latin America and many parts of Asia, labor needs were more or less uniform throughout the agricultural year. Resident farm labor was called for, which often implied a personal patron-client relationship between the two parties. A number of perquisites were extended to live-in workers including shelter, some land as well as support during times of crisis. "When the rhythm of work is changed so that some labor use peaks get very steep and deep troughs appear in other seasons, there is no good reason to support workers full time on the farm, so day wage-laborers tend to be substituted for resident laborers" (Theisenhusen, 1978:13). While there is little doubt that workers under the traditional system were exploited, as they become proletarianized they are denied the benefits of the old system and must shift for themselves. In India and Pakistan, Ahmad (1972:20-1) concludes that "There is an increasing tendency for owners of large tracts of land to be so overwhelmingly concerned with the monetary returns from farming and consequently to disregard their traditional obligations towards tenants and laborers particularly in terms of social services..."

A number of studies indicate that the increase in wage labor is associated with increases in absolute poverty. Under conditions of high population growth the supply of labor is growing more rapidly than the demand, which tends to depress wages. This is exacerbated by inflation that reduces the real value of nominal wages which tend to increase at a slower rate than prices. As Esman (1978:23) notes "In the majority of countries which have not experienced the 'green revolution' there has been an inexorable downward pressure on real wage rates;...Even in areas in which high-yielding varieties have been adopted and total employment has increased, real wage rates have risen slowly because the increased demand for labor has attracted large numbers of migrants."

In Brazil, particularly in the southern part of the country that has experienced significant technological change in the agricultural sector, the reduction in the proportion of tenants and permanent labor and the increase in temporary wage-workers has been attributed to the combined effects of mechanization and legislation requiring landowners to pay minimum wages and social security benefits for employees. This has resulted in the out-migration of rural families who have moved to provincial agro-industrial centers and market towns where they join the ranks of urbanized marginal groups. During peak seasons of labor demand in the countryside these workers are transported by intermediaries to the farm gate where they are paid wages as temporary workers (D'Incao e Mello, 1976; Martinez-Alier, 1975; Gonzalez and Bastos, 1975).

The key variables that have received attention in the literature, and the relationships between them spelled out in the various studies, are summarized in Figure 1. It should be noted that the interactions depicted are those reflected in the research reviewed in this section. Rather than an attempt to capture all of the factors that affect the structure of the ag-



rarian sector, Figure 1 merely summarizes the arguments frequently put forth in the voluminous literature on the topic.

It is important to emphasize that the starting point assumes a skewed distribution of technological innovations. The relationships would not hold in the event that new technologies were adopted by all groups including smallholders, tenants, and sharecroppers. A more even access to innovations appears to be more likely in societies where land is more equally distributed to begin with. This seems to be the case in some Asian countries, especially Taiwan. However, the model shown in Figure 1 is relevant to highly stratified societies characterized by the predominance of large landholders who employ a permanent labor force or lease land to tenants and sharecroppers.

The out-migration of the rural population, the conversion to wage labor, and the concentration of land holdings are the outcome of many of the changes currently underway in the agricultural sector of many LDC's. The chilling prospects implied by this trend can be more fully appreciated in light of recent estimates for Asia and Latin America that indicate that rural households below the "small farmer" category represent a majority of the labor force (Esman, 1978:Tables 1-4). In Asia, the percentage of landless rural households ranges from 25 percent in Bangladesh to 41 percent in Java; marginal cultivators from 13 percent in India to 45 percent in Bangladesh. Combined landless and near-landlessness exceeds 75 percent in Java, Bangladesh and the Philippines. In Latin America the proportions of landlessness and near-landlessness ranges from 85 percent in Bolivia and Guatemala to 55 percent in Costa Rica. In Mexico nearly 30 percent of the rural households are headed by landless agricultural workers; in Brazil nearly half of the rural households are effectively landless.

These figures are particularly ominous given population growth rates of about 3 percent per annum. Assuming that a third of the increments to

the rural population out-migrate, the rural labor force will increase by more than 50 percent by the end of the century. The IBRD estimates that those suffering from absolute poverty in the non-communist developing countries will increase from 650 million to about 1.1 billion in the year 2000. On the basis of these projections, Esman (1978:8) concludes that "Short of far-reaching policy changes, the future will bring further sharing of poverty, exacerbated by increasing concentration of land ownership and mechanization--processes which bear especially on the employment opportunities and wage rates of landless workers and marginal cultivators.

#### Technological Change and the Status of Women

The complex changes that are taking place in the agricultural sector of many developing countries have far-reaching implications. As the earlier discussion emphasized, these trends have profoundly altered the system of production and marketing, have changed the patterns of land tenure, and have had a significant impact on the social relations of production in the countryside. Among the consequences of these changes is a shift in women's roles and a change in the sexual division of labor in agriculture which, in turn, are likely to have an impact on fertility levels. A complete discussion of the mechanisms by which women's roles are related to fertility far exceeds the scope of this review (see Griffith, 1979). Nevertheless, many of the same factors that affect land tenure also influence the role of women in rural areas. The following section briefly touches on some of the ways that technological change and shifts in access to land affect women specifically.

In a pioneering analysis of the relationship between women and development, Boserup (1970:16) distinguishes between male and female farming systems. Female farming systems, where food production is taken care of

primarily by women, seem most often to disappear where farming systems with ploughing of permanent fields are introduced in lieu of shifting cultivation. The advent of the plough usually entails a radical shift in sex roles in agriculture as men take over the ploughing even in regions where the hoeing had formerly been done by women (Boserup, 1970: 33). With the introduction of new technology, which tends to fall into the hands of men, the productivity gap between the sexes widens as men monopolize the use of new equipment and the modern agricultural methods. The skewed distribution of technology by sex implies that men's labor productivity tends to increase while women's remains more or less static (Boserup, 1970:53).

Others have carried the argument a step further. Chaney and Schmink (1976) propose that modernization not only fails to confer equal benefits to both sexes, but that women's situation actually worsens as the modernization process goes forward. The diffusion of the Western patriarchal model, which prescribes the role of breadwinner for the male and reserves the home for the woman, implies that, when cash enters the system, women's activities reach an upper limit as exporters and bankers prefer to deal with men. The male advantage is bolstered by technical advisers who introduce techniques for agricultural improvement and exclude women from their educational programs.

Government policy based on a patriarchal model of development can also have an impact on the status of women in rural areas. This is particularly true with respect to policies that govern access to the means of production through settlement schemes and agrarian reform. In some parts of Africa where female farming predominated, women were eliminated by European-style land reforms, and the land was given over to their husbands (Boserup, 1970: 80).

The expansion of a capitalist system of production, and the proletar-

ianization of the peasantry also influence the sexual division of labor in agriculture. Rather than being culturally determined, or static over time, Deere (1978) argues that the division of labor by sex is a socio-economic variable that is responsive to the material conditions of production. Data collected in the Cajamarca area of Peru indicate women's increased participation in agriculture is related to the fact that for most peasant households agricultural production is a declining activity. As the family loses access to the means of production of subsistence, and as poverty increases, women take a more active part in agricultural production while men devote time to wage labor activities. Not only do women in landless and smallholder households participate more in agriculture relative to total family labor employed on the farm, but women from these strata also participate in a wider variety of tasks. Greater participation implies that women from the smallholder sector have a greater voice in agricultural decision-making than do women from middle peasant farms with respect to seed preparation, and regarding other factors related to production such as what, where and when to plant (Deere, 1978:245).

The fertility implications of these findings are indirect and often contradictory. Given the complexity of the issues involved the net effect of the various tendencies is difficult to determine. What is increasingly apparent is the need to revise the longstanding assumptions which predicted that the outcome of rural development would be the promotion of women's status and roles in the family which were expected to lower fertility by providing socially acceptable options to motherhood, by increasing the age at marriage and by lowering the cost of children as well as parental aspirations for their offspring. Mounting evidence of the adverse effects of "development" on women's status suggests that many of these changes may be fertility stimulating, at least for particular subgroups of the rural population in developing societies.

## CONCLUSIONS

Fertility, like other forms of behavior, is rooted in a complex socio-economic system of interactions that makes it difficult to isolate the effects of a single variable. In currently developing countries the complexity of the rural sector, and the rapid changes that are taking place in some areas, present additional confounding factors. These considerations caution against the universal applicability of theoretical frameworks that have been used to explain the relationship between land and fertility. Integrating the findings of the review of the literature on the direct and indirect factors that influence the quantity, quality, and access to land (Part II) with the literature on the land/fertility relationship (Part I) serves to highlight specific dimensions of the issue that have not been the subject of systematic analysis. Using previous studies as a point of departure, the need is to develop new avenues of research that come to grips with salient features of rural areas in the Third World. The objective of this concluding section is to summarize the tentative generalizations derived from the literature, and to elaborate a set of priority questions that could serve to guide the future research necessary before more definitive conclusions can be put forth.

## Size of Farm and Fertility

As noted in the conclusions to Part I, evidence on the effect of land availability on fertility is the clearest of any of the dimensions reviewed. Two aspects of land availability were identified: the size of holdings among farm operators and the abundance or scarcity of land for farm sites. Findings on the size of holdings and fertility generally reveal a positive relationship. This conclusion should be regarded as tentative in light of

a number of critical considerations that are rarely accounted for in the studies reviewed.

The possibility of reciprocal influence between family size and size of holding should be noted (Mamdani, 1972; Mazur, 1975; Ware, 1978). Larger holdings not only permit larger families, but in some instances, larger families appear to be a means for acquiring land and increasing the size of the area cultivated.

An additional problem is the notion of farm size, a concept that requires more meaningful definition. The absolute physical size of a farm may not be a good basis for comparison in regions having different climates, soils, markets, and levels of technical and economic development. Even within relatively small regions these variables can differ substantially from one farm unit to the next. When such variability is present it is difficult to interpret the meaning of empirical results obtained.

A more relevant definition of the concept of size could be based on the area of land needed to provide remunerative employment to a typical rural family, using the technical resources available in the region and in accordance with local customs and cultural values. This approach suggests a classification scheme that is useful in order to demonstrate problems inherent in the assumption that land and fertility are linearly related to each other. For the purpose of illustration, consider the following four categories of farm size taken from Barraclough's (1973) study of agrarian structure in Latin America:

1. "Sub-family" size farms which have insufficient land to satisfy the minimum needs of a family or to allow the utilization of their work throughout the year.
2. "Family" size farms which have sufficient land to support a family at a satisfactory standard of living through the work of its members and the application of the methods prevailing in the area.

C. "Multifamily medium" size farms which have sufficient land to employ a number of workers outside the family, but not sufficient to justify organization based on the appointment of a manager, overseer, etc.

D. "Multifamily large" size farms which have sufficient land to give permanent employment to a group of workers much larger than the family of the owner, and which require the division of labor and the establishment of an administrative hierarchy.

This breakdown, however simplistic, suggests important distinctions between farm families. The fact that different family types are associated with different size of holdings has important implications for the study of the relationship between size of farm and fertility. It suggests, for example, that the model applied to one type of family may not necessarily apply to others.

A straightforward example can be formulated by discussing the movement from category A to category B in the above classification. For "sub-family" size farms the predominant factors influencing fertility may be biological ones that operate through differences in fecundity. Fertility may be depressed to the extent that destitute rural families are poorly nourished and suffer from ill health. As farm size increases (or as new technology increases productivity) so as to elevate families from category A to B, a different set of variables may come into play. The initial impact of such a shift, insofar as it is associated with such things as better nutrition, would undoubtedly be an increase in fertility, at least in the short run. The positive relationship between farm size and fertility is thus likely to be related to the increase in the "supply" of children, having little to do with models of choice that emphasize the "demand" for offspring.

Within the category of "family" size farms (B), levels of fertility may also respond to plot size, but biological factors are likely to be less important. For this type of family, the child labor models may be

the most appropriate theoretical framework. It can be safely assumed that families depart from a natural fertility schedule and practice some form of control over reproductive behavior (which is itself an empirical question that must be addressed), then fertility may be positively associated with farm size for the reasons stipulated by the family labor perspective. But the applicability of this model is questionable in cases where non-family workers are employed ("multifamily medium" size farms, category C), and is clearly irrelevant in the case of farms that have sufficient land to give permanent employment to a labor force that requires formal division of labor and a management hierarchy (category D).

These observations emphasize the idea that size of farm must be defined in terms that are more substantively relevant. Secondly, as the above example illustrates, the theoretical perspective or the models applied to the explanation of fertility differentials may vary considerably among different categories of family farm size. Thus it is plausible to assume that "supply" factors influence fertility levels in sub-family size farms, while "demand" factors become more important as the size of farm decreases, at least up to a certain point. Research designs that fail to take these distinctions into account run the risk of misinterpreting the empirical relationships observed.

#### Availability and Access to Land

In the literature reviewed, the presence of available land was almost uniformly related to higher fertility. The assumption underlying the relationship between land availability and fertility is the idea that the peasantry is a self-regulating population. The mechanisms by which the reproductive behavior of the group is regulated occurs through the linkages that are presumed to exist between marriage, the opportunity to procreate and the inheritance of places on the land. As land becomes available, both nup-

tiality and fertility are expected to rise. In the context of LDC's this theoretical perspective must be elaborated in order to account for a number of variables. These include: the different types of access to land (smallholders, tenants and sharecroppers), the trends in land tenure (increasing proletarianization), and other factors such as size of plot (as defined earlier) and migration. The following discussion briefly outlines the reasons why these variables are important. The points raised suggest research issues that should be addressed if we are to understand the relationship between land and fertility in developing countries.

### Inheritance

When the household is the unit of production, the desire to maintain and to transmit household wealth (land) is strong. As the literature reviewed in Part I suggests, under these conditions the process of inheritance is an important link between land and reproductive behavior. Inheritance systems were shown to have complex effects on fertility primarily through regulation of family formation. But no simple or uniform predictions of these practices can be stated in isolation from the larger society in which they are found. A number of considerations in the nonfarm sector as well as the farm sector impinge upon inheritance systems.

A key variable is the stability of the control or ownership of land. Studies which emphasize the role of inheritance typically refer to smallholders rather than to tenants and sharecroppers. The latter by definition do not have title to land, and the relative stability of their access to it may vary from one region to another. In some countries, particularly in Latin America, even the smallholder's permanent access to land is extremely tenuous, a factor that significantly affects the relationship between land and fertility as it operates through the process of inheritance. If a family has no guarantee that property can be safely transmitted to the

next generation (or, for that matter, no guarantee that it can maintain control over land even during the parent's lifetime), it is unlikely that the inheritance or bequest models, as they are formulated to explain historical patterns of fertility in some parts of Europe and the United States, are applicable to LDC's without taking into account the circumstances peculiar to developing countries.

The theoretical framework could be extended to this situation by applying the economist's distinction between "quantity" and "quality" of children. It is reasonable to assume that parents will invest in higher quality children if they have a secure hold over their property. Conversely, under conditions of insecurity or unpredictability, the tendency may be to opt for a greater quantity of children (Merrick, personal communication). This implies that, apart from farm size and the availability of land, land tenure arrangements associated with greater insecurity or risk may have the effect of stimulating higher fertility by leading to an emphasis on quantity (as opposed to quality) of children, and by attenuating the impact of inheritance as a factor that depresses fertility levels in areas where land is scarce.

These considerations highlight the importance of taking into account the social and political context within which reproductive behavior takes place. In parts of Asia, where land is more equitably distributed and where land can be transmitted between generations, the theoretical framework used to explain the relationship between land and fertility may be more straightforward compared to the case of Latin America where the peasant is being threatened by fundamental changes in the structure of the agricultural sector. The increasing proletarianization of the rural population is a case in point.

#### Access to Land

In addition to tenants, sharecroppers, and smallholders (all of whom

have some form of access to land), the analysis of rural fertility patterns must also take into account those who do not have land. This is particularly important given the review of the literature on land tenure that suggests an increase in the proportion of landless rural workers. A full understanding of the relationship between land and fertility necessarily implies the need to focus on the effects of proletarianization on reproductive behavior.

Proletarianization implies a decline in the proportion of the labor force who have effective control over their own means of production, and an increase in the proportion who for survival are dependent on the sale of their own labor power. With regard to the European experience Tilly (1978:40) argues that proletarianization weakens the nexus between household position, marriage, procreation, inheritance, and the maintenance of household continuity. The increase in the number of wage laborers attenuates the pressure to conserve and transmit household wealth and thus reduces the constraints on fertility as well. The absence of impact of inheritance is considered crucial. "As the opportunity for employment of children outside the household expanded, the possibilities of enjoying them both for themselves and for the wages they brought to the household increased...The missing variable is the pressure to conserve family property" (Tilly, 1978:40).

Whether or not proletarianization leads to higher fertility as the above reasoning would suggest is open to debate. But the main point is that very few studies have ever addressed this question. This is a particularly relevant issue given the changes in the agricultural sector of some countries that have contributed to the increase in the number of landless and near-landless families. To the extent that research focuses primarily on the relationship between land and fertility, there is the risk of overlooking the sizeable (and increasing) proportion of the rural population that does not have effective control over the means of production.

## Migration

An additional consideration is the role of migration, whose impact is also likely to attenuate the link between land and fertility. Years ago, Kingsley Davis (1963) coined the term "multiphasic" response to emphasize the idea that a population reacts to population pressure in a number of ways including lowering fertility and/or accelerating out-migration. Taking this idea as a point of departure Friedlander (1969, 1970) hypothesizes that the greater the opportunity for out-migration, the longer rural fertility will remain high. This is demonstrated in the case of the British and the Swedish experience. The British urbanized early, absorbed rural migrants in urban areas, and as a result experienced relatively late declines in rural fertility. The Swedes, on the other hand, urbanized late, experienced less rural to urban migration, and therefore experienced substantial declines in rural fertility before large-scale industrialization.

This example demonstrates that the fertility response to population pressures caused by a decline in mortality and the fragmentation of holdings is contingent upon different degrees of out-migration from the rural areas. With respect to the relationship between land and fertility, migration is thus important because it alters the nature of the costs and benefits of children, factors that lie at the heart of the child labor and bequest models of reproductive behavior. This consideration is relevant in the case of developing countries given the high rates of rural to urban migration in most LDC's.

### Other Aspects of Rural Development

The impact of land availability (or size of farm) in fertility in LDC's is likely to be complicated by the impact of other dimensions of rural development. The effect of land availability and farm size on fertility may

be positive, but the impact of other factors generally associated with a higher quality of life tend to operate in the opposite direction. As several studies indicate, the effect of such variables as female education, village-level traditionalism (Shutjer et al., 1978), literacy and child mortality (Merrick, 1978) is to lower fertility levels. On the basis of current research findings, it is unclear at what point the negative impact of socioeconomic variables outweighs the positive effect of land availability and farm size on fertility. This is an important consideration from the standpoint of rural development policy. Redistributive policies may stimulate fertility from the standpoint of the positive association between land and fertility. Nevertheless, such policies may have an overall negative impact on fertility to the extent that they affect other aspects of rural development that contribute to lower fertility levels.

### Theory and Method

A major deficiency of the literature reviewed is the lack of a guiding theoretical framework that accounts for the considerations that have been discussed in this conclusion. For the most part, individual studies examine some aspect of the land-fertility relationship without reference to theory. This contributes to the generally mediocre quality of research in this area. A lack of conceptual clarity has led to a variety of operational procedures designed to measure aspects of land availability and access to land. Many measures appear to be only loosely connected to their conceptual referents. Some of these measurement problems, of course, stem from restrictions on the data taken from secondary sources. Regardless of the source of the problem, poor measurement procedures limit interpretation of much of the existing literature.

The use of secondary data is related to another issue in this type of research. The majority of the research on land and fertility has not been

conducted using individual couples or households. Rather, regions, states, counties, and townships typically have been employed to estimate relationships, although some individual household data have been developed from manuscript sources (Easterlin, 1976a, 1976b; McGinniss, 1977). Direct evidence on the decision-making processes involved in land-fertility issues was not found in any of the studies we reviewed.

Primary data on land and fertility in LDCs is weak and scattered. The effects of various land resettlement and redistribution policies on fertility in the LDCs have not been systematically studied. Similarly, studies of changes in landholdings in relation to changes in family size represents another gap in the literature. Knowledge of the connections between these phenomena would contribute to the design of more effective policies for both agricultural and demographic development.

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ON

### RURAL DEVELOPMENT, LAND AND HUMAN FERTILITY

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- 1972 "Agricultural mechanization and employment in Latin America."  
International Labor Review 105-106: 11-45.

Agricultural production is much more mechanized in Latin America than in other regions of the developing world, yet has the fastest growing labor force. Mechanization has been rapid but confined to the large farm sector where it has displaced labor. Various institutional supports have increased the profitability of mechanization. Mechanization also allows operators to bypass dependence on a labor force touched by mounting social unrest.

Adams, Dale W.

- 1970 Factors in Carrying Out Land Reform, Services and Supplies Complementary to Land Reform. Washington, D.C., Agency for International Development, Spring Review of Land Reform.

This paper examines services and supplies associated with "social surgery" reform, or redistribution of land ownership and/or granting long term tenurial rights to land user. The areas studied had at least modest amounts of infrastructure. Less attention is given to colonization and agricultural aid without reform.

Chapters are devoted to: credit, housing and other social amenities, participant training activities and production supplies. The roles of the following agencies are discussed: World Bank, AID, and Inter-American Development Bank.

The future role of AID is discussed with emphasis on complementary services and supplies rather than involvement in land reform programs.

Agency for International Development

- 1973 Spring Review of Small Farm Credit (in 20 volumes). Washington, D.C.: U.S. Agency for International Development.

This extensive collection of papers provides excellent information on rural financial policies, programs and problems in a large number of low-income countries.

Aghajanian, Akbar

1978 "Fertility and family economy in the Iranian rural communities." *Journal of Comparative Family Studies* 9 (Spring): 119-127.

Size of landholding was found to be strongly related positively to fertility among 505 rural villagers living in 25 villages in Southern Iran. This relationship held with a number of social and demographic factors controlled.

Ahmad, Z. M.

1972 "The social and economic implications of the Green Revolution in Asia." *International Labour Review* 105 (Jan.): 9-34.

The Green Revolution has left some formidable problems in its wake. Generally speaking, small cultivators, sharecroppers and landless agricultural labourers have not benefited; regional inequalities and income disparities have been accentuated; and there is a widespread fear and danger of labour displacement as a result of mechanization aggravated by the wholesale eviction of tenants and sharecroppers by larger landowners.

Ahmed, Iftihar

1976 "The Green Revolution and tractorization: Their mutual relations and socioeconomic effects." *International Labour Review* 114(1): 83-95.

While Green Revolution technology can provide higher yields and more employment, the concurrent use of tractors produces no clear output advantage, displaces labor, encourages the eviction of tenants, and has adverse effects on income distribution. International cross-section evidence appears to refute the suggestion that Green Revolution technology has been solely responsible for the current upsurge of tractorization in developing countries. If progress is to be made towards greater food production, higher employment levels and more even distribution of income, the best policy would be the promotion of the new technology without resorting to certain types of mechanization.

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This book is a brief survey of land reform programmes in Japan, Taiwan, Philippines, South Korea, Malaysia and Thailand.

Ajami, Ismail

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Family size was positively related to size of landholdings among a small sample (N=74) of villagers in Iran. Smallest family size was found among landless laborers. Small sample from only three villages limits generalizability.

Ajami, Ismail

- 1976 "Differential fertility in peasant communities: a study of six Iranian villages." *Population Studies* 30: 453-463.

A study of differential fertility in six Iranian villages. Landholdings were used as one factor in a composite measure of socioeconomic status. Size of landholding was positively related to number of living children and children ever born. Smaller differences although positive, were found between size of holdings and desired family size.

Alcantara, Cynthia Hewitt

- 1976 *Modernizing Mexican Agriculture: Socioeconomic Implications of Technological Change, 1940-1970*. Geneva: UNISRD.

This work deals with the "green revolution" in wheat in Sonora. A lengthy background of the land tenure history and politics of the area is included. Development in the region has concentrated the control of irrigated land into the hands of a few, reduced the Ejido sector to renters of their lands to wealthy agribusiness operators, and changed the Yaqui Indians from subsistence farmers to indebted laborers who still "own" land but have lost control of it to the National Ejido Bank. Smallholders have been forced to sell out and now must work as agricultural labor.

Allen Elizabeth

- 1975 "New settlement in the Upper Amazon Basin." *Bank of London South American Review* 9(11): 622-628.

This article examines the settlement that has taken place in the area east of the Andes between Colombia and Bolivia in the upper Amazon Basin. Planned as well as spontaneous settlement is considered. The objectives of lowland development are discussed and the means for reaching such objectives are put forth. The means include infrastructure and credit as well as cohesive development areas as opposed to strung out settlement along penetration roads. It is pointed out that lowland tropical development will not alone solve the pressing economic problems of the involved countries. It is recommended that financial investment in the future should be directed to support successful spontaneous movements rather than planned colonies.

Ames, Glenn Clifford Webster

- 1973 *Ryot's Reward: A Study of Production Credit Repayment Problems of Small Farmers in Mysore State, India*. Doctoral dissertation, University of Tennessee, Knoxville.

This study reports on loan repayments among 136 farmers-member-borrowers of 35 primary agricultural credit cooperatives in Mysore State, India. The relationship between repayment and various socioeconomic variables is tested. The author found that

defaulters had fewer assets than nondefaulters, and that repayment failures were closely tied to crop failures.

Arnold, Fred and Chintana Perjaranonda

1977 Economic Factors in Family Size Decisions in Thailand. Report No. 2, World Fertility Study, Bangkok, Thailand.

Early findings from the 1975 World Fertility Survey in Thailand are presented. This report deals with the perceived benefits and costs of children. Selected findings include the "perceived advantages of a large family" by size of holdings. The percentage reporting advantages of children as help in a family enterprise varied directly with size of holding. Farmers with employees were slightly less likely to list this as an advantage of a large family.

Baack, B. and J. D. Reid

1976 "Land tenure patterns and property rights in agriculture." Journal of Economic History 36 (March): 29-32.

This article is the summary of an economic research workshop that explored the causes of tenure choices. The history of various sharecropping patterns was considered. A new model of tenant agriculture was proposed that would incorporate administrative aspects, crop characteristics as well as the heterogeneity of the factors of production.

Barker, Randolph, et al

1972 "Employment and technological change in Philippine agriculture." International Labour Review 106(2-3): 111-139.

Mechanization in the Philippines began with sugar cane production. By the late 1960's rice regions were also being mechanized, but to a lesser extent due to a variety of factors. Mechanization thus far has not resulted in any major labor displacements. The stated government policy is to provide credit for small farmers, but it appears larger landholders are receiving this money and using it to purchase tractors. This trend may pose a threat to the tenant holders. A few cases of eviction have already occurred.

Barraclough, Solon (ed.)

1973 Agrarian Structure in Latin America: A Resume of the CIDA Land Tenure Studies. Lexington, Mass.: Lexington Books.

Responding to the resolutions adopted by the Punta del Este Conference of 1961 the Organization of American States carried out, through the inter-American Committee for Agricultural Development (CIDA), a study of land reform and agricultural development. It was designed to: describe present land tenure systems, examine the relations between land tenure and development, and to determine criteria for the evaluation of agrarian reform programs. The principal hypothesis of the CIDA studies is that the present

system of land tenure in Latin America can be modified in order to achieve a more rapid economic and social development. The countries covered in this volume include Argentina, Brazil, Chile, Colombia, Ecuador, Guatemala, and Peru.

Barraclough, Solon L. and Domike, Arthur F.

1966 "Agrarian structure in seven Latin American countries." *Land Economics* 42, No. 4 (November), pp. 391-424.

Barraclough, Solon and Juan Carlos Collarte (eds.)

1973 *Agrarian Structure in Latin America. A Resume of the CIDA Land Tenure Studies of: Argentina, Brazil, Chile, Colombia, Ecuador Guatemala, and Peru.* Lexington, Massachusetts: D. C. Heath and Company.

The first part of this work is concerned with the general background of tenure patterns found in Latin America today. The relationships that land tenure has to social and economic development and to agrarian reform are put forth. The various types of agrarian reform policies are then considered. Following this discussion, seven case studies for the countries listed above are presented. Historical patterns are described and predictions of achievements and possibilities, were agrarian reforms implemented, conclude each case.

Bautista, F. and T. Wickham

1974 *The Tractor and the Carabao: A Socio-Economic Study of the Choice of Power Source for Land Preparation in Nueva Ecija, Los Banos.* Philippines: IRRI.

The study presents the results of a farm survey carried out in the Philippines. Based on a small sample of rice farmers in Nueva Ecija, the authors estimate that the labor inputs of primary and secondary tillage is about 7.4 man days per hectare using carabao. This is compared to 4.0 days for farmers using small two wheel tractors.

Beaver, Steven E.

1975 *Demographic Transition Theory Reinterpreted.* Lexington, Mass.: D.C. Heath and Co.

An empirical study of the theory of demographic transition in Latin America. The author develops a series of propositions from transition theory and tests these with lagged variables for 24 countries from 1950 to 1969. Land availability was strongly related to fertility in a multiple regression analysis containing a series of demographic and social variables.

Benswanger, H. P.

1978 *The Economics of Tractors in South Asia: An Analytical Survey.* New York: Agricultural Development Council.

This study reviews a large number of empirical works that have been done over the last few years in the Indian subcontinent. The report argues that in order to estimate the impact of mechanization, the foregone employment of not investing capital into employment-creating agricultural investments should also be counted.

- Berkner, Lutz K. and Franklin F. Mendels  
1978 "Inheritance systems, family structure, and demographic patterns in Western Europe, 1700-1900." Pp. 209-223 in Charles Tilly (ed.), Historical Studies of Changing Fertility. Princeton: Princeton University Press.

The relationship between inheritance systems and nuptial and fertility patterns in Western Europe between 1700 and 1900 is examined in an historical analysis. The authors argue against a simple effect of inheritance systems on demographic behavior. Economic opportunity, market forces, and land tenure systems may interact with aspects of the inheritance system to influence nuptial patterns and fertility.

- Bhalla, A.  
1976 "Technology and employment: some conclusions." International Labour Review 113(2): 189-203.

The author reviews the "static" and the "dynamic" approaches to identification and introduction of appropriate technology. It is argued that if research and development for appropriate technology is to be carried out, it should be done via the concept of need-based research and done in cooperation with local universities and industrial users.

- Birdsall, N.  
1977 "Analytical approaches to the relationship of population growth and development." Population and Development Review 3: 63-102.

This article reviews the principal theoretical approaches to the study of the relationship between population growth and economic development.

- Bose, S. R. and E. H. Clark, II  
1969 "Some basic consideration on agricultural mechanization in West Pakistan." The Pakistan Development Review 9 (Autumn): 273-308.

Using field survey data for Pakistan the authors report that interviewing farmers in the Punjab who have mechanized the results indicate that there is a consistent response that labor force per acre had been reduced by about 50 percent compared to the pre-mechanization rate.

- Boserup, Ester  
1970 Women's Role in Economic Development. London: George Allen and Unwin, Ltd.

This is a path-breaking book which was among the first to focus attention on the impact on women of rural development programs in developing societies. Drawing most of the material from Africa, Boserup argues that the introduction of new technology has increased the "productivity gap" between the sexes as men monopolize the use of new equipment and modern agricultural methods which increases their economic output relative to females.

- Braun, Rudolf  
1978 "Early industrialization and demographic change in the Canton of Zurich." Pp. 289-334 in Charles Tilly (ed.), Historical Studies of Changing Fertility. Princeton: Princeton University Press.

Historical data are used to argue that rapid population growth in the Canton of Zurich occurred as a result of the growth of cottage industries. Moreover, cottage industries developed only where the local agrarian communities were loosely organized and did not prevent growth beyond fixed limits. Agricultural-industrial interactions are discussed.

- Burki, S. J., et al  
1977 Global Estimates for Meeting Basic Needs: Background Paper No. 1. Washington: World Bank.

The World Bank estimates that approximately half of the rural population of developing countries, more than 650 million people, suffer from "absolute" poverty. The number is expected to increase to 1.1 billion by the year 2000.

- Carter, Elizabeth  
1970 Findings and Implications for A.I.D. Spring Review of Land Tenure, June 2-4, 1970. No. AID-SR-70-13.

The major findings that emerged from the Spring Review of Land Tenure, 1970 are discussed in terms of their policy implications for USAID: 1) tenure is a significant dimension of a country's development; 2) support of tenure reforms need not be withheld for fear of economic reasons; 3) mechanization and land consolidation should be discouraged; 4) window dressing "reform" schemes shouldn't be supported; 5) USAID may constructively support a dominant, indigenous political will for land reform; 6) how and when a reform should be carried out was beyond the scope of the Review; and 5) USAID should consider assigning appropriate staff to work on land reform problems.

Chaney, Elsa and M. Schmink

1976 "Women and modernization: access to tools." Pp. 160-182 in J. Nash and H. I. Safa (eds.), *Sex and Class in Latin America*. New York: Praeger.

The authors argue that modernization not only fails to confer equal benefits to both sexes, but that women's situation actually deteriorates as rural development takes place.

Chambers, Robert and Jon Moris

1977 "MWEA: An irrigation rice settlement in Kenya." *Development Digest* 15(4): 75-90.

The MWEA rice project represents a highly successful enterprise from the standpoint of technical agriculture, economic profitability and administrative management. Socially, it is harder to judge. Two thousand landless immigrant workers were involved in this project. The project has produced working population who feel insecure about their tenure rights. The women in this project have lost their traditional power over subsistence income, therefore they have lost domestic power as well. Credit, housing, production services and supplies and marketing were made available through the project. Social infrastructure programs such as schools and health posts have been more limited as has participation of the tenants in managerial decisions.

Chaplin, David

1971 "Some institutional determinants of fertility in Peru." Pp. 223-230 in David Chaplin (ed.), *Population Policies and Growth in Latin America*. Lexington, Mass.: D. C. Heath and Co.

The system of landholding in Peru is discussed as one institutional determinant of fertility. Land scarcity and concentration are seen as limiting fertility by delaying marriage among smallholders and sharecroppers.

Christodolou, D.

1977 *Agrarian Reform in Retrospect: Contributions to its Dynamic and Related Fundamental issues*. Paper presented at the International Seminar on Agrarian Reform and Institutional Innovation in the Reconstruction and Development of Agriculture: Major issues in Perspective. Madison, Wisconsin, 14-22 July 1977.

This paper presents a selective analysis on a world scale of situations concerning important issues and action relevant to agrarian reform in the post-1945 period with a view to pinpointing the dynamic elements of the problem. The analysis is followed by some generalizations on the fundamental attributes of agrarian reform and a theoretical presentation of sectors' interactions within a tentative typology of political elites and their role in agrarian reforms. The paper ends with some concluding observations pointing to essential new directions in agrarian reform study and action.

- Clayton, E. S.  
1974 "A note on farm mechanization and employment in developing countries." *International Labour Review* 110(1): 57-62.
- Connell, K. H.  
1965 "Land and population in Ireland: 1780-1845." Pp. 423-433 in D. V. Glass and D. E. C. Eversley (eds.), *Population in History*. Chicago: Aldine.
- The author presents an historical analysis of Irish marriage and fertility patterns before the famine. He argues that the Irish system of land tenure, coupled with the increasing adoption and reliance upon the potato, led to subdivision of holdings and earlier marriage.
- Cummings, Ralph W., Jr.  
1978 "Land tenure and agricultural development." Land Tenure Center Paper No. 117. Madison: Land Tenure Center, University of Wisconsin.
- A typology of land tenure systems is elaborated based on the type of ownership/distribution (concentrated, dispersed and collective and the size (small, dualistic and large). On the basis of the eight types of tenured systems identified, the author discussed criteria for evaluating land tenure systems, including such considerations as: net value of production, marketed surplus, capital investment, participation in the economy, and policy implications.
- Davis, Kingsley  
1963 The theory of change and response on modern demographic history. *Population Index* 29: 345-366.
- The author argues that populations respond to changing conditions in complex ways including migration, abortion and other changes in demographic behavior.
- D'Incao e Mello, M. C.  
1976 *O Boia-Fria: Acumulacao e Miseria*. Petropolis, Brazil: Editora Vozes.
- The author outlines the structural conditions which have given rise to the phenomenon of the landless labourer in southern Brazil who lives in an urban area but travels daily to work in the fields. It is argued that this is a result of the accumulation and reproduction of capital in the hands of those who own capital at the expense of the increasing number of proletarianized rural workers.
- DeJanvry, A.  
1973 "A socioeconomic model of induced innovations for Argentine agricultural development." *Quarterly Journal of Economics* 87(3): 410-435.

The socioeconomic model is used to understand the stagnation of the Argentine agricultural sector. This is done through the discussion of the topics of: inducement of innovations, decision process in the inducement of innovations, the adoption of new technologies, the adjustment path of actual and latent demand, and induced innovations and Argentine agricultural development. The paper presents data that shows that the adoption of new technologies by some farmers raises the price of land and depresses the income position of nonadopters. The impact of this is immediate on those wishing to buy land and tenants who have to rent lands. Also, a strong bias against small farmers is access to credit, information and education was found to exist. This made it impossible for them to adopt new technologies.

- 1975 "The political economy of rural development in Latin America: an interpretation." American Journal of Agricultural Economics 57(3): 490-99.

The theory of unequal exchange between center and periphery is extended to provide an interpretation of rural underdevelopment in Latin America. It serves to explain both the causality of agricultural stagnation under dominance of the latifundio and the economic functionality of the subsistence sector where rural poverty is concentrated. The contradictions of the subsistence sector as a purveyor of cheap labor to the commercial sector of the economy imply population growth and ecological destruction that reinforce rural misery. This theory provides a framework to analyze the political economy of rural development programs. Land reform and small farmer rural development projects are discussed in this context.

- 1976 "The political economy of rural development in Latin America: an interpretation: Reply." American Journal of Agricultural Economics 58: 590-591.

Arguing from a theoretical perspective, the author posits that fertility should be negatively related to farm size. This relation is based on the declining marginal revenue of children associated with the increasing complexity of the tasks performed, the introduction of nonfamily labor, and labor-saving machinery.

DeVany, Arthur and Nicholas Sanchez

- 1977 "Property rights, uncertainty and fertility: An analysis of the effect of land reform on fertility in rural Mexico." Review of World Economics 113: 741-764.

The Mexican system of land rights termed ejido is argued to exert a pronatalist effect on fertility. An ecological analysis of 48 municipalities in the State of Mexico found evidence of a significant effect. Regardless of the measure used, fertility varied positively with the ejido-related landholdings.

Devany, Arthur and Nicholas Sanchez

n.d. "Land tenure structures and fertility in Mexico." Unpublished paper, Department of Economics, Texas A&M University.

Same data used in the citation above. A slightly different theoretical perspective is employed.

De Wilde, J. C.

1967 Experiences with Agricultural Development in Tropical Africa. Baltimore, Md.: Johns Hopkins Press.

The first volume of this two volume work, contains a description of the study, an overview of the principal features of African agriculture, as well as chapters on the labor force, mechanization, credit, extension, land tenure and on rural life. This volume ends with a summation of past development progress, conclusions on certain aspects of development and points out implications for the future. The second volume is the case studies. The studies include material on settlement schemes, irrigation schemes, regional development programs and national development plans.

1971 "The manpower and employment aspects of selected experiences of agricultural development in tropical Africa." International Labour Review 104(5): 367-385.

The author analyses the employment effectiveness of a number of agricultural development projects, and concludes that, if African population increase is to find a livelihood in the rural areas serious attention must be directed to rural development programs and special efforts must be made to include the poorer regions that have been left out of the mainstream of development.

Deere, Carmen Diana

1978 The Development of Capitalism in Agriculture and the Agriculture and the Division of Labor by Sex: A Study of the Northern Peruvian Sierra. Unpublished Ph.D. dissertation, Agricultural Economics, University of California, Berkeley.

A case study of the impact of capitalism on sex roles in Cajamarca, Peru. The author concludes that, as the majority of the peasantry became proletarianized, the peasant household became less the focus of direct production. The division of labor by sex was responsive to these changing material conditions as traditional sex roles broke down with the insertion of the household into the wider economy. Women's participation in agriculture, formerly a male domain, increased as men were forced to migrate temporarily from the household in search of wage work.

- Delgado, Oscar (ed.)  
1965 Reformas agrarias en la america latina. Mexico: Fondo de Cultura Economica.

This is a collection of articles and essays dealing with the subject of agrarian reform in Latin America. The book is divided into three parts: The first part provides a general overview of the subject; the second part examines the experiences of Mexico, Cuba, Bolivia, Venezuela and Chile; the third part is concerned with counter-reform in various nations, including Guatemala, Colombia, Ecuador, Brazil and Uruguay. The case of the large banana plantations of Central America is considered separately in part three.

- Demenev, Paul  
1968 "Early fertility decline in Austria-Hungary: A lesson in demographic transition." *Daedulus* 97 (Spring): 502-522.

Austrian regions are described historically as fitting the transition theory pattern of fertility decline, while Hungarian provinces did not fit the pattern. Moreover, in the Hungarian provinces fertility decline appeared to originate among the peasantry in response to land pressures.

- Domike, A. L.  
1970 "Colonization as an alternative to land reform." Paper for Spring Review, Land Reform, AID, Washington, D.C., June 2-4.

Argues that settlement programs cannot "do away with" the need for agrarian reform because of reasons that are both economic and political. However, if the question is "can new land settlement programs effectively supplement land reform?" the answer is a qualified affirmative.

- Dorner, Peter (ed.)  
1971 Land Reform in Latin America. Issues and Cases. Land Economics Monograph Series Number 3. University of Wisconsin, Madison: Land Tenure Center.

This book examines the question of land reform in Latin America and presents various case studies of rational land reform programs. The first part presents a conceptual framework for understanding the policy issues of land tenure reform. The second part examines the relationships between reform and development. The third part contains case studies of Chile, Bolivia, and Colombia. The fourth part presents a discussion of supplementary reform measures, including colonization and peasant organizations. The book concludes with a chapter on policy implications.

- Downing, T. C.  
1977 "Partible inheritance and land fragmentation in a Oaxaca village." *Human Organization* 36(Fall): 235-43.

Insofar as public policy is based on assumptions about society, social scientists may influence the policy process by identifying and testing the validity of commonly held beliefs. This approach to applying anthropology is exemplified by investigating the assumption that partible inheritance leads to the fragmentation of land using data collected in a peasant village in southeastern Mexico. A simple method for measuring the rate of fragmentation is provided.

Dozier, Craig L.

1969 Land Development and Colonization in Latin America: Case Studies of Peru, Bolivia, and Mexico.

This work provides a descriptive account of the settlement zones of Peru, Bolivia and Mexico. Detailed reports of directed colonization programs are included.

Driver, Edwin

1963 Differential Fertility in Central India. Princeton: Princeton University Press.

Analysis of a survey conducted in Central India in 1958. Detailed cross-tabulations are presented with most standard social and demographic variables. The author reports a positive relationship between size of holdings and fertility.

Easterlin, Richard A.

1971 "Does human fertility adjust to the environment?" American Economic Review: Papers and Proceedings 61: 399-407.

Early analysis of relationship between land and fertility. Illustrative data are presented consistent with the land availability and fertility thesis.

1976a "Population change and farm settlement in Northern United States." The Journal of Economic History. 36: 45-75.

The "bequest" model is developed to explain the relationship between land availability and fertility. The increasing scarcity of land in older, more settled areas is seen to limit farmers' changes of setting up children on nearby farms, thus leading to lower fertility. Land availability was found to be positively associated with fertility, but no relationship was found between size of holding and fertility.

1976b "Factors in the decline of farm family fertility in the United States: Some preliminary research results." Journal of American History. 63:600-614.

An analysis of 20,664 households in 102 townships in states from New Hampshire to Kansas is used to show that fertility varies directly with the availability of land. An exception to this

finding occurs in that the highest fertility is not found on the frontier, but in the area just next to the frontier. Easterlin argues that "second generation" migrants had the highest fertility.

- Easterlin, Richard A., George Alter and Gretchen A. Condran  
 1975 "Farm and farm families in old and new areas: The northern states in 1860." Revised draft of paper presented at the MSSB Summer Conference on Historical Demography, Williamstown, Mass., July 14-17, 1974. University of Pennsylvania, mimeo.

A more detailed discussion and presentation of data than given in the preceding two citations. The "bequest" model is developed and tested with individual household data. Farm labor is reported to be unrelated to fertility in newer settled areas.

- Esman, Milton  
 1978 Landlessness and Near-Landlessness in Developing Countries. Ithaca, New York: Rural Development Committee, Center for International Studies, Cornell University.

This study presents world-wide estimates of the degree of landlessness and near-landlessness in rural areas. The principal conclusion is that the economic growth in LDCs has bypassed the rural poor and threatens to create even worse conditions in the future.

- FAO/UN  
 1954 Progress in Land Reform. Analysis of replies by governments to a United Nations questionnaire. New York: UN Department of Economic Affairs.

A global review of general reform policies and agrarian structures is presented in the first part of the paper. Part II considers the various measures taken to implement general reform policy, including: transfer of ownership, land settlement schemes, tenancy conditions, employment, land consolidation, land registration, credit, taxation, and co-operative development. The paper concludes by comparing the situations of the developed countries vs. the less developed countries, as well as considering the effects of the various measures tried in agrarian reform situation.

- 1956 Progress in Land Reform. Second Report. Analysis of replies by governments to a United Nations questionnaire. New York: UN Department of Economic and Social Affairs.

A review of the agrarian situation in the reporting countries is presented. Differences in policy between the developed countries and the less developed countries are presented. The policies of the developed countries have as their objective, improvement of the institutional framework of agriculture,

without major changes in the agrarian structure. In the less developed countries, the importance of a sound tenure system is increasingly recognized as a pre-condition for development; the difficulties of creating such a tenure system via land tenure reform policies is stressed.

1970 Progress in Land Reform . Fifth Report. New York: United Nations.

This report was drafted after taking into consideration the conclusions of the World Land Reform Conference held in 1966, therefore the purpose and scope of the report is different from earlier reports in the series. More emphasis is given to the tiller of the land, i.e., peasant, tenant, and farm labourer. The problems and progress in reform of tenure is discussed in terms of production processes, investment and credit, administration of land reforms, popular participation and balanced development. The paper ends with a call for more research on the development process and the need for regional planning within the context of national planning in developing countries.

1976 Progress in Land Reform. Sixth Report. New York: United Nations.

The first part of this paper related the major dimensions of development problems with agrarian structures. A major problem in development has been the neglect of the rural sector in favor of rapid industrialization. The problem of population is discussed in terms of social and economic development rather than policy family planning. Developments and trends in agrarian structures throughout the world are considered. Results have been very mixed. The situation in Africa has been deteriorating especially in pastoral areas, in Asia conventional reform measures have not succeeded although the Chinese (Peoples Rep.) approach offers a valid alternative, and in Latin America, the progress has been limited.

FAO/UN  
1970

Special Committee on Agrarian Reform. Agrarian Reform in Asia and the Far East. (Regional Analysis Paper) Bangkok, Thailand: Regional Office for Asia and the Far East.

The contemporary agrarian patterns of the various regions in Asia and the Far East are presented. Conditions that have created these patterns are explored. Tenancy reforms and their effects throughout the area are discussed. The Second Development Decade Program and the role of the U.N. and other agencies is presented. The proposed impacts of the program are considered.

FAO/UN  
1971 "Agrarian reform in Africa." Regional Office for Africa.

There has been little agrarian reform in Africa because of possible explosive consequences. But a "green revolution" is probably imminent.

FAO/UN  
1974a "Report on the FAO Expert Consultation on Emerging Agrarian Structures in Africa," held in Dakar, Senegal, 29 November - 1 December, 1973.

Economic development programs in Africa introduced trade, monetization, migration, colonization, these have influenced the traditional system and is forcing change. African governments need to consider possible policy implications.

FAO/UN  
1974b Land Reform, Land Settlement, and Cooperatives. 1974 No. 1/2. Agrarian Reform in China--Objectives, Approach, Achievements.

Agrarian policy of Mao Tse-Tung's China, the collective approach. By collectivizing agriculture the individual family was freed from subsistence risks, so facilitating innovations--the use of mass mobilization was assessed.

FAO/UN  
1974c Land Reform, Land Settlement and Cooperatives 1974--No. 1/2. Sixth Report on Progress in Land Reform 1968-1974. Joint UN/ILO/FAO Report.

Conference to consider the Sixth Report on "Progress in Land Reform" which covered the period 1968-1974. Preoccupied with the need for a new set of political and social values that will take care of the "small cultivators," post Green Revolution victims.

FAO/UN  
1975 Land Reform, Land Settlement, and Cooperatives. 1975 No. 2. Land Reform and Development in Thailand--Chaiyang Chuchart.

Deals with Agricultural Land Reform Law of January 17, 1975. Provisions and institutions to implement the law.

FAO/UN  
1979 Review and Analysis of Agrarian Reform and Rural Development in the Developing Countries since the Mid-Sixties. Reference Document for World Conference on Agrarian Reform and Rural Development, Rome, 12-20 July 1979. WCARRD/INF. 3.

This document, prepared in anticipation of the World Conference, reviews and analyzes the following aspects of agrarian reform

and rural development in the developing countries since the mid-1960's: (1) overall socio-economic conditions in these countries, (2) the participation of rural people in development, (3) the success or failure of government policies and programs, and (4) the reasons for these successes or failures. The information for the document comes from 55 country review papers, special case studies, and other contributions from the UN system. It is a comprehensive and up-to-date source of information on agrarian reform and rural development.

FAO/UNFPA

1975a Report on the FAO/UNFPA Seminar on Agricultural Planning and Population. Malta, 18 November - 7 December, 1974. Rome: FAO.

The Seminar was held to consider questions regarding food supply and population growth. One of the main objectives was to review the concept of rural development. It was stressed that in order for agricultural innovations to be effective, the agrarian structure must be conducive to them. Rural development should be seen as part of regional development and planning should be undertaken to include disadvantaged areas and populations in development. Agrarian reform is seen as an essential and vital element in integrated rural development.

FAO/UNFPA

1975b Report on the FAO/UNFPA Seminar on Population Problems Related to Food and Agricultural Development in Asia and the Far East. Held in Bangkok, Thailand 9-13 December, 1974. Rome: FAO.

Employment, food and population are the three most critical areas in rural development. The complex relationships among these three factors are neither easily nor adequately understood by planners and administrators. FAO has a responsibility to help create an awareness of the value of explicit national population policies for promoting better rural living and for bringing about more rapid economic and social progress through improved agricultural and rural development. This can be done through FAO's work in education, training and extension and through the promotion of integrated approaches to rural development.

Feder, E.

1970 "La 'funcion social de la tierra' y la pobreza rural en la America Latina." El Trimestre Economico 37(145): 3-38.

The author notes that, in nearly all Latin American countries, agrarian reform legislation is based on the notion of the "social function of land" (la funcion social de la tierra). This has provided the major loophole that allows the continuation of large latifundios. According to the legal tradition, land can only be expropriated in the "public interest." By extension, property or land that complies with its "social function"

(i.e., which is used in the public interest) is not subject to expropriation. The effect of this criteria is to shift the question away from the concentration of land per se and to invoke criteria related to production and productivity that must be applied to each individual case. In effect this takes all of the "teeth" out of agrarian reform legislation.

- 1975 "The new penetration of the agricultures of the underdeveloped countries by the industrial nations and their multinational concerns." Occasional Papers No. 19, Institute of Latin American Studies, University of Glasgow.

An infusion of money into the sector of the rural poor will not, and cannot, go to the root causes leading to poverty. The existence of a powerful elite and innumerable numbers of landless and near landless is an almost iron-clad guarantee that benefits accruing to the poor via the World Bank scheme will be syphoned off by the landed elite. The result will be the disappearance of the peasant-landowners or tenants and their control over any land.

- 1976 "How agribusiness operates in underdeveloped countries." Development and Change 7 (Oct.): 413-443.

Argues that the penetration of multinational corporations into the agricultural sector of underdeveloped countries (called agribusiness) is having serious implications. In the production-contract system used by agribusiness the growers most likely to bear the heaviest losses when the market is erratic are the smallest producers. Modernization of underdeveloped agriculture has a fundamental anti-peasant bias that will tend to eliminate the small producer.

- n.d. "The new World Bank programme for the self-liquidation of the third world peasantry." Mimeograph.

Capitalists and industrial countries are more interested in investing in agriculture and agricultural related industries because the profitability of overseas industrial investments have been gradually declining. This is seen as a new phase in the expansion of capitalistic investment in the Third World and the World Bank will play an important role in the expansion. The "small" green revolution planned by the Bank will have disastrous consequences for the landless and near landless, just as the "big" green revolution did.

Flores, Edmundo

- 1970 "The concept of land reforms: Its relation to agricultural and socio-economic development." Solidarity 5(7): 31-40.

Land reform is viewed as a development of the modern age; it pursues two different objectives: 1) improved allocative

efficiency and factor proportionality in the agricultural sector; and 2) general economic development. The author argues that land reform is a redistributive measure which transfers power, property, income, and status from one group to another. Land reform should not be confused with "substitute" programs including hybrid seeds, colonization, infrastructure investment, and literacy campaigns.

- Forster, Colin and B.S.L. Tucker  
 1972 Economic Opportunity and White American Fertility Ratios, 1800-1860. New Haven: Yale University Press.

A re-analysis of Yasuba's earlier work on fertility and land availability. A more sophisticated analysis involving a multiple regression model and employing lagged birth rates basically supports Yasuba's argument. Land availability is significantly related to fertility and is considerably more influential than the percentage of the population that was urban.

- Frankel, Francine R.  
 1971 India's Green Revolution Economic Gains and Political Costs. Princeton, New Jersey: Princeton University Press.

This book examines five districts, selected from the 114 districts involved in the Intensive Agricultural Development Program, which included high yield variety programs. The five districts include both wheat and rice areas. All of the rural classes were considered in the analysis; landlord, tenant, small holder and landless agricultural workers. It is shown that in areas where economic disparities existed, the introduction of the HYV package has sharpened the disparities and led to polarization. The impact on the landless labour has been severe.

- Friedlander, Dov  
 1969 Demographic Responses and Population Change. Demography 6: 359-381.  
 1970 The Spread of Urbanization in England and Wales, 1851-1951. Population Studies 24: 423-443.

This article analyzes the relationship between urbanization, rural out-migration and fertility.

- Gerosvitz, M.  
 1976 "Land reform: Some theoretical considerations." Journal of Development Studies 13(Oct.): 79-91.

This paper discusses alternative explanations of the empirically established inverse relation between the size of farm and the output-land/labour-land ratios used in agricultural production in LDCs. The analysis establishes the implications

of the various explanations for changes in income distribution and agricultural output associated with different types of land reform programmes. These implications are rather heterogeneous and are extremely sensitive to the particular explanation of the production ratio pattern which is adopted.

Garcia, Antonio

1967 Reforma Agraria y Economica Empresarial en America Latina. Santiago: Editorial Universitaria, S.A.

This work explores the relationship between agrarian reform and the economics of industrialization. The various types of reform are discussed as well as the various types of tenure found in Latin America. A structural analysis of the modernization of agriculture is offered. Case studies of agrarian reform are presented and analyzed.

Goldscheider, C.

1971 Population, Modernization and Social Structure. Boston: Little, Brown & Col.

The author presents a review of the major themes in demography: fertility, mortality, migration, etc. The publication is a useful textbook that presents an extended discussion of theoretical issues and empirical findings.

Gordon, D.

1976 Credit for Small Farmers in Developing Countries. Boulder, Colorado: Westview Press, Inc.

Presents a summary of the main conclusions reached by a major study in 1972-73 of small farmer credit programs. The study was sponsored by the Agency for International Development.

Gotsch, C. H.

1972 "Technical change and the distribution of income in rural areas." American Journal of Agricultural Economics (May): 326-340.

Argues that an examination of the impact of new agricultural technology on the rural sector requires an investigation of what might be called a "rural system." That is, in addition to the conventional farm management analysis required for an understanding of the effects of technical change on individual farms, predicting its ultimate impact necessitates explicit consideration of the interaction of such variables as the absolute size and distribution of holdings, the character of the land tenure system, and the nature of the organizations (public and private) that provide services to rural people.

1973 "Tractor mechanization and rural development in Pakistan." International Labour Review 57(2): 133-166.

This article is concerned with government policy in regard to mechanization. Both private benefit and social benefit are considered. Thus far policy has been favorable to mechanization and most programs have been biased toward the large farmers. This pattern has negative net social benefits, such as tenant eviction and land consolidation.

- Gonzales, E. N. and M. I. Bastos  
 1975 "O Boia-Fira: contradicao de uma agricultura em tentativa de desenvolvimento." Reforma Agraria 5(Sept/Oct).

The study uses the 1970 Demographic Census to estimate the number of rural workers resident in urban areas in Brazil. The article suggests that temporary wage-labor is expanding rapidly at the expense of both resident workers and different types of tenants. The "boia-fria" (rural wage earners living in urban areas) is regarded as representative of the rural proletariat which is in the process of formation.

- Griffin, Keith  
 1974a Political Economy of Agrarian Change: An Essay on the Green Revolution. Cambridge, Mass.: Harvard University Press.

This book is about technical change in the agricultural sector of LDCs and is concerned with the economic, social and political implications of introducing HYVs in rural areas of Asia and Latin America.

- 1974b The Political Economy of Agrarian Change. Boston: Harvard University Press.

This work is concerned with the process of technological innovation and its effect on the distribution of income and the growth of agricultural output. It is argued that the most important element that affects inequality is factor prices. A land reform is necessary but will not suffice to counter effects of distorted factor prices. Scale neutral innovations will always favor the prosperous at the expense of the poor, unless they are given equal access to knowledge, credit and new inputs.

- 1976 Land Concentration and Rural Poverty. New York: Holmes and Meier Publishers, Inc.

The theme of the book is that the distribution of income in the agricultural sector and the standard of living of the majority of the rural population are greatly affected by the degree of land concentration. The argument consists of a series of case studies in three continents, giving special emphasis to North Africa and Latin America with some attention given to Asia.

Griffin, Keith and A. R. Khan (eds.)

1972 Growth and Inequality in Pakistan. London: Macmillan.

A collection of essays that cover a range of topics including the post-independence development strategy that has been pursued by Pakistan, an analysis of growth and stagnation in agriculture, and a section on industry and trade. The series focuses on the idea that faster growth rates have not led to greater prosperity as the beneficial effects of growth have not trickled down to the impoverished masses. Policy alternatives that place a priority on welfare are discussed.

Hicks, Whitney

1974 "Economic development and fertility change in Mexico, 1950-1970." Demography 11: 407-421.

The author examines the relationship of selected development variables to fertility among 32 states of Mexico and among 31 rural areas in these states. Arable land per worker in agriculture was positively related to fertility. The most important variable in all equations was the percentage of the population who spoke an indigenous language.

Hiday, Virginia A.

1978 "Agricultural organization and fertility: A comparison of two Philippine frontier communities." Social Biology 25: 69-75.

Two agricultural communities in Mindanao are compared with regard to economic organization and fertility. The expected differences in fertility between subsistence and commercial agriculture communities were not obtained. However, land tenure appeared to influence fertility negatively through its effect on age of marriage.

Hamid, J.

1973 Agriculture Mechanization: A Case for Fractional Technology. New York: Agricultural Development Council.

The author argues that the labor displacement effect of tractorization does not necessarily hold in the case of small two wheel tractors. The argument is that small two wheel tractors replace animals rather than farm workers; large tractors presumably replace both.

Hatch, John K.

1974 The Corn Farmer of Motipe: A Study of Traditional Farming Practices in Northern Coastal Peru. Doctoral dissertation, Land Tenure Center, University of Wisconsin, Madison, WI.

Presents a detailed description of a typical small Peruvian corn farmer's activities during a crop cycle in 1972. The author

carefully details why farmers fell 32% short of repaying crop loans from a local cooperative. He concludes that the main reason for partial loan default was the fact that the use of the loans did not significantly increase farm productivity.

Hathaway, Dale E., J. Allan Beegle, and W. Keith Bryant  
1968 The People of Rural America. Washington: U.S. Government Printing Office.

A 1960 Census monograph which examines, among other characteristics, fertility in relation to county-level factors. The authors report, surprisingly, a negative relationship between the proportion of farmers and farm managers in the rural-farm population and rural-farm fertility. This finding is attributed to the negligible value of child labor.

Hawley, Amos H.  
1950 Human Ecology: A Theory of Community Structure. New York: The Ronald Press.

Hawley found fertility to be positively related to size of farm in Central Luzon, the Philippines. Using data from individual households, he found the highest fertility among farm tenants with the fertility of owners and laborers being more similar.

Huntington, Samuel P.  
1968 Political Order in Changing Societies. New Haven: Yale University Press.

"My effort here is to probe the conditions under which societies undergoing rapid and disruptive social and economic change may in some measure realize this goal [political stability]."

International Rice Research Institute  
1978 Research Highlights for 1977. Los Banos: Philippines.

A detailed study by the International Rice Research Institute of a village which has adopted high yielding rice varieties found that the expansion of irrigation systems and introduction of modern rice technologies have resulted in significant gains in income and production, but the population has expanded rapidly and the proportion of landless laborers is growing. If these trends continue, farm size will decline, real wages will fall, and value of tenancy rights will rise, widening the gap between farmers and landless workers.

Inukai, I.  
1970 "Farm mechanization, output and labour input: A case study in Thailand." International Labour Review 51(5): 453-473.

The findings support the contention that, in a dynamic setting, selective mechanization may create more jobs than it eliminates. In fact, labor saving devices (such as tractors and diesel pumps) have provided farmers with an opportunity to spread work over several seasons. As such they have on balance enabled farmers to increase the labor input in agriculture. But as with other aspects of progress, success is likely to depend on the planned integration with mechanization of a number of other aids to production.

Jacoby, Erich H.

1966 Evaluation of Agrarian Structures and Agrarian Reform Programs. Rome: FAO.

Deals with the concept of evaluation of agrarian structures and structural improvement programs, and reflects the experience of FAO in the field of evaluation.

Jaffe, A. J. and K. Azumi

1960 "The Birth Rate and Cottage Industries in Underdeveloped Countries." Economic Development and Cultural Change 9: 52-63.

This article reports on research that focused on differential fertility rates of women engaged in various types of economic activities. Women in cottage industries were found to have fertility rates comparable to women who were not employed. The authors conclude that employment per se does not have a negative effect on the birth rate as the relationship is contingent on whether or not the job is compatible with child-bearing.

King, Russell

1977 Land Reform: A World Survey. Boulder, Colorado: Westview Press.

This book presents a global view of the land reform situation. A general overview of the subject is contained in Part 1. Parts 2-5 cover the major geographical areas of the world: Latin America, Asia, Africa and the Middle East. Each of these sections contains case studies as well as an introduction to the region.

Kleinman, Davis S.

1973 "Fertility variation and resources in rural India." Economic Development and Cultural Change 21: 679-696.

A 17-variable model of fertility is examined for 315 districts in India. Cultivated acreage per household was positively related to fertility. Land concentration was more weakly related to fertility, but in the negative direction.

Knowles, Jane B. (ed.)

- 1977 International Seminar: Agrarian Reform. Institutional Innovation and Rural Development Major Issues in Perspective. Proceedings published in the Land Tenure Center Newsletters #56 and #57.

This Seminar was held on the Madison campus of the University of Wisconsin from July 14-22, 1977. The Seminar was a policy-oriented program. It attempted to address, region by region, current or accomplished programs in a number of representative countries. Attention was given to completed land reform programs, programs in progress, political shifts that have thwarted reform programs and colonization and settlement programs. The two newsletters contain brief reports on the papers and proceedings.

Kocher, Jane E.

- 1973 Rural Development, Income Distribution and Fertility Decline. New York: Population Council.

This monograph argues for attention to issues of equity in development policy. A sustained fertility decline is viewed as unlikely unless the benefits of development are widely distributed among the poor.

Ladejinsky, W.

- 1970 "Ironies of India's Green Revolution." Foreign Affairs 48(4): 758-768.

Argues that sharecroppers were worse off as a result of the Green Revolution because of the increased value of land which led landowners to evict tenants from their property.

LaPorte, Robert, James Petras, and Jeffrey Rhinehart

- 1971 "The concept of agrarian reform and its role in development: Some notes on societal cause and effect." Comparative Studies in Society and History 13(4): 473-485.

This article attempts to "critically assess past and current literature dealing with agrarian reform and its impact on agricultural development." Also attempts to assess role assigned to agrarian reform in social and political development.

Latif, Abdul, and Nuimuddin Chowdhury

- 1977 "Land ownership and fertility in two areas of Bangladesh." Bangladesh Development Studies 5: 239-245.

Mixed results are reported for a simple three-variable model relating size of holding, marital duration, and fertility. Size of holdings were significantly and positively related to fertility in a northern Bangladesh village, but no relationship

was found in a southern village. Small sample size and few control variables limit generalizability of findings.

Lee, T. H.

- 1971 *Intersectoral Capital Flows in the Economic Development of Taiwan, 1895-1960*. Ithaca, New York: Cornell University Press.

Taiwan represents an example of successful agricultural development. In the post-war period income distribution was sharply changed by the land reform program that increased the proportion of owner-cultivators and reduced the number of tenants. At the same time market mechanisms and profitability stimulated small farmers to adopt new technologies. Autonomous growth in the agricultural sector was systematically accomplished in such a way that the abundant resources of labor and scarce capital funds combined appropriately to increase output and contribute to industrial expansion through a system of taxation and financial institutions that effectively mobilized capital out of the agricultural sector into industry.

Leet, Don R.

- 1975 "Human fertility and agricultural opportunities in Ohio counties: From frontier to maturity, 1810-60." *Essays in Nineteenth Century Economic History*. David C. Klingman and Richard K. Vedder (eds.). Athens: Ohio University Press.

A measure of "agricultural stress" is used as an indicator of land availability. Eighty-three Ohio counties not containing a major urban center between 1810 and 1860 are used as the units of analysis. Land availability was positively related to fertility and accounted for almost two-thirds of the variance.

- 1976 "The determinants of the fertility transition in Antebellum, Ohio," *Journal of Economic History* 36: 359-377.

Ohio counties again are used as the units of analysis. A multiple regression analysis included measures of urbanization, sex ratio, regional background, and land value. Land value of non-urban land was employed as a measure of population pressure. Population pressure thus measured was strongly related to lower fertility.

- 1977 "Interrelations of population density, urbanization, literacy and fertility." *Explorations in Economic History* 14: 388-401.

The concept of agricultural opportunities is argued as comprising three dimensions: density, land availability, and value of land. The data were consistent with the land availability-fertility thesis. This paper contains one of the more systematic discussions of the dimensions of agricultural opportunities.

Lehmann, David (ed.)

1974 Peasant, Landlords, and Governments. Agrarian Reform in the Third World. New York: Holmes and Meier.

This is a collection of papers dealing with the questions of agrarian reform. The papers are divided into three geographical regions: Latin America, Chile and Peru; China, the People's Republic, 1947-1950; and India. Many of the papers mention and analyze rural social movements. All of the papers stress the need to examine the pre-existing agrarian structure in order to gain an understanding of the patterns of reform.

Lehmann, D.

1976 A Theory of Agrarian Structure: Typology and Paths of Transformation in Latin America. Center of Latin American Studies, University of Cambridge, Working Paper No. 25.

The author contends that the pattern of development in Latin America is such that where once anti-feudal reformism was consistent with an overall capitalist pattern of development, today it is increasingly difficult to seek the aims of reformism without confronting the power of capitalism. Under capitalism, more production and less inequality are not achieved by land redistribution alone. But other objectives are achieved: more peasants are incorporated into the market. Under socialism, reform initially stimulates the entrepreneurial urges of the peasantry, then central planning has to bring these urges to heel, or circumscribe quite strictly their market freedoms.

1978 "The death of land reform: A polemic." World Development 6(3): 339-345.

The ideology of land reform is separated into historicists and technocrats. The implications of both are discussed. The author presents his own interpretation of the state, social classes and agrarian structure based on the belief that the removal of "feudal" remnants does not necessarily lead to greater social equity. The author concludes that the issues at stake transcend land reform and argues that instead, they should encompass the quality and morality of political and economic relationships in society as a whole.

Lele, Uma J. and John W. Mellor

1972 "Jobs, poverty and the Green Revolution." International Affairs (London) 49(Jan.): 30-32.

The authors discuss the implications of the traditional approach to the question of economic development, noting the negative effects on employment and income distribution. Suggestions are offered to provide a positive alternative to the capital-intensive, import-displacing, low-employment growth pattern that has been followed in many low-income countries. They argue that

the emphasis be on consumer goods which would accelerate the growth of employment, savings and exports. A rapidly expanding food supply is considered a sine qua non for such an approach.

Lele, Uma

1975 The Design of Rural Development: Lessons from Africa. Baltimore: Johns Hopkins.

A study of rural development policies and programs in sub-Saharan Africa, making use of IBRD's field research.

Lindert, Peter H.

1978 Fertility and Scarcity in America. Princeton: Princeton University Press.

This study is a rather comprehensive examination of factors affecting U.S. fertility since 1900. An economic framework is employed to explain variation in marriage and childbearing among states. Land availability and land cost were significantly related to fertility variation among states in 1900, with land availability exerting the stronger effect.

Lorimer, Frank

1954 Culture and Human Fertility. Paris: UNESCO.

An early and comprehensive analysis of cultural factors influencing human fertility. Institutional factors such as religion, family structure and inheritance patterns are related to variations in fertility.

Lotchie, M. F.

1976 "Agrarian socialism in the third world: The Tanzanian case." Comparative Politics 8(3): 479-99.

A review article that examines the literature dealing with Tanzania's attempt to collectivize the agricultural sector. The literature shows that the ujaama system has been expensive to start and has not produced as expected. Those opposed to the system have participated in selling their produce illegally, planted only subsistence plots and have molded local opinion to stand in the way of further collectivization.

Martinez-Alier, V.

1975 "As mulheres do caminhao da turma." Debate e Critica 5: 59-85.

This study, done by an anthropologist, focuses on women who are part of the emerging class of rural wage laborers in Brazil who reside in urban areas and are transported daily to the work site in trucks.

Mamdani, Mahmood

1972 The Myth of Population Control: Family Caste and Class in an Indian Village. New York: Monthly Review Press.

A critical analysis of the Khanna Study in India. The author argues that children are valuable in acquiring, holding onto, and farming land in India. Thus high fertility is a rational response to the economic circumstances of Indian farmers.

Massey-Ferguson, Ltd.

1974 The Pace and Form of Mechanization in the Developing Countries. Toronto: Massey-Ferguson.

Published by a major producer of agricultural machinery, the article presents a list of the economic and social benefits of mechanization in developing countries.

Mazur, D. Peter

1975 "The influence of human fertility on the economic conditions of the rural population of Poland." Population Studies 27: 423-438.

Children ever born is treated as a causal variable influencing farm size. Family size varies directly with size of landholding. Polish Census data from 1970 were used with controls for age and duration of marriage.

Macinnis, R. M.

1977 "Childbearing and land availability: Some evidence from individual household data." Pp. 201-227 in Ronald Demos Lee (ed.), Population Patterns in the Past. New York: Academic Press.

Farm size and ratio of improved acreage to maximum ever improved were related to fertility in 1861 Canadian Census data. Number of children were greater, the higher the level of household wealth, as indicated by both farm size and farm progress. Reverse causality was suggested since farmers with older sons would have the labor to clear more land. Controls included age composition, farm size, ratio of unimproved to occupied land and a land utilization index.

McCoy, Terry

1977 "Reconsidering the Politics of Agrarian Reform in Latin America: A Comparison of the Chilean and Peruvian Experiences," in Latin America: Rural Life and Agrarian Problems, edited by Steffin W. Schmidt and Helen Hoyt Schmidt. Ames: Iowa State University Research Foundation: 50-80.

This comparative evaluation of the Chilean and Peruvian experiences with agrarian reform concludes that the political conditions conducive to the emergence of reform do not sustain it through implementation.

McFarquhar, A. A. M. and M. Hall

1970 "Mechanization and agricultural development: No miracle in Africa." Paris: Options Mediterraneees.

The authors, using data on cotton production in Uganda, report a 57 percent reduction in man-hours per acre for mechanized processes compared to the more traditional hand-hoe cultivation.

McInerney, J. P. and G. F. Donaldson

1973 The Consequences of Farm Tractors in Pakistan. Washington, D.C.: Development Economics Department; International Bank for Reconstruction and Development.

This is a study of the employment consequences of mechanization in Pakistan. The authors estimate that the use of four wheel tractors during the period 1933-70 reduced labor use per cultivated hectare by some 40 percent. It also resulted in 4.2 tenant families replaced per farm and a net overall destruction of about five jobs per tractor.

Merrick, Thomas W.

1978 "Fertility and Land Availability in Rural Brazil." Demography 15: 321-336.

Age specific birth rates in 1969 were negatively related to land scarcity measured by high land values, high man-land ratios and low incidence of latifundia. Fertility was positively related to subsistence agriculture and negatively related to percent of workers who were employees. Microregions in six states of southern, southwestern and central-western Brazil were studied.

The research reported is a partial replication of Easterlin's study which found that in the U.S. rural fertility in the late nineteenth century declined as land for starting new farms became more scarce. In Brazil it was found that literacy, child survival and access to land were relatively more important than land availability.

Merrill, W. C.

1975 The impact of Agricultural Mechanization on Employment and Food Production. Washington, D.C.: Economics and Sector Planning Division, U.S. Agency for International Development.

This study presents a thorough review of the effects of mechanization in agriculture. The topics include: the impact on yields, the intensity of land use, the effects in terms of both on-farm and off-farm employment.

- Modell, John  
1971 "Family and fertility on the Indiana frontier, 1820." *American Quarterly* 23: 615-634.

Modell fails to find support for Yasuba's findings on the relationship of density and fertility. The child women ratio was used for children 0-9 per 1,000 women 16 to 44 and population density was used as a proxy for land availability. White families were analyzed from the Indiana 1820 Census.

- Nelson, M.  
1973 *The Development of Tropical Lands: Policy Issues in Latin America*. Baltimore, MD: Johns Hopkins University Press.

Land development and the policy agents associated with them are evaluated. An analysis of economic, social and institutional factors that have played a role in the success or failure of a number of tropical highway and colonization ventures is presented. These aspects and the role of development, and conservation and use of natural resources are treated in 9 chapters.

- Nelson, Michael  
1977 "Twenty-four settlement projects in Latin America." *Development Digest* 15(4): 91-103.

A survey of experience in 24 settlement projects on new lands in tropical Latin America suggests that elaborately directed government projects in remote, unsettled areas are least likely to bring about dynamic and viable growth; more modest assistance to semi-directed or spontaneous settlements are a more promising use of resources.

- Nisbet, Charles T.  
1967 "Supervised credit programs for small farmers in Chile." *Inter-American Economic Affairs* 21(2): 37-54.

Reports on the supervised credit program in Chile during the early 1960's. The author points out the weakness and problems found in the program, and concludes that the program has made little headway in increasing the output possibilities for small farmers; finds that financial success in such credit programs hinges on seven qualities, among which local control by small groups is prominent. The characteristics are: local controls and responsibility, credit given through a small group, encouragement of credit union growth from associations, clientele including a mixture of private and collective production, flexible mix of production and market credit, "networking" capital flows, and risk sharing.

Most credit programs do not penetrate deep enough into the society and chiefly benefit the middle classes. Such programs

allow their portfolios to "creep upward" to serve the upper classes and large landowners. This is done not only to the mere exclusion of the poor, but also the detriment of the poor by increasing the "push factors" of rural to urban migration.

Pohoryles, A. and A. Szeskin

1973 Land Tenure in Africa and Its Effects on Economic Growth. The David Horowitz Institute for the Research of Developing Countries. Paper No. 3.

Describes the different types of land-ownership patterns which point to the heterogeneity of land tenure systems in Africa. An attempt is made to survey the advantages and drawbacks of existing land tenure systems in Africa.

Raj, K. N.

1972 "Mechanization of agriculture in India and Sri Lanka (Ceylon)." International Labour Review 106(October): 315-334.

In India and Sri Lanka, where labor is abundant and poverty widespread among the underemployed, mechanization of agriculture can be justified in terms of development objectives only if the required increases in output cannot be achieved otherwise. The author finds that in certain cases there was perhaps no alternative to mechanization for achieving increases in production, in some cases it has taken forms that have had no obvious beneficial effects on production or has been used as a means for reducing the dependence of large landowners on tenants or casual labor. Raj argues that the cause of mechanization is found less in terms of under-pricing of scarce resources (capital and foreign exchange) and more related to concentration of land ownership which removes the resource constraint.

Rao, C. H. Hanumatha

1972 "Farm mechanization in a labour abundant economy." Economic and Political Weekly 7(February): 393-400.

In India the cost of biological sources of energy seems to be increasing relative to that of mechanical sources even though unemployment is growing. The author argues that there are two types of mechanization: 1) the land augmenting type that will produce more employment via the rise in the scale of operations (tractorization); and 2) the human labor displacement type that has little land-augmenting potential (harvest combine). The displacement of mechanization may not prove to be socially beneficial. The author calls for a selective farm mechanization program that will emphasize the land-augmenting type, such as tractorization, which should raise the overall employment potential in the economy. The author cites evidence that the prevailing unequal distribution of land makes the cost of draft power

higher per acre for the large farmer. Therefore in the context of expanding agricultural output, large farmers may find mechanical sources less costly, especially because the participation of family labor may rise with mechanization which may further reduce their costs.

Rich, William

1972 "Smaller families through social and economic progress." Pp. 193-287 in Overseas Development Council (ed.), *New Directions in Development*. New York: Praeger.

The author agrees for equity in the benefits of development as a fertility-reducing strategy. The author would be sympathetic to the argument advanced in the Kocher citation above.

Repetto, R.

1977 "Income distribution and fertility change: A comment." *Population and Development Review* 3: 486-489.

Rogers, Jorge

1966 *Dos Caminos para la Reforma Agraria en Chile, 1945-1965*. Santiago: Editorial Orbe.

This book examines Chile's experience in agrarian reform during the period 1945-1965. The first part of the work considers the reform legislation of 1965. The second part considers the reform legislation and action that began in 1945. The book concludes by examining the 24 points necessary for an agrarian reform in Chile and by suggesting a legislative plan that incorporates the points.

Rosenzweig, Mark R.

1977 "The demand for children in farm households." *Journal of Political Economy* 85: 123-146.

This study measures fertility as the crude birth rate in farm population and relates it to value of land and farm buildings. Increase in farm size or value was related negatively to fertility. Author feels that there was an increase in the value of time on farm wives as well as a decrease in the pecuniary returns from children on the farm which were strong factors in lowering fertility.

Rosenzweig, Mark and Robert Evenson

1977 "Fertility, schooling, and the economic contribution of children in rural India: An econometric analysis." *Econometrica* 45: 1065-1079.

Authors studied relationship of child-woman ratios with land quality, measured by value per acre sown, mean landholding, and landholding inequality. Land size was positively related to

child-woman ratios as was the land quality measure. Inequality of landholdings was negatively related to fertility. The study included 189 districts in India for 1961.

Sanceratne, N.

- 1974 The Political Economy of Asian Agrarian Reform: A Comparative Analysis with Case Studies of the Philippines and Sri Lanka (Ceylon). Ph.D. dissertation, Development Studies, University of California.

Thoroughgoing agrarian reforms have been undertaken in Asian countries only where an incumbent elite has been displaced. In other countries landlord interests controlling political power have resisted agrarian reforms, using land reform rhetoric, symbolic legislation, unenforceable laws and reforms with very limited scope; such as reforms restricted to certain crops or certain types of ownership. The control of tenancy rents has generally failed due to the landlord-tenant relationship. Such incremental reforms may be the only path open to changing existing agrarian structures. These structures were built up over centuries and 25 years of small changes is a short period to redress the problem.

Schluter, M.

- 1971 "Differential rates of adoption of the new seed varieties in India: The problem of the small farmer." Occasional Paper No. 47. Ithaca, New York: Cornell University.

As compared to smaller cultivators, the larger farmers can better afford the risks of innovation. This paper documents the tendency of small farmers to lag behind the large farmers in adopting new technology.

Schmidt, Steffen W. and Helen Hoyt Schmidt (eds.)

- 1977 Latin America: Rural Life and Agrarian Problems. Ames, Iowa: Iowa State University Research Foundation, Inc.

This book is an outgrowth of the 1976 Midwest Association of Latin American Studies Conference held at Iowa State University, Ames, Iowa, October 23-25. Nine papers in three distinct areas form the body of the book. The three areas are rural themes in literature; agrarian radicalism--Mexico, Chile, Peru; and agrarian policy making and reform. All three areas address the matter of food production and rural life through both the technical and social natures of the problem.

Schutjer, Wayne A., C. Shannon Stokes and Gretchen Cornwell

- 1978 "Relationship among land, tenancy, and fertility among Philippine barrios." Paper presented at the annual meeting of the Population Association of America, Atlanta, GA, April.

This study showed direct relationship between land ownership status and the child-woman ratio, while indirect effect through female education was negative. Data were from 68 villages in one province of the Philippines. Age, female education, modernization and production patterns were controlled in the analysis.

Smith, T. L.

1969 "Studies of colonization and settlement." Latin American Research Review 4(1): 93-123.

The article reviews a number of studies that mention or deal specifically with colonization schemes in Latin America. The material is dated, but useful for locating earlier publications. The article presents a discussion of the various different definitions of the term "colonization" as used in Spanish and Portuguese.

Soles, Roger E.

1978 "Successful rural credit projects in Latin America." Development Digest 16(3): 15-35.

The Inter-American Foundation, directly funded by the US Congress, supports by grants, projects in Latin America. Some of these provide credit for relatively poor groups not normally eligible to receive commercial bank loans. The article reviews that experience.

Stoeckel, John and Moqbul A. Choudhury

1969 "Differential fertility in a rural area of East Pakistan." Millbank Memorial Fund Quarterly 47: 189-198.

The authors utilize three measures of socioeconomic status--land holdings, occupation and education, and studied relationships with total marital fertility rate. Landholding was negatively related to fertility and was a stronger relationship than either occupation or husband's education. No controls were utilized in this study of married couples in 15 villages of East Pakistan.

1973 Fertility, Infant Mortality and Family Planning in Rural Bangladesh. Dacca: Oxford University Press.

In this study, desired family size was related to size of landholdings. Families with no land had lower fertility than owners of medium size landholdings but did not differ from those with larger landholdings. Authors attribute the latter finding to a response by large landowners renting out land and requiring fewer children as labor. The study was done in Bangladesh with a sample of 1600.

- Stout, B. A. and C. M. Downing  
 1974 Selective Employment of Labor and Machines for Agricultural Production. East Lansing, Michigan: Institute of International Agriculture, Monograph No. 3.

This study presents a review of the degree of mechanization for selected countries as well as estimates of the impact of mechanization on employment.

- Stys, W.  
 1957 "The influence of economic conditions on the fertility of peasant women." Population Studies 11: 136-148.

Fertility as measured by children ever born and surviving children was related to size of landholding in this study. The relationship was clearly positive with the exception of landless households in 20 villages of southern Poland. Controls were made for birth cohort and age at marriage.

- Tai, Hang-Chao  
 1972 "The political process of land reform: A comparative study." Pp. 295-305 in Norman T. Upton and Warren F. Flechman (eds.), The Political Economy of Development: Theoretical and Empirical Contributions. Berkeley: University of California Press.

Comparative study of 8 LDCs focusing on the role of the elite.

- 1974 Land Reform and Politics: A Comparative Analysis. Berkeley: University of California Press.

- Teitelbaum, M.  
 1975 Relevance of Demographic Transition: Theory for Development Countries. Science 188: 420-430.

The author reviews the premises of the theory of the demographic transition in light of the situation faced by the currently developing nations.

- Tender, Judith  
 1975 AID and Small Farmer Organizations: Lessons of the Ecuadorian Experience. Prepared for the Office of Development Programs, Bureau of Latin America, Agency for International Development.

This study evaluates AID's assistance to various types of rural cooperatives in Ecuador over the past couple of decades. This includes credit unions, the Cooperative Bank of Ecuador, rice cooperatives, and a land sale guarantee program. The author finds a limited amount of success among these cooperatives in serving small farmers' needs.

Theisenhusen, William C.

- 1965 "Agrarian reform and economic development in Chile: Some cases of colonization." *Land Economics* 42 (3): 282-292.

A general background to the agrarian situation in Chile is presented. A survey of eight reform colonies was carried out. The results showed former farm laborers had not received title to the majority of the released land. Based on this survey the author predicts a failure.

Thiesenhusen, W. C.

- 1969 "Population growth and agricultural employment." *American Journal of Agricultural Economics* 51(November): 735-753.

- 1971 "Latin America's employment problem." *Science* 171(March): 868-874.

After reviewing the statistics on un- and under-employment in Latin America, the author offers as a solution the notion of "contrived dualism." This plan, given the land tenure structure in Latin America, would involve two subsectors: (1) The first would emphasize growth in marketable surplus (i.e., large farms); (2) The second would emphasize growth in employment giving priority to supporting small farm, and programs to provide secure and legal titles for present occupants of public lands.

- 1975 *Chile's Experiments in Agrarian Reform: Four Colonization Projects Revisited.* Land Tenure Center Reprint No. 121. Madison: Land Tenure, University of Wisconsin.

Four previously funded agrarian reform projects were studied, once in 1964 and again in 1970. Three of the four were originally collective farm operations, by 1970, all were private "family sized" farms. Family income has gone up in all four settlements. The dairy settlement appears to have been more conducive to developing an unequal pattern of family income distribution than the field crop settlements.

- 1978 "Some social consequences of mechanization." Paper presented at Conference on Agricultural Technology for Developing Nations, 24 May, University of Illinois-Urbana.

The author argues that mechanization leads to unemployment in stratified societies for a number of reasons including unequal access to credit, commodity prices and size of holding necessary for profitable use of mechanization. Tractors and high yield varieties increase the value of land and lead to tenant eviction. There are conditions where mechanization has a salutary effect on employment including extensive new land use, manpower release which can be deployed to other tasks and backward linkages to manufacturing.

Tilly, Charles (ed.)

- 1978 Historical Studies of Changing Fertility. Princeton: Princeton University Press.

This volume is a collection of essays in the area of historical demography written by a number of the best researchers in the field. The themes cover issues such as the history of fertility decline, the role of inheritance systems, the impact of industrialization and theoretical essays on the economics and sociology of fertility.

Tuma, E. H.

- 1965 Twenty-Six Centuries of Agrarian Reform: A Comparative Analysis. Berkeley: University of California Press.

- 1974 Major Accomplishments and Trends in Agrarian Reform. Paper prepared for the Sixth Progress Report on Land Reform. UN/FAO/ILO.

An overview of recent trends, since 1967, is presented. Various agrarian policies have been pursued, in some countries there has been a reversal of earlier policies as in Chile and Iraq. Iran has introduced corporate and agribusiness farming in place of small family farming. Also, the last few years have witnessed a sustained interest in biological farm innovations and less emphasis on institutional change. Labor-saving mechanization has received new emphasis perhaps due to greater political stability or better regional development. The demographic factor has become increasingly more conspicuous in reform proposals and development policies. New hopes in agrarian reform may be justified because more new approaches are being tried. Popular participation is increasing and governments have shown more flexibility than in the past.

Venkatappiah, B.

- 1972 "Issues in farm mechanization." Development Processes and Planning, No. 11.

Argues in favor of appropriate technology such as hand pumps, pedal pumps and other simple instruments that may open new possibilities to small farmers.

Vinovskis, Maris A.

- 1976a Demographic History and the World Population Crisis. Worcester, Mass.: Clark University Press.

Vinovskis used number of improved acres per person in agriculture and unimproved acres per person in agriculture as a measure of land availability and studied the relationship with child-woman ratios in New York counties around 1850. The number of unimproved acres was positively related to fertility but not as strong as

other variables. Controls employed were percent of women 16-44 married, percent of employed in manufacturing, percent foreign born, percent urban (places of 5,000 or more), average school attendance of children aged 5 to 16, and per capita valuation.

- 1976b "Socioeconomic determinants of interstate fertility differentials in the United States in 1850 and 1860." *Journal of Interdisciplinary History* 6: 375-396.

This study measures child-woman ratios and the average value of the farm, which was used as an index of agricultural opportunity. Farm value was negatively related to fertility in 1850, but not in 1860. Control variables included percent urban, percent illiterate, sex ratio, and percent foreign labor. State-wide data for Northeast, Mid Atlantic, North Central, South Atlantic and South Central U.S., regions for 1850 and 1860 were used.

Von Pischke, J. D.

- 1978 "When is small holder credit necessary?" *Development Digest* 17(3): 6-24.

This article strongly questions the frequently asserted "need" of small farmers for access to low-interest credit to enable them to adopt technological improvements. In many cases credit may be unnecessary, in others it may be useless, and in most circumstances low interest rates do more harm than good. The tendency of subsidized agricultural programs to serve rural elites is discussed.

Voss, C.

- 1974 "Agricultural mechanization, production and employment." *Monthly Bulletin of Agricultural Economics and Statistics* 23(1): 1-7.

The author argues for a constructive approach favouring a rational mechanization of agriculture in the developing countries. Such mechanization can increase labour productivity and earnings; it can take some of the drudgery out of farm work and thus make it more attractive as well as profitable. Through backward and forward linkage, mechanization can make a substantial contribution to overall employment. To minimize labour disadvantages in the short run the forms mechanization takes and the speed at which it occurs need intelligent and sympathetic guidance. Over the longer term, perpetuation of labour intensive non-mechanized agriculture will tend to maintain rural poverty and stagnation, once the beneficial effects of new inputs other than mechanization have reached a certain level.

Ware, Helen

- 1978 "The economic value of children in Asia and Africa: Comparative perspectives." *Papers of the East-West Populations Institute*, No. 50.

A review of the value of children in Asia and Africa, stressing the importance of land ownership as a factor in the material value of children. Children function to aid acquisition of land in some cases.

Wood, Charles H. and Marianne Schmink

1979 "Blaming the victim: Small farmer production in Amazon colonization project." *Journal of Third World Studies* (in press).

This work examines the evolution of development policy for Amazonia and the impact such policy has had on the colonists. It appears that the policy has gone from opening up the Amazon for the smallholders to condemning the same people as "predatory" and dangerous to the ecology of the area. The smallholder is blamed for failure to increase agricultural production when the government agencies responsible for providing credit, transportation and technical activities are really at fault. Because of this the small holder has been written out of any future development plans for the Amazon.

World Bank

1978 *Agricultural Land Settlement. A World Bank Issues Paper.* Washington, D.C.: World Bank.

The experience in settlement since World War II is considered and the scope for future settlement is discussed. Policy issues concerning settlement comprises the bulk of the text. The involvement of the Bank in settlement lending is discussed, both in terms of actual capital spent and in terms of policy.

Yasuba, Yasukichi

1962 *Birth Rates of the White Population in the United States, 1800-1860.* Baltimore: Johns Hopkins Press.

Early statement and empirical demonstration of the land availability-fertility thesis. Yasuba examined the relationship between the availability of farm land by state for the period 1800 to 1860, and white fertility ratios. The positive association between land availability and fertility was attributed to changes in the demand for children, age of marriage, and the incidence of marriage.