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THE IMPACT OF FARM MECHANIZATION ON  
SELECTED ASPECTS OF FAMILY LIFE IN THREE VILLAGES  
OF CENTRAL BEKA'A, LEBANON

By  
HAGOP KAYAYAN

A THESIS  
Submitted to the  
AMERICAN UNIVERSITY OF BEIRUT

In partial fulfillment of  
the requirements for the  
degree of

MASTER OF SCIENCE IN  
AGRICULTURE

June 1968

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MECHANIZATION AND CHANGE

KAYAYAN

## ACKNOWLEDGMENTS

The author wishes to express his deep gratitude to Professor Hubert J. Morsink for his invaluable advice and help not only in the early development of this thesis but also for his uneasy and hopefully successful task in training and guiding a future rural sociologist.

The author also wishes to thank the members of his major committee, Professors Halim Barakat, Fawzi Al - Haj and Salah Yacoub (the Major Advisor), for their useful comments and suggestions in the course of the writing of this thesis. They have contributed in refining methodological concepts and style. The committee members spent time and effort above the call of duty in providing useful criticism and improving the quality of this thesis.

The author is thankful to Professor Richard Antoun for his insight producing suggestions at the early conception of this thesis.

The author wishes also to acknowledge the help of Miss Rita Havounjian who did not spare time and effort in typing this thesis.

AN ABSTRACT OF THE THESIS OF

Hagop Kayayan for Master of Science in Agriculture

Major: Rural Sociology

Title: The impact of farm mechanization on selected aspects of family life in three villages of Central Beka'a, Lebanon.

This study is focussed on the social implications of farm mechanization. It intends to study some of the effects which farm mechanization might have on farm families, including the effects on the division of labor. A total of 82 respondents were selected from three villages in the Central Beka'a Plain of Lebanon namely, Bednayel, Housh el Rafaka and Timmin Tahta.

The hypotheses tested in this study were the following:

Hypothesis 1. The higher the level of mechanization on the farm the lesser will be the amount of work performed by the members of the family, including men, women and children.

Hypothesis 2. The higher the level of mechanization on the farm the less tiresome will be the work performed by various members of the family, including men, women and children.

Hypothesis 3. The higher the level of mechanization on the farm the more leisure time will be available to all members of the family.

Hypothesis 4. The higher the level of mechanization on the farm the more technical and mechanical skills will be acquired by farmers and/or their sons.

Hypothesis 5. The higher the level of mechanization on the farm the fewer will be the number of relatives living with and/or being supported by the family.

Hypothesis 6. The higher the level of mechanization on the farm the higher will be children's attendance at school.

The measurements of the dependent variables related to women, female and male children were based on fathers' perception of the amount of work performed and leisure time available to them rather than asking such family members to provide the information themselves.

For research hypothesis 1, the amount of work performed was measured as follows:

- a. For men, the number of hours of work per year and per dunum was considered.

- b. For women, the number of hours of work performed and the number of operations in which they helped were used.
- c. For male and female children, the number of operations in which they helped was used.

In research hypothesis 2, the tiresomeness of work performed was measured by asking the farmer to evaluate the tiresomeness of work done by him, his wife and his male and female children.

In research hypothesis 3, the amount of leisure time available was measured by the average number of hours of daily leisure available to the farmers, their wives and children.

Technical and mechanical skills were measured by the ability of farmers and/or their sons to drive tractors and to perform major and minor tractor repairs.

For research hypothesis 5, the number of relatives living with and/or being supported by the family was provided by the farmers interviewed.

Children's attendance at school was measured by the number of days of absence from school as indicated by the official school attendance records.

Level of mechanization on the farm was considered as the independent variable and was measured by the percentage of mechanized over non-mechanized operations in growing the five major crops in the area. This percentage was then multiplied by a constant to take into account the number of years of tractor use.

The chi-square test of significance was used to test the significance of the relationships. A 0.05 probability level was chosen to test the significance of relationship between the independent variable (level of mechanization) and the dependent variables studied.

The following results were yielded by the analysis of the data:

1. Level of mechanization on the farm and the amount of work performed by men, women, male and female children were not found to be significantly related.
2. Level of mechanization on the farm and the tiresomeness of work performed were significantly related for farmers and their wives. The higher the level of mechanization on the farm the less tiresome was the work performed by farmers and their wives. The relationship was not significant for male and female children.
3. The relationship between level of mechanization on the farm and the amount of leisure time available was not significant for farmers, their wives and their children.

4. The relationship between the level of mechanization on the farm and the acquisition of mechanical and technical skills was not found to be significant.
5. The relationship between level of mechanization and the number of relatives living with and/or being supported by the family was not found to be significant.
6. Level of mechanization on the farm and the attendance of children at school were significantly related. The relationship indicated that the higher the level of mechanization on the farm the more children attended school.

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## I. INTRODUCTION

The social implications of technical modernization in developing countries have received relatively limited attention. With the rise in income among the populations in these countries and the governments' encouragement toward the purchase of productive items, investment on machinery contributing toward the production process is increasing at a fast rate. In this respect the trend of farm mechanization is also progressing at a rapid pace. For instance, according to Customs Statistics (1965, pp 766 - 772), in 1964, Lebanon imported tractors for the total value of 7,078,537 Lebanese Pounds. The social effects of such rapid farm mechanization have not yet been investigated extensively. There is, accordingly, a definite need for investigating the economic and social implications of agricultural mechanization. A manual prepared by the World Federation for Mental Health (1955, pp 11-16) suggests the study of the impact of technical modernization in relation to the whole culture of the society in which such innovations are introduced.

### Purpose of the Study

The purpose of this thesis is to study some of the social effects which farm mechanization might have on farming families in the Central Beka'a valley of Lebanon, including the effects on the division of labor.

By farm mechanization is meant the adoption or the use of tractors

and their accompanying implements instead of traditional use of animal drawn agricultural implements. An attempt will be made to correlate different levels of mechanization with the hypothesized changes which can result from such mechanization. More specifically, the purpose of this thesis is to study the effects of using tractors on:

- a. the nature and amount of agricultural work performed by various members of the nuclear family;
- b. the kind and amount of leisure time available to different members of the family;
- c. the amount of technical and mechanical skills acquired by farmers and/or their sons;
- d. the number of relatives who are living with or are supported by the family; and
- e. the children's attendance at school.

Though limited in scope, this study can have important theoretical and practical implications in the area of social change.

### Theoretical Implications

Early in the development of sociological theory the attention of sociologists has focussed on the impact of technological change on the division of labor. Durkheim (1966, pp 353 - 372) postulates that the adoption of technological innovations by members of a social group changes its pattern of division of labor. Furthermore, he states that rapid changes in the division of labor create a situation of anomie among the group members. In his investigations of this phenomenon, Durkheim adopted the global historical approach without having an "empirical"

basis to support his theory concerning the triple relationship of changes in technology, division of labor and anomie. This study, although it has no specific theoretical implications, can serve, in the future, as a basis for further research designed to test the second stage of Durkheim's theory concerning the effects rapid changes in the division of labor might have on anomie.

### Practical Implications

The practical importance of studies of this nature can be best visualized when considered at the level of the individual, the family, the community (the village), the region and the nation as a whole. The following are some examples to which the results of this thesis can be applied:

#### In Extension Work

One of the problems met by extension workers and planners is to direct the information transmitted to the right person. Thus, based on the results of this study and others of this nature such as the one done by Perk (1963, pp 384 - 385), it would be possible to know the extent and nature of agricultural work performed by each member of the family and therefore direct the teaching or planning to reach the right persons involved in the improved operations to be taught. For instance, if extension workers are interested in teaching an improved method in controlling weeds their efficiency would be highly reduced if the new

method is taught only to farmers rather than their wives, or both, assuming that only the latter are involved in weeding operations.

### In Social and Economic Planning

Recent development plans in countries of the Middle East, e.g. Syria and Iraq, often emphasize the need for the decentralization of industry into rural areas and the encouragement of crafts as a means at reducing rural migration and achieving social justice. It has been found in studies related to sociological aspects of industrialization by Berouti (1965, pp 11 - 12, 20 -30) that, in factories located in rural areas, workers often come from nearby villages and they tend to maintain farming as a side occupation. In addition, it has been found that workers of rural origin have a relatively low level of commitment to the factory and to their new industrial jobs. It has also been found, when industries existed in a certain area, that women there tend to become engaged in both industrial and agricultural work. Thus, a knowledge of the existing pattern of the division of labor within the farming family in a region could help the responsible authorities in assessing the manpower available in it for industry and in deciding the size and the nature of industries needed in the region.

In areas where regional planning, land settlement or land reform schemes are sought the knowledge of the division of labor within the farming family is imperative, since, based on such knowledge, matters such as the size of land to be attributed to each family, the organization of collective leisure activities and the establishment of many public facilities and services could be determined.

### In Studying Rural-Urban Migration and Manpower

The results of this and other similar studies can provide the basis for the investigation of rural-urban migration. Assuming that mechanization of agriculture liberates part of the present labor force involved in agriculture, different alternatives are offered for the excedent labor, some of which are:

- a. to remain in the agricultural sector in a "hidden unemployment or semi-unemployment form;
- b. to be absorbed by local industries; and
- c. to migrate to urban areas seeking employment in industries or the tertiary sector of the economy i.e. the services sector.

In the field of development planning and the implementation of regional development projects it is thus essential to know the existing situation of the labor force and the possible sources of changes in the reallocation of labor. The level of technological advance in a country influences to a large extent the distribution of its labor force. This study and similar studies dealing with the relationship between technology and labor can help plan such projects.

In addition to the above mentioned theoretical and practical implications of this study, the topic per se cannot be overlooked by any rural social scientist and to a lesser extent by extension agents and agricultural economists since it represents a major and significant part of rural life among one of the most predominant types of farmers in the region, namely mechanized land owning farmers.



## II. REVIEW OF LITERATURE

As in the case of most spectacular changes affecting human society, the shift from agricultural tools and animal drawn implements to the use of tractors was, in the early stages, dramatised in novels. The most outstanding and realistic description was provided by Steinbeck (1939, pp 1 - 100), who described the impact of mechanization, together with farmers' indebtedness, on the exodus of farmers toward Western United States.

Philosophical studies, such as the one done by Feibleman (1967, pp 328 - 329), have emphasized the mutual relations and effects between man and his tools. Feibleman indicated this dual interdependence between man and tools by pointing out that on the one hand man tries to modify his environment and for this purpose he creates an innumerable variety of tools; on the other hand, "there is a feedback from tools; in a certain sense it is true that tools make the man".

Although novels and philosophical studies do not contribute to the empirical and precise study of the impact of technological innovations, they provide insight, a general framework and quests for more detailed field research and theories concerning such changes.

### Literature dealing with Division of Labor

Beauvoir (de) (1949, pp 12 - 32), in an attempt to analyze the origins of the division of labor between the sexes argued that initially it was based on the physical and physiological differences,

but, in the course of history, it has lost some of its significance and has taken a traditional form. Similarly, Mead (1962, p 16) and Firth (1958, pp 82 - 83) attributed the division of labor between the sexes, in its early stages at least, to the physiological and physical differences. Gross (1958, pp pp 327 - 328) added to these elements the age of the participants in the division of labor as an interweaving factor. Dube (1965, pp 168 - 174) provided a more comprehensive set of factors influencing the division of labor in an Indian community such as age, sex, caste, and social status. Each of these factors was further differentiated into subcategories and was found to be associated, in the minds of Indian farmers, with specific agricultural operations. Descriptive studies concerning the division of labor in various types of communities tend to confirm the general proposition which states that division of labor was initially based on physical and physiological differences between the sexes and with time, it became more dependent on traditional values and norms. Men have in most cases been assigned to tasks requiring heavy muscular effort whereas women worked on operations, though not less tiresome necessarily, requiring a lighter muscular effort and a longer time to sustain.

Literature Dealing with the Impact of Technological  
Innovations on the Division of Labor and Manpower

The abundance of literature concerning the prevailing situation of the division of labor is not matched by studies concerning the changes in the division of labor as a result of technological innovations and to a much lesser extent ones concerning the impact of farm mechanization.

Durkheim (1966, pp 61, 353 - 372), in his constant concern for social solidarity and anomie, analyzed the division of labor at its various stages and its evolution in history. In the latter aspect, he concluded that "It is possible that the economic utility of the division of labor may have a hand in this, but, in any case, it passes far beyond purely economic interests, for it consists in the establishment of a social and moral order sui generis. Through it, individuals are linked to one another". It is the awareness by each participant of his contribution toward the same general purpose of the social group that, according to Durkheim, creates the feeling of solidarity. However, Durkheim admitted that in the course of its historical development, almost every form of division of labor passes through a critical stage. He stated "though the division of labor produces social solidarity, it sometimes happens that it has different, and even contrary results". Such changes, according to Durkheim, have taken place as a result of industrial and commercial crises, conflict between capital and labor and progress in the scientific and technological fields.

Among the case studies which dealt with the impact of technological changes on the division of labor two were provided by Bliss and Sharp. Bliss (1952, pp 23 - 32) reported the case of the Papago Indians of Southern Arizona among whom the wheel was introduced during the latter part of the nineteenth century. These Indians lived in a semi-desert environment and their earlier contacts with Spanish civilization was limited. As a reward for their cooperation with the Anglo-Americans against the Apaches, they were helped by the Bureau of Indian Affairs. Among the material goods given to the Papago Indians was the wagon with wheels with which they were not as yet familiar. The wagon had important implications on the division of labor. Before the introduction of the wagon, housewives used to carry ollas of water from the water source to their homes. With the use of the wagon this task

was performed by one man carrying the water for the whole village, thus replacing three activities previously performed by women: the carrying of water, the many manufacture of ollas and the gathering of firewood. Among men, the usage of the wagon developed engineering skills in building roads and cooperative forms of labor. It reduced the number of man/days necessary for trading activities and the transportation of firewood since these activities were previously performed by man separately and was possible to perform them by a small group of men for the rest of the population of the use of the wagon. In addition the wagon opened the possibility of raising new crops since they could be easily transported to nearby markets for sale.

Similar effects were mentioned by Sharp (1964, pp 84 - 94) in his analysis of a totally different community, the Yir Yoront aborigines of Australia, upon the introduction of steel axes. Among these tribes the use of the stone axe was one of the most important artifacts of their culture. It served both in making their daily living and in totemic ceremonies. The steel axes, mainly introduced by missionaries, had among other things, reduced one of the major time consuming tasks of men namely manufacturing stone axes or going on trade journeys to buy them.

Literature Dealing with the Impact of Agricultural  
Mechanization on the Division of Labor and Manpower

Perk, (1963, pp 378 - 386) when dealing with the impact of agricultural mechanization on the division of labor, operationally defined the latter as the amount of work performed by various family members and the amount of leisure available to them. Based on studies done by other researchers he concluded that men did not replace the work

previously performed by women.

Leighton and Smith (1955), in an attempt to develop indices of social change resulting from technological innovations, analyzed studies concerning seven rural communities in which such changes had taken place. Two of these indices were concerned with the diversification of occupational roles and with the amount of labor performed by each member of the community. The two indices were accorded high importance by the authors and they suggested comparing them at different time intervals in order to investigate social change. Although research along this line could yield clearer results, it might have the disadvantage of being time consuming. In addition, its application might be limited to the investigation of the changes in the whole community rather than to the investigation of the changes which might take place among various family groups and members as it is the case in the present study.

Tanyol (1959, pp 198 - 218), studied the impact of mechanization on manpower and population movements in 48 villages between 1950 and 1955. He found that the population of 34 of these villages which were using tractors had decreased while the population in the remaining 14 villages had increased.

Mead (1955, pp 174 - 194) stated that "a change in techniques may make shifts in the balanced division of labor, disrupting the pattern of relationship between man and wife, father and son, unless it is introduced with awareness, and unless help is given in readjusting the disturbed balance". Morsink (1966, p 36) had illustrated Mead's point by giving an example from the Nachingwea new settlement scheme in Tanganika when in the period of 1952 - 1953, heavy machinery for land clearance was introduced. He stated that "according to tradition, men did the heavy work of land clearing in agriculture, and women the tasks of planting and weeding. However, the introduction of heavy machinery for land clearance resulted in an unbalanced situation where men's work

He also noted that under-employment had increased in these villages. Another effect which farm mechanization can have on the division of labor was illustrated by Robinson's quotation of a local medical doctor's remark: "Machinery was tried in a couple of villages last year. The infant mortality rate dropped in those villages because the mothers had time to look after their babies during the harvest season".

Karpat (1960, pp 83 - 103) had illustrated the impact which tractor use can have on the development of technical and mechanical skills among a new group of village mechanics who were able to perform various minor mechanical repairs needed. The group was not yet highly mechanized since major mechanical repairs were still performed in larger cities.

Saab (1960, pp 104 - 113) refined the impact of farm mechanization on labor changes and asserted that during the first stage of introducing the agricultural machinery the manpower needs decreases but at a further stage the free manpower made available will be absorbed by various activities created by agricultural mechanization such as mechanics, operators and sale agents.

Beaglehole (1955), in an attempt to evaluate the changes induced by technological innovations, concluded that the division of labor and the intensity of work are in a constantly precarious equilibrium and they are subject to changes with the different prevailing situations.

Friedmann (1955, pp 243 - 260) analyzed the impact of farm mechanization in a comprehensive manner, indicating its effect on the nature of work, development of skills and the availability of leisure time. He stated "it is of course true that mechanization (...) eliminates much

and they are subject to changes with the different prevailing situations.

Friedmann (1955, pp 243 - 260) analyzed the impact of farm mechanization in a comprehensive manner, indicating its effect on the nature of work, development of skills and the availability of leisure time. He stated "it is of course true that mechanization (...) eliminates much of what was formerly heavy labor (...) it has made work infinitely less hard than it used to be". Another effect highlighted was the development of new technical skills among the population involved. As a result of the shortening of working days, more and diversified leisure has been available to farmers.

Based on the above review of literature it can be ascertained that previous research indicated the definite impact technological changes and more specifically farm mechanization, can have on social structure, division of labor within the family and manpower.

The division of labor, according to the authors reviewed, is often based on sex, age, caste, religion and social status. The examples mentioned indicated the effect of technological changes, specially in artifacts which are significant and vital part of the communities studied, on major changes in the division of labor within the family. In addition, it affected the forms of relation existing between different members of the family as well as the level of skills, the tiresomeness of work and the amount of leisure. Furthermore, farm mechanization was found to have an impact on the prevailing situation of manpower and rural urban migration.

However, in most cases, the literature reviewed did not measure the changes taking place, except for those in manpower. The contribution of this study is that it dealt with the changes studied in quantitative

terms. In addition, only some selected aspects of the division of labor, as defined by Perk (1963, pp 378 - 386) were dealt with, such as the amount of work performed and the amount of leisure time available to various family members. Other social implications of farm mechanization, such as its impact on children's attendance at school, were not investigated by any of the studies reviewed but were dealt with in this thesis.



### III. METHODOLOGY

As previously mentioned, the purpose of this thesis was to study the social implications of farm mechanization on some aspects of family life and structure including the division of labor within it. Initially, it was intended to take two groups of farmers namely, mechanized and non-mechanized, who grew relatively similar crops and had similar farming patterns and study the influence of mechanization on the division of labor. This attempt, though, was unsuccessful because totally non-mechanized farmers were difficult to find. In one case a totally non-mechanized village was found but it differed radically in its cropping and farming patterns from the villages in the region. This village had rocky and hilly lands where the use of tractors was not possible. It was decided then to study mechanized villages and to establish different levels or degrees of mechanization and classify the respondents accordingly, rather than dealing with mechanized versus non-mechanized farmers as planned earlier.

The hypotheses tested in this study were:

Hypothesis 1. The higher the level of mechanization on the farm the lesser will be the amount of work performed by the members of the family, including men, women and children;

Hypothesis 2. The higher the level of mechanization on the farm the less tiresome will be the work performed by various family members including

men, women and children;

Hypothesis 3. The higher the level of mechanization on the farm the more leisure time will be available to all members of the family;

Hypothesis 4. The higher the level of mechanization on the farm the more technical and mechanical skills will be acquired by farmers and/or their sons;

Hypothesis 5. The higher the level of mechanization on the farm the fewer will be the number of relatives living with the family and/or being supported by its income;

Hypothesis 6. The higher the level of mechanization on the farm the higher will be the children's attendance at school.

#### Measurement of Variables

The independent variable taken into consideration in this study was the degree or level of mechanization of the farmer. In order to measure this variable, each farmer was asked about the crops he grew and the number of dunums he planted of each. It was found that wheat, barley, onions, potatoes and tomatoes were the major crops of the area. The farmer was further asked to specify the operations performed by tractor for each crop and, based on these answers, the farmer's level of mechanization was determined by using the following formula:

$$P = \frac{M}{T} \times 100 \times C$$

where P stands for the degree or level of mechanization of each farmer, M for the number of mechanized operations in the growing of wheat, barley,

onions, potatoes and tomatoes, T for the total number of operations that can be mechanized (for a list of these operations see the Appendix) and C for a constant related to the number of years the tractor was in use. The latter was given a relative and arbitrary value of 1.0 for 1 - 5 years of tractor use, 1.3 for 6 - 10 years of tractor use and 1.4 for more than 10 years of tractor use. This variable was introduced in order to refine the concept of degree of mechanization. To illustrate the formula used, the following example can be given. In the villages studied, there were 10 operations that can be mechanized for growing each of wheat and potato crops. If a farmer had mechanized four and three operations for wheat and potatoes respectively, and he has been using the tractor for seven years, and since the equivalent constant for this period is 1.3, the farmer's level of mechanization will then be:

$$\frac{(4 + 3)}{(10 + 10)} \times 100 \times 1.3 = 45.5$$

This constant was used on the assumption that the longer the period of tractor use, the higher is the degree of mechanization. The decreasing rate of increase of the constant was judged necessary on the assumption that in the early years of mechanization the farmer's degree or level of mechanization and its entailing mental and psychological changes increase, but tend to increase at a lower rate with time. This constant renders the formula closer to reality. However, it has the disadvantage of giving the constant a relative and absolute value. It could be modified when studying different cases of mechanization in different areas. The values given to the constant were absolute and could alter the distribution of level of mechanization to some extent.

The dependent variables taken into consideration and their measurement were as follows:

### The Amount of Work Performed by Various Members of the Family

For men, this variable was measured by the number of hours they worked per year and per dunum of land operated. The total number of hours of work was computed from the data provided by the farmers concerning the number of hours he worked per day during each season. Thus, if a farmer worked a total of 1000 hours and operated 50 dunums of land, then the amount of work performed by him in this case will be 20 hours per dunum per year.

For women, the number of hours they worked per year and per dunum of land operated was also used in addition to the number of operations in which women helped on the farm.

For male and female children, the number of agricultural operations in which they helped their parents was used.

### The Tiresomeness of Work Performed by Various Family Members

Since a quantitative measure of the tiresomeness of work could not be devised, each farmer was asked to evaluate whether his work and the work of the other members of his family were at present as tiresome as before, a little less tiresome, much less tiresome, a little more tiresome or much more tiresome than before.

### The Amount of Leisure Time Available to Family Members

The amount of leisure time available to each member of the family was calculated by asking the farmers to provide information on the average number of leisure hours available to each member of the family per day and per season.

### The Amount of Technical and Mechanical Skills Acquired by Farmers

This was measured by the ability of the farmer to repair and drive the tractor which he operated.

### The Number of Relatives Living with or Being Supported by the Family

This was measured by asking each farmer to state the number of relatives living with him on the farm and their relation to the family. Similar information was obtained concerning the number and relation of relatives who did not live with the farmer's family but were economically dependent to a large extent on the farmer's income.

### School Attendance of Children

School attendance of farmers' children was measured by the number of days the children were absent from school during the school year 1966 - 1967 as indicated by the official attendance rolls of the school in each village.

### Choice of Villages and Farmers in the Sample

Three villages in the Central Bekaa Plain of Lebanon were chosen for this study. These were Bednayeel, Housh el Rafaka and Timnin Tahta. The choice of these villages was based on the following considerations:

1. The three villages are geographically very close to each other, the distance between the first and last village not exceeding 10 kilometers;
2. All three villages are within the same agricultural region i.e. the farming pattern and the crops grown are similar;
3. The three villages are of the same religious sect, all being exclusively Shi'ite villages. This allows for the control of one of the most important intervening variables, since religion by itself could account for differences in the division of labor;

4. Previous sociological and economic studies have been conducted in these villages by Stevens (1959, pp 137 - 192) and Fetter (1961, pp 6 - 10) which made farmers more accustomed to the idea of being interviewed for academic purposes.
5. The villages are very close to the Agricultural Research and Education Centre of the American University of Beirut. This made the interviewing part of this study much easier.

Since the farmers in the sample could not be selected beforehand on the basis of their level of mechanization, it was decided to interview all land owning farmers in each of the three villages. A complete list of farmers in each village was provided by its mukhtar (elected village head) after he was contacted and the purposes of this thesis were explained to him. This list was then cross-checked by asking some farmers in each village to give the names of farmers in their village. As a result very few names were added to the original list. The total number of farmers included in the original list was 113. From the original list provided by the mukhtars of the three villages 31 were not interviewed because, in most cases, they were not found in their homes after a third visit was made. Thus the total number of interviewees was 82 of which 31 were from Bednayeel, 35 from Housh el Rafaka and 16 from Timnin Tahta. The fewer number of interviewees from Timnin Tahta is explained by the fact that farmers in this village were interviewed last and while doing their heavy irrigation work in the fields which contributed to a high proportion of absences among them. Thus, the large number of farmers who were not interviewed may have

reduced the representativeness of the sample. In addition, the list of names which was obtained from the mukhtars could have introduced a source of bias because it may not have been a complete one.

### The Questionnaire

The questionnaire used in this study was first designed to be used, but in a slightly different way, in Anjar, a village situated in Eastern Bekaa at the foot of the Anti-Lebanon mountains. However, after a number of interviews with farmers were conducted, the interviewing was discontinued because it was found that the village did not suit the purposes of this research since practically all its farmers were geneous. This experience with the questionnaire in Anjar provided an opportunity to pretest and modify the final research instrument used in this study (See the Appendix).

All the questions in the questionnaire, except two only, were closed end questions since the objective here was to develop quantitative measurements for the division of labor among various categories of mechanized farmers.

### Conducting the Interviews

It was interesting to note the farmers' reactions to the content of the questionnaire. These reactions ranged from giving a serious thought to the questions before they were answered to a skeptical smile about the purposes of this study. However, most of the interviewees' answers were considered satisfactory.

Six interviewers helped in the conducting of the eighty two interviews utilized in this study. Four of these were sociology majors, one was a graduate in the social sciences and one a secondary school

graduate from one of the villages in the sample. The latter had proved to be a valuable interviewer in a previous research conducted by the Agricultural Economics and Sociology Division of the Faculty of Agricultural Sciences at the American University of Beirut. It should be mentioned here that five of the interviewers conducted only 18 interviews out of the 82 and have done this in only one day. Therefore individual biases which could have resulted from them were minor. All questions in the questionnaire were reviewed with the interviewers and they were given adequate instructions on how to ask them in Arabic properly and how to explain them to farmers, if needed. In the case of the secondary school graduate Arabic translation of the questionnaire was provided.

Each interview lasted from thirty minutes to one hour depending on the interest of the farmers and their "hospitality". Almost all the interviews were carried out in the houses of the interviewees or in their fields. The mukhtars of the three villages were interviewed first for the two following reasons:

1. To familiarized them with the content of the questionnaire and acquire their support and approval; and
2. To minimize the resentment of farmers who would be initially reluctant to be interviewed.

Unstructured interviews were also carried out with the directors of schools in the three villages in order to collect information on the attendance and performance of the children in these villages. The attendance records of the respondents' children who were in the third



grade and above were obtained and analyzed for the school year 1966 - 1967.

Wives and children of farmers were not interviewed because of the difficulty for an outsider to talk to women and female children. The help of a female interviewer could not be secured throughout the interviewing period. The questions concerning wives and children were not opinion or value judgement questions and therefore, validity errors which can arise from asking such questions was minimized. Such questions were related to the number of hours of help received by the farmer from his wife and children, the number of hours of leisure available to them and the number and nature of agricultural operations they helped in. The main source of error in this case was the fact that the data provided throughout this study were based on the farmers' previous year's perception, rather than actual measures, of the amount of work performed by other family members and the amount of leisure available to them.

#### Statistical Analysis

Each farmer's level of mechanization was computed according to the formula which was discussed earlier. For purposes of statistical analysis, the respondents were grouped into three categories, namely high, medium and low levels of mechanization. Farmers having scores ranging between 20 and 34 were classified as having "low" level of mechanization, those with scores ranging between 35 and 49 were classified as having "medium" level of mechanization and those having scores above 49 were considered as having a "high" level of mechanization. These categories were then related to each of the dependent variables.

The chi-square was used to test the significance of the data. A 0.05 probability level was chosen to test the significance of relationship between the independent variable (level of mechanization) and each of the dependent variables investigated. This means that whenever a  $\chi^2$  is found, which proves to have 0.05 or more probabilities of being obtained simply by chance, the null hypotheses which state that no relationship exists between the independent and dependent variables will be accepted. Vice versa, whenever a  $\chi^2$  is found, which proves to have less than 0.05 probabilities of being obtained by chance, the null hypotheses which state that no relationship exists between the independent and the dependent variables will be rejected. Contingency coefficient and the corrected contingency coefficient ( $\bar{C}$ ) was then computed to measure the degree of association between the two variables.

#### IV. RESULTS AND DISCUSSION

##### Characteristics of the respondents

As previously mentioned, 82 farmers were interviewed in the course of this research. The average age of the male respondents was 40.85 years, whereas the average age of their wives was 42.10. All the farmers interviewed, except one were married and the average number of years of married life for the whole sample was 25.18. It is interesting to note that these facts support the common belief that early marriages in the Middle Eastern villages are commonly practiced and highly valued. In addition, they indicate that men tend to marry women of a younger age, the difference between the average age of farmers and their wives being almost eight years. Only two farmers, out of the 82 interviewed, had two wives each. This indicates the rare occurrence of polygamy, specially in rural areas.

Farmers' level of education was relatively low since 22 farmers, representing 27 percent of the sample, did not attend school at all, while 23 farmers (28 percent) had only one to three years of schooling. In most cases the type of school attended by the latter group was a coranic village school. Twenty five farmers attended school for four to six years, but the number of farmers who continued after their sixth year of schooling and were able to complete their ninth grade dropped sharply to eight, or 10 percent of the sample. Only two interviewees had finished their high school education, whereas one studied at a technical school and another is enrolled at the Lebanese University.

Compared to farmers, wives had an extremely low level of education since 75 percent of them never went to school, whereas 18 percent had one to three years of schooling. Only two women completed their sixth grade and three completed their ninth grade.

The average family size of the respondents was 8.11. When the relatives living with and/or being supported by the family were considered this number increased to 9.24.

Tractors were introduced in the three villages 20 years ago but apparently it gained momentum during the last 10 years. The length of time in which tractors have been in use by the respondents ranged from 2 -20 years. Eleven farmers in the sample used their tractors, whereas 71 farmers, representing 87 percent of the sample, rented tractors from their owners. There were 12 tractors in use in the three villages. The implements used with tractors were mainly two and five-bottom moldboard plows, discs, trailers, harvesters and a special threshing implement which is composed of a wooden board with sharp "razors".

The Influence of Farm Mechanization on the Amount of Work Performed by Various Family Members:

Hypothesis: The higher the level of mechanization on the farm the lesser will be the amount of work performed by various family members, including men, women and children.

This hypothesis was tested separately for men, women and children. For men, the amount of work performed was measured by the number of hours worked per year and per dunum. For women, the amount of work performed was measured in terms of the number of hours worked per year and per dunum and in terms of the number of agricultural operations in which they helped. For female and male children the amount of work performed

was measured by the number of agricultural operations in which they helped.

For purposes of statistical analysis, the amount of work performed was categorized as follows:

1. For men, three categories were established namely, "Low" which includes 1 - 9 hours/year/dunum, "Medium" which includes 10 - 29 hours/year/dunum and "High" which includes 30 or more hours/year/dunum.
2. For women, the amount of work performed, expressed in terms of number of hours per year and per dunum, was categorized into "low" which consists of 0 - 9 hours/year/dunum and "high" which consists of 10 or more hours/year/dunum; while the amount of work performed, expressed in terms of number of operations, was classified into two categories namely, "low" which includes "did not help in any operation", and "high" which includes "helped in one or more operations".
3. For female and male children, two categories were established in each case namely, "low" which includes "did not help in any operation", and "high" which includes "helped in one or more operations". The range of number of operations in which either wives, female or male children helped was 0 - 9.

The independent variable, namely the degree of mechanization, was categorized, as previously mentioned, into three categories of "low" (scores 20 - 34), "medium" (scores 35 - 49) and "high" (scores above 49).

The amount of work performed was then related to the degree of mechanization to see whether or not any association existed between level of mechanization and the amount of work performed by various family members.

Table one indicates that 55 percent of the men who worked 1 - 9 hours/year/dunum were "highly" mechanized, whereas only 18 percent and 27 percent of them were found to have "medium" and "low" level of mechanization respectively. In addition, 28 percent of those who worked 30 hours/year/dunum or more were classified as having a "high" level of mechanization as compared to 39 percent who were classified as having "Low" level of mechanization. In other words, highly mechanized farmers formed a higher proportion of those working least and a smaller proportion of those working "medium" or "high" number of hours. The relationship, as expressed by the  $\bar{C}$  value, between the two variables investigated, though, was found to be in the expected direction stated in the research hypothesis, but since the chi-square at the 0.05 level was not significant, there is no basis to infer that the degree of association in the sample is also present in the population.

The amount of work performed by women, in terms of number of hours of work, was related to the level of mechanization on the farm in Table 2. It was found that among the wives who worked "low" number of hours, 37 percent were wives of "high" mechanized farmers, whereas 32 and 31 percent were wives of "medium" and "low" mechanized farmers respectively. In addition, it was found that among wives working 10 or more hours/dunum/year, the highest proportion, 53 percent, were represented by wives of farmers with a "low" level of mechanization while 26 and 21 percent were wives of farmers who are in the "medium" and "high" level of mechanization groups respectively. Thus, the expected direction of relationship in the hypothesis was confirmed. The  $\bar{C}$  value indicated a relatively moderate extent of association between women's work and the

Table 1. The effect of level of mechanization on the amount of work performed by farmers.

Level of mechanization	Amount of work performed by men (in hours/year/dunum).						Total	
	"Low" (0-9)		"Medium" (10-29)		"High" (30 or more)		No.	%
	No.	%	No.	%	No.	%		
"Low" (Scores 20-34)	6	27	17	40	7	39	30	37
"Medium" (Scores 35-49)	4	18	15	36	6	33	25	30
"High" (Scores 50 or more)	12	55	10	24	5	28	27	33
Total	22	100	42	100	18	100	82	100
$\chi^2 = 8.14;$ 4 d.f; $P > 0.05;$ $\bar{C} = 0.41$								

Table 2. The effect of level of mechanization on the amount of work performed by wives.

Level of mechanization	Amount of work performed by wives (in hours/year/dunum)				Total*	
	"Low" (0 - 9)		"High" (10 or more)		No.	%
	No.	%	No.	%		
"Low" (Scores 20-34)	19	31	10	53	29	36
"Medium" (Scores 35-49)	20	32	5	26	25	31
"High" (Scores 50 or more)	23	37	4	21	27	33
Total	62	100	19	100	31	100

$\chi^2 = 0.32; 2 \text{ d.f.}; P > 0.05; \bar{C} = 0.22$

\*One of the farmers was unmarried. Therefore, in this and subsequent tables dealing with wives and children N will be 81, instead of 82.



level of mechanization on the farm, but there was no basis to infer that the degree of association found can be generalized to the population since the chi-square value was not significant at the 0.05 level.

The amount of work performed by women, as expressed in terms of number of operations, was related to the level of mechanization on the farm in Table 3. In this table it was observed that wives of farmers with "high" level of mechanization formed the largest proportion of those who did not help in any operation, 42 percent, whereas wives of farmers with "low" level of mechanization formed the smallest proportion in this category. A similar trend was indicated among the category of wives who helped in one or more operations since wives of farmers with a "low" level of mechanization represented 45 percent while those of "high" level of mechanization formed only 23 percent of the category. It can be concluded from these data that the direction of relationship, as expressed by  $\bar{C}$  value, between the level of mechanization on the farm and the amount of work performed by women was as hypothesized. This relationship, though, was not significant at the 0.05 level.

The influence of level of mechanization on the number of operations for which female children's help was secured was dealt with in Table 4. Initially, the number of operations in which female children were involved were grouped into three categories, namely, "low" (0 operation), "medium" (1- 5 operations), and "high" (more than 5 operations). For the purpose of analysis the last two categories were collapsed into one and was called "high". The table shows that daughters of farmers with "high" level of mechanization formed the largest proportion (42 percent) of those who did not help in any operation while daughters of farmers with "medium" and "low" level of mechanization represented 30 and 28 percent of those who did not help respectively. Among those daughters who helped in one or more operations, the

Table 3. The effect of level of mechanization on the amount of work performed by wives.

Level of Mechanization	Amount of work performed by wives (in number of operations)				Total	
	"Low" ( 0 operation)		"High" 1 operation or more)		No.	%
	No.	%	No.	%		
"Low" (Scores 20-34)	12	28	17	45	29	36
"Medium" (Scores 35-49)	13	30	12	32	25	31
"High" (Scores 50 or more)	18	42	9	23	27	33
Total	43	100	38	100	81	100
$\chi^2 = 3.72; 2 \text{ d.f.}; P > 0.05; \bar{C} = 0.31$						

Table 4. The effect of level of mechanization on the amount of work performed by female children.

Level of Mechanization	Amount of work performed by female children (in number of operations)					
	"Low" (0, operation)		"High" (1 operation or more)		Total	
	No.	%	No.	%	No.	%
"Low" (Scores 20-34)	14	28	15	49	29	36
"Medium" (Scores 35-49)	15	30	10	32	25	31
"High" (Scores 50 or more)	21	42	6	9	27	33
Total	50	100	31	100	81	100

$$\chi^2 = 5.19; \quad 2 \text{ d.f.}; \quad P > 0.05; \quad \bar{C} = 0.35$$

smallest group represented daughters of "high" mechanized farmers, while the largest group represented daughters of "low" mechanized farmers. Therefore, it can be concluded that the direction of the relationship between the two variables was as expected. The extent of association, as indicated by the  $\bar{C}$  value, was relatively small. The relationship between the level of mechanization on the farm and daughters' work, as expressed in number of operations, was not significant at the 0.05 level.

The relationship between level of mechanization on the farm and male children's work was tabulated in Table 5. As indicated in this table, male children of most mechanized farmers formed the least percentage of those who did not help in any operations whereas they represented the largest percentage of those who helped in one or more operations. Children of the least mechanized farmers, on the contrary formed the largest percentage, 40 percent, of those children who did not help in any operation, and the least percentage of those who helped their parents in one or more operations. Thus, it can be concluded from these data that the direction of the relationship exhibited between level of mechanization and the amount of work performed by male children is in the opposite direction to the one advanced in the research hypothesis. The extent of this relationship was low as indicated by the  $\bar{C}$  value and was not significant at the 0.05 level.

In summary, it can be stated that the relationship between farm level of mechanization and the amount of work performed by various members of the nuclear family was not significant in all cases. In the case of male children's work, an opposite direction of relationship to the one expected in the research hypothesis could be discerned but it was not

Table 5. The effect of level of mechanization on the amount of work performed by male children.

Level of Mechanization	Amount of work performed by male children (in number of operations)					
	"Low" (0 operation)		"High" (1 operation or more)		Total	
	No.	%	No.	%	No.	%
"Low" (Scores 20-34)	22	40	7	27	29	36
"Medium" (Scores 35-49)	17	31	8	31	25	31
"High" (Scores 50 or more)	16	29	11	42	27	33
Total	55	100	26	100	81	100
$\chi^2 = 1.35; 2 \text{ d.f.}; P > 0.05; \bar{C} = 0.18$						

significant. Thus, hypothesis one, i.e. the higher the level of mechanization on the farm the less will be the amount of work performed by various family members including men, women and children, can not be accepted.

However, concerning the number of hours of work performed by men and women certain facts should be kept in mind:

- a. farmers, in most cases, were found to have a very vague idea of time as measured by hours. A typical reply to the question on the number of hours a farmer worked per day during a season was: "I go to the field when the sun rises and come home at sunset or a little before". Actually, obtaining data on the number of hours worked was the most difficult task in the questionnaire;
- b. the farmers estimated the number of hours of work performed by their wives and one cannot be sure of the accuracy of such an estimation.
- c. since the amount of agricultural work performed was measured by the time spent per dunum of land operated, the latter influenced to some extent this measure. For example, a farmer with 10 dunums of land and one with 50 dunums might spend two hours, for instance, to reach their respective fields. However, when calculating the amount of work performed per dunum of land operated by each farmer, the first will spend 12 minutes whereas the second will spend two and a half minutes.

The Influence of Farm Mechanization on the Tiresomeness of Work  
Performed by Various Family Members:

Hypothesis: The higher the level of mechanization on the farm the less tiresome will be the work performed by the various family members including men, women and children.

Since a quantitative measurement of work tiresomeness could not be devised, farmers were asked to evaluate whether their work and that of their family members had become less or more tiresome than it was before they had started using tractors. Five categories of tiresomeness namely, "much less tiresome", "little less tiresome", "as tiresome as before", "a little more tiresome" and "much more tiresome", were initially used. For purposes of statistical analysis, categories 2, 3, and 4 were combined and were labelled "little or no change in tiresomeness". None of the respondents have chosen the last category and therefore it was not included in the analysis. Thus, two categories of tiresomeness were finally used when this variable was analyzed in relation to the level of mechanization on the farm.

The influence of farm mechanization on the tiresomeness of work performed by farmers was dealt with in Table 6. Among those farmers who felt "little or no change" has occurred on the tiresomeness of their work, 56 percent were in the "low" level of mechanization category. The remaining 31 percent of the farmers who said "little or no change" has occurred on the tiresomeness of their work were in the "medium" level of mechanization category. Only 19 percent of the farmers who claimed farm mechanization made their work much less tiresome were "low" mechanized farmers, while 30 and 51 percent were "medium" and "high" mechanized farmers respectively. These data

supported the direction of relationship expected in the research hypothesis, i.e. the higher the level of mechanization on the farm the less will be the tiresomeness of work performed by farmers. The  $\bar{C}$  value indicates a relatively high association between the level of farm mechanization and the tiresomeness of farmers' work. This relationship was found to be significant at the 0.05 level.

Concerning the tiresomeness of work performed by wives, 21 of the respondents mentioned that their wives never helped them in agricultural work. These were excluded from Table 7 which presents the relationship between farm level of mechanization and the tiresomeness of work performed by wives. Sixty eight percent of the farmers who estimated that the tiresomeness of their wives' work had undergone little or no change were in the "low" level of mechanization category, whereas only 5 percent of those who have given such an estimation were in the "high" level of mechanization category. Among those who felt that their wives' work had become much less tiresome, 37 percent were "high" mechanized farmers whereas 26 percent were "low" mechanized farmers. These data confirmed the expected direction of relationship between the two variables investigated i.e. the higher the level of mechanization on the farm the less tiresome will be the work performed by women. In addition, a relatively high level of association, as indicated by the  $\bar{C}$  value was found and the relationship was significant at the 0.05 level.

As in the case of the wives, 38 respondents mentioned that their female children never helped them in agricultural work and were therefore excluded from Table 8 which deals with the relationship between farm level of mechanization and the tiresomeness of work per-



Table 6. The effect of farm level of mechanization on the tiresomeness of work performed by farmers.

Level of mechanization	Tiresomeness of work performed by farmers.					
	Little or no change		Much less tiresome		Total	
	No.	%	No.	%	No.	%
"Low" (Scores 20-34)	22	56	8	19	30	37
"Medium" (Scores 35-49)	12	31	13	30	25	30
"High" (Score 50 or more)	5	13	22	51	27	33
Total	39	100	43	100	82	100
$\chi^2 = 17.41; 2 \text{ d.f.}; P < 0.05; \bar{C} = 0.60$						

Table 7. The effect of farm level of mechanization on the tiresomeness of work performed by women.

Level of Mechanization	Tiresomeness of work performed by women.					
	Little or no change in tiresomeness		Much less tiresome		Total	
	No.	%	No.	%	No.	%
"Low" (Score 20-34)	15	68	10	26	25	42
"Medium" (Score 35-49)	6	27	14	37	20	33
"High" (Score 50 or more)	1	5	14	37	15	25
Total	22	100	38	100	60	100

$$\chi^2 = 8.31; \quad 2 \text{ d.f.}; \quad P < 0.05; \quad \bar{C} = 0.51$$

Table 8. The effect of farm level of mechanization on the tiresomeness of work performed by female children.

Level of Mechanization	Tiresomeness of Female children's work				
	Little or no change in tiresomeness		Much less tiresome		Total *
	No.	%	No.	%	No.
"Low" (Scores 20-34)	13	54	7	37	20
"Medium" (Scores 35-49)	8	33	7	37	15
"High" (Scores 50 or more)	3	13	5	26	8
Total	24	100	19	100	43

$\chi^2 = 1.66; 2 \text{ d.f.}; P > 0.05; \bar{C} = 0.31$

\* A total of 38 respondents said that their female children never helped on the farm and therefore they were excluded from this table.

formed by female children. This table shows that 54 percent of those farmers who mentioned that the tiresomeness of their daughters' work had not changed or changed only a little were found to be "low" mechanized farmers, whereas only 13 percent of them were found to be "high" mechanized farmers. These data supported the expected direction or relationship, but this relationship was not supported when comparing farmers who mentioned that their daughters' work had become much less tiresome with their level of mechanization since a higher proportion (37 percent) of those farmers belonged to the "low" level of mechanization category as compared to 26 percent of them who belonged to the "high" level of mechanization category. It is thus difficult to decide in which direction the relationship prevailed. In any case, the extent of association between the two variables, i.e. level of mechanization and tiresomeness of work performed by daughters was relatively low as indicated by the  $\bar{C}$  value and this was not significant at the 0.05 level.

When the tiresomeness of work performed by male children as related to the level of mechanization was discussed in Table 9, it was found that 35 respondents mentioned that their male children never helped them in agricultural work, and therefore they were not included in the table. As it can be observed in this table the difference between the total respondents in each of the two vertical columns were not great. This can be largely attributed to the small sample used in the table. Among those farmers who thought that farm mechanization brought little or no change to the tiresomeness of the work performed by their male children, 45 percent were in the "low" mechanized group, whereas 33 and 22 percent were in the "medium" and "high" mechanized

Table 9. The effect of farm level of mechanization on the tiresomeness of work performed by male children.

Level of Mechanization	Male children's work tiresomeness					
	Little or no change in tiresomeness		Much less tiresome		Total <sup>x</sup>	
	No.	%	No.	%	No.	%
"Low" (Scores 20-34)	8	45	10	36	18	39
"Medium" (Scores 35-49)	6	33	10	36	16	35
"High" (Scores 50 or more)	4	22	8	28	12	26
Total	18	100	28	100	46	100

$$\chi^2 = 0.39; 2 \text{ d.f.}; P > 0.05; \bar{C} = 0.15$$

<sup>x</sup>A total of 35 respondents said that their male children never helped on the farm and therefore they were excluded from this table.

group respectively. This expected direction of relationship was not supported among farmers who felt that their male children's work had become much less tiresome since a higher proportion of those belonged to the "low" and "medium" mechanized farmers, while relatively smaller proportion belonged to the "high" mechanized group. The extent of relationship between farm level of mechanization and the tiresomeness of work performed by male children was found to be low as indicated by the  $\bar{C}$  value. The relationship between the two variables was not significant at the 0.05 level. This may be explained by the possibility that, with increasing level of mechanization, male children tend to take over their fathers' work, especially those aspects requiring newly introduced technical and mechanical skills. To this possibility must be added the one by which farmers, with age, tend to grant increasing responsibilities to their male children. The two above possibilities were illustrated by an interview the author had with a young man in one of the villages. The young man's father had bought a few years ago a tractor. Two years ago the young man had left school to operate the tractor which they own whenever it is used on their fields or others. He was very hopeful about the future of his work since he said: "This is the way agriculture will be in a few years time".

Thus, it can be concluded that the research hypothesis, namely the higher the level of mechanization the less tiresome will be the work performed by various family members including men, women and children, was supported when the work performed by farmers and their wives was considered and it was rejected when the work of male and

Table 10. The effect of farm level of mechanization on the amount of leisure available to farmers.

Level of Mechanization	Amount of leisure available to farmers (in hours of leisure per day)						T	
	"Low" (2-3.3)		"Medium" (3.4.-4.6)		"High" (4.7) & above)		Total	
	No.	%	No.	%	No.	%	No.	%
"Low" (Scores 20-34)	10	46	18	43	2	11	30	37
"Medium" (Scores 35-49)	8	36	11	26	6	33	25	33
"High" (Scores 50 or more)	4	18	13	31	10	56	27	30
Total	22	100	42	100	18	100	82	100

$$\chi^2 = 8.88; \quad 4 \text{ d.f.}; \quad P < 0.05; \quad \bar{C} = 0.42$$

female children was investigated.

The Influence of Farm Mechanization on the Amount of Leisure Time Available to Various Family Members.

Hypothesis: The higher the level of mechanization on the farm the more leisure time will be available to all members of the family.

As previously mentioned the amount of leisure time available to the various family members was measured by the number of hours of leisure per day. This measure was computed from the data provided by the farmers concerning the average number of hours of leisure available per day during each season for them, their wives, and their children. For the latter, and in cases where families have more than one child, hours of leisure available for all children was considered.

For purposes of statistical analysis three categories of leisure time were established: "low" (2.0 - 3.3 hours per day), "medium" (3.4 - 4.6 hours per day) and "high" (4.7 or more hours per day). The amount of leisure was then related to the degree of mechanization to see whether or not any association existed between them. As indicated in Table 10, 46 percent of those who had a "low" amount of leisure available were in the "low" level of mechanization category while only 18 percent of those were in the "high" level of mechanization category. Among those farmers who had a "medium" amount of leisure, 43 percent were farmers in the "low" level of mechanization category, while 26 and 31 percent were in the "medium" and "high" level of mechanization respectively.

Fifty six percent of those who had a "high" amount of leisure time were "high" mechanized farmers, while only 11 percent of them were



in the "low" level of mechanization category. The extent of association between the two variables namely, level of mechanization and amount of leisure available to farmers was moderate as the  $\bar{C}$  value indicates. However, such relationship was not found to be significant at the 0.05 level.

The relationship between farm level of mechanization and the amount of leisure available to wives was presented in Table 11. It was found that among the wives who had a "low" amount of leisure 59 percent were wives of "low" mechanized farmers while only 18 percent were wives of "high" mechanized farmers. On the other hand, 18 percent of those who had a "high" amount of leisure were wives of "low" mechanized farmers, while 50 percent were wives of "high" mechanized farmers. The data indicated a positive relationship between the level of mechanization on the farm and the amount of leisure time available to farmers' wives. This relationship, as expressed by the  $\bar{C}$  value, was moderate but it was not significant at the 0.05 level.

In the case of children, the relationship between farm level of mechanization and the amount of leisure available to them was presented in Table 12. This table indicates that 45 percent of those who had a "low" amount of leisure were children of "low" mechanized farmers compared to 22 percent who were children of "high" mechanized farmers. When the group of children having a medium amount of leisure was considered, it was found that equal proportions of those (36 percent) were in the "low" and "high" level of mechanization categories. Among those sons who had a "high" amount of leisure, 36 percent belonged to "high" mechanized farmers, while 28 percent belonged to "low" mechanized

Table 11. The effect of farm level of mechanization on the amount of leisure time available to wives.

Level of Mechanization	Amount of leisure available to wives (in hours per day)							
	"Low" 2 - 3.3		"Medium" 3.4 - 4.6		"High" 4.7		Total	
	No.	%	No.	%	No.	%	No.	%
"Low" (Scores 20-34)	13	59	12	32	4	18	29	36
"Medium" (Scores 35-49)	5	23	11	30	7	32	25	31
"High" (Scores 50 or more)	4	18	14	38	11	50	27	33
Total	22	100	37	100	22	100	81	100
$\chi^2 = 8.99$ 4 d.f.; $P < 0.05$ ; $\bar{c} = 0.43$								

Table 12. The effect of farm level of mechanization on the amount of leisure available to children.

Level of mechanization	Amount of leisure available to children (in hours per day)							
	"Low" 2 - 3.3		"Medium" 3.4 - 4.6		"High" 4.7		Total	
	No.	%	No.	%	No.	%	No.	%
"Low" (Scores 20-34)	8	45	16	36	5	28	29	36
"Medium" (Scores 35-49)	6	33	12	28	7	36	25	31
"High" (Scores 50 or more)	4	22	16	36	7	36	27	33
Total	18	100	44	100	19	100	81	100
$\chi^2 = 1.91; 4 \text{ d.f.}; P > 0.05; \bar{C} = 0.21$								

farmers. The relationship between the amount of leisure available for children and the level of mechanization on their fathers' farms was in the expected direction, but when chi-square test was applied, its value was not found to be significant at the 0.05 level.

In summary, the relationship between level of mechanization and the amount of leisure time available for all family members was in the expected direction as tables 10, 11 and 12 indicate but since none of these relationships were significant at the 0.05 level the hypothesis was rejected.

When considering the amount of leisure time available some points should be kept in mind:

1. As in the case of the amount of work performed, farmers were found to have a vague idea of time as expressed in terms of hours.
2. The amount of leisure time available to wives and children was estimated by farmers. These estimates were rough and subject to errors.
3. The classification of the amount of leisure time into categories was arbitrary and the cutting points used might not be adequate.
4. In many cases it was difficult for farmers to make a clear distinction between leisure and rest (e.g. afternoon naps).

The type of leisure available to farmers and their families was found to be surprisingly uniform and limited to four or five activities. During their leisure time, farmers mostly visited friends or members of the "extended family". This type of leisure was mentioned

by all farmers. A similar leisure activity was to take part in social events e.g. attending weddings, funerals, commemorations of death and birth of children. In all three villages there was no public recreation place such as coffee house, cinema, etc. The only such place in each village is the mukhtar's house where, at each visit to the latter, various groups of farmers were met. Other major leisure activities were trips to nearby villages or towns to visit friends and/or settle administrative matters. Very few farmers mentioned hunting as a leisure activity. One farmer, a relatively wealthy one, stated that he worked very little and spent "all" his leisure time with "politics".

Female children spent, in most cases, their leisure time with female friends. In addition, they helped their mothers in housework. Interviewing was carried out during the spring, and at this time, young girls of approximately 7 - 20 were seen having long walks within the village only.

Young men's leisure activities were also uniform and consisted mainly of visits to friends, walks in the village streets at sunset, athletics and hunting trips.

#### The Influence of Farm Mechanization on the Acquisition of Technical and Mechanical Skills.

Hypothesis: The higher the level of mechanization on the farm the more technical and mechanical skills will be acquired by farmers and/or their sons.

In order to test this hypothesis three items were used as indicators of technical and mechanical skills. These were the ability of the farmers and/or their sons to:

1. perform major tractor repairs,
2. perform minor tractor repairs and
3. drive tractors.

It was found that none of the farmers or their sons could perform major tractor repairs. These were performed in Zahleh by mechanics at the tractor sales agencies.

The level of farm mechanization was related to the ability to perform minor tractor repairs in Table 13. Among those farmers or their sons who could perform minor repairs, 38 percent were "highly" mechanized, whereas 31 percent were in both "medium" and "low" level of mechanization categories. Thirty percent of the farmers who could not perform any minor repairs were in the "high" level of mechanization category, while 40 percent were "low" mechanized farmers. Thus it can be concluded that the relationship was in the expected direction but it was not significant at the 0.05 level.

The relationship between tractor driving ability and the level of mechanization on the farm is summarized in Table 14. As indicated by this table, it was found that among those who could not drive a tractor the least proportion (25 percent) were in the "highly" mechanized group, while the largest proportion (46 percent) were in the "low" mechanized group. Thus the data supported the expected direction of relationship i.e. the higher the level of mechanization on the farm the more driving skills will be acquired by farmers and/or their sons. However, the extent of relationship between the two variables as the  $\bar{C}$  value indicates, was low. When the chi-square test was applied, its value was not found to be significant at the 0.05 level and, thus, there was no basis to infer that the finding can be generalized to the population.

Table 13. The effect of level of mechanization on the ability of farmers and/or their sons to perform minor tractor repairs.

Level of mechanization	Yes		No		Total	
	No.	%	No.	%	No.	%
"Low" (scores 20 - 34)	10	31	20	40	30	37
"Medium" (scores 35 - 49)	10	31	15	30	25	30
"High" (scores 50 or more)	12	38	15	30	27	33
Total	32	100	50	100	82	100
$\chi^2 = 0.75, 2 \text{ d.f.}; P > 0.05; \bar{C} = 0.15$						

Table 14. The effect of level of mechanization on the tractor driving ability of farmers and/or their sons.

Level of mechanization	Could drive		Could not drive		Total	
	No.	%	No.	%	No.	%
"Low" (Scores 20 - 34)	8	23	22	46	30	37
"Medium" (Scores 35 - 49)	11	32	14	29	25	30
"High" (Scores 50 or more)	15	45	12	25	27	33
Total	34	100	48	100	82	100

$$\chi^2 = 4.96; \quad 2 \text{ d.f.}; \quad P > 0.05; \quad \bar{C} = 0.35$$



In general, it can be stated that the farm level of mechanization was not significantly related to the acquisition of technical and mechanical skills by farmers and/or their sons. Thus, the hypothesis, namely the higher the level of mechanization on the farm the more mechanical and technical skills will be acquired, should be rejected.

As important as the association between level of mechanization and the development of technical and mechanical skills, is the appearance of the latter two skills as such among the population. Although the number of farmers, and/or their sons, who could drive a tractor was relatively limited (34 out of 82), it is indicative of the apparently progressing trend of acquiring mechanical and technical skills in roughly a decade. Similarly, the number of farmers, and/or their sons, who could perform minor repairs was rather moderate, 32 out of the 82 respondents, but this also shows an increasing rate of adaptation to farm machinery. However, in all three villages there was neither a shop nor a person specialized in major tractor repairs.

The Influence of Farm Mechanization on the Number of Relatives Living With and Being Supported by the Family:

Hypothesis: The higher the level of mechanization on the farm the fewer will be the number of relatives living with and/or being supported by the family.

In order to test this hypothesis farmers were asked to state the number of relatives living with their family and the number of relatives who did not live with the family but were dependent mainly on the farmer's family for their livelihood. Initially, three separate

categories were established namely, none, 1 - 3 relatives and four or more relatives. However, for purposes of statistical analysis the latter two categories were collapsed into one and was labelled "one or more relatives".

In table 15 it was shown that among those who did not have any relatives living with them or being supported by them only 18 percent were in the "highly" mechanized group whereas a larger proportion (41 percent) were in the "low" mechanized group. Among those who had one or more relatives living with them or being supported by the family, 51 percent were in the "highly" mechanized category compared to 32 and 17 percent who were in the "low" and the "high" mechanized categories respectively. Thus, those who had least number of relatives living with or being supported by them were in the "medium" level of mechanization group followed by those in the "low" and "high" level of mechanization groups in the order mentioned. In general, the direction of relationship between the two variables was not as hypothesized. The data show that the higher the level of mechanization on the farm the more relatives will live with and/or be supported by the family and vice versa. The degree of relationship indicated by the data was found to be moderate as demonstrated by the  $\bar{C}$  value. The chi-square value showed that the relationship between the two variables was significant at the 0.05 level.

In summary it was found that an inverse relationship to that hypothesized existed between the two variables investigated. This can be possibly due to the fact that farmers who are highly mechanized are normally well to do and they may feel responsible for their re-

Table 15. The effect of farm level of mechanization on the number of relatives living with and/or being supported by the family.

Level of Mechanization	No relatives		One or more relatives		Total	
	No.	%	No.	%	No.	%
"Low" (Scores 20 - 34)	19	41	11	32	30	37
"Medium" (Scores 35 - 49)	19	41	6	17	25	30
"High" (Scores 50 or more)	9	18	18	51	27	33
Total	47	100	35	100	82	100

$\chi^2 = 10.35; 2 \text{ d.f.}; P < 0.05; \bar{C} = 0.51$

latives who are relatively less fortunate.

The Influence of Farm Mechanization on the Children's Attendance at School:

Hypothesis: The higher the level of mechanization on the farm the higher will be children's attendance at school.

The number of days in which children of the third grade or above were absent from school during the year 1966-67 was considered to measure school attendance variable. Since in all three villages only 22 children of interviewed farmers were found to be at school in the third grade or above, some of the columns and rows were collapsed for purposes of statistical analysis. Thus, "medium" and "high" level of mechanization categories were collapsed and labelled "high" level of mechanization. Similarly, only two absence categories were considered, namely, "low" (0 - 4 days of absence per year) and "high" (5 or more days of absence per year).

Table 16 indicated that among those children who had a "low" record of absence 19 percent were children of "low" mechanized farmers while 81 percent were children of "high" mechanized farmers. Among those who had "high" record of absence, children of "low" and "high" level of mechanization were equally represented (50 percent in each case).

Since this table was fourfold, Yule's coefficient was applied to find out the direction and degree of relationship between level of mechanization and school attendance of children. The resulting coefficient ( $Q = 0.63$ ) indicated a moderate positive relationship. Thus, it can be concluded that the relationship between farm level of mechanization and children's absence from school was significant and in the direction expected in the hypothesis.

Table 16. The effect of farm level of mechanization on children's absence from school.

Level of mechanization	Children's absence from school (days/year)					
	"Low" (1 - 4 days)		"High" (5 & More)		Total	
	No.	%	No.	%	No.	%
"Low" (Scores 20 - 34)	3	19	3	50	6	27
"High" (Scores 35 and above)	13	81	3	50	16	73
Total	16	100	6	100	22	100

$$\chi^2 = 5.22 ; \text{ d.f. } 1; P < 0.05; Q = 0.63$$

## V. SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

In this thesis an attempt was made to investigate some social implications of farm mechanization on family life. The specific areas studied were the effect of tractor use on:

- a. The amount of agricultural work performed by various members of the nuclear family;
- b. The tiresomeness of the work of various family members;
- c. The development of technical and mechanical skills among the population studied like tractor repairing and tractor driving skills;
- d. The amount of leisure available to various family members;
- e. The number of relatives living with or being supported by the family;
- f. Children's attendance at school.

The above variables were considered as dependent variables while the level of mechanization on the farm was considered the independent variable throughout this study.

The sample included 82 farmers from three villages in the Central Beka'a, namely Bednaye, Housh el Rafaka and Timnin Tahta. Farmers were asked to answer, among other things, questions concerning the work performed by other family members.

Data collection was done through the use of a detailed questionnaire, attempting, whenever possible, to measure the changes in quantitative terms. The amount of agricultural work performed by men was

measured by the number of hours of work performed per year and per dunum. The amount of work performed by wives was measured in number of hours of work per year and per dunum and also in terms of number of operations performed. The work of male and female children was measured in terms of number of operations in which they helped their parents. Similarly, the amount of leisure available to each family member was measured by the number of hours he or she spent on leisure. Children's attendance at school was measured by the number of days of absence from school as indicated by the official school attendance rolls. Concerning the number of relatives, each farmer was asked to specify the number of relatives and their relation to the family living with him or economically dependent on his income. Only the tiresomeness of work could not be measured quantitatively. Each farmer was asked to evaluate qualitatively the tiresomeness of work for himself and the other members of the family.

For purposes of statistical analysis, the chi-square test, the contingency coefficient, the corrected contingency coefficient and Yule's coefficient were used. The probability level of 0.05 was chosen to test the significance of relationship between the independent and each of the dependent variables. The findings which were obtained can be summarized as follows:

#### Findings related to hypothesis 1

In general, the amount of work performed by men decreased as the level of farm mechanization increased. The relationship between the two variables was moderate as indicated by the  $\bar{C}$  value but was not significant at the 0.05 level.

The amount of work performed by women was not significantly

related to the level of farm mechanization at the 0.05 level. The relationship, though, as expressed by the  $\bar{C}$  value was in the expected hypothesized direction.

The amount of work performed by male children was not significantly related to the level of mechanization on the farm. The data seemed to exhibit an inverse relationship from the one hypothesized.

The amount of work performed by female children was not significantly related, as expressed by the chi-square value, to the level of mechanization. The relationship between the two variables was moderate as the  $\bar{C}$  value indicates.

One can conclude from the above findings that hypothesis 1 which assumed the presence of a positive relationship between the level of farm mechanization and the amount of work performed by various family members can not be supported.

#### Findings related to hypothesis 2

The tiresomeness of work performed by men was significantly related to the level of mechanization on the farm as indicated by the chi-square value at the 0.05 level. The relationship was relatively high as indicated by the  $\bar{C}$  value. The direction of relationship was in the one expected in research hypothesis.

For women, the tiresomeness of their work was also found to be significantly related to the level of farm mechanization. The  $\bar{C}$  value indicated a relatively high degree of association. The direction of relationship was as expected in the hypothesis.

The tiresomeness of work performed by female children was not significantly related to the level of mechanization on the farm as the



chi-square value indicates. The direction of relationship was similar to that expected in the research hypothesis. The extent of relationship was moderate as indicated by the  $\bar{C}$  value.

For male children, the tiresomeness of the work performed was not found to be significantly related to the level of mechanization on the farm as indicated by the chi-square value. The direction of relationship was not clearly indicated since the frequencies were rather evenly distributed. The  $\bar{C}$  value indicated a small degree of association.

#### Findings related to hypothesis 3

The amount of leisure time available to farmers was not found to be significantly related to the level of mechanization on the farm. The direction of relationship between the two variables, though, was as expected in the research hypothesis i.e. the higher the level of mechanization on the farm the more leisure time will be available to farmers. The extent of relationship was moderate as indicated by the  $\bar{C}$  value.

Among women, the amount of leisure was not found to be significantly related to the level of mechanization on the farm, as indicated by the chi-square value. The extent of relationship was moderate and the direction of relationship expected in the research hypothesis was supported.

In the case of children, the amount of leisure was not significantly related to the level of mechanization as it was indicated by the chi-square value. The extent of relationship was relatively small, but the direction of relationship was as expected.

#### Findings related to hypothesis 4

None of the farmers interviewed nor any of their sons were able

to perform major tractor repairs.

The ability of farmers and/or their sons to perform minor tractor repairs was not found to be significantly related to the level of mechanization on the farm as indicated by the chi-square value. The direction of relationship, though, was in the same direction expected in the research hypothesis and the extent of relationship was shown to be relatively moderate by the  $\bar{C}$  value.

The ability of farmers and/or their sons to drive tractors was not significantly related to the farm level of mechanization. Although the direction of relationship was as expected in the hypothesis, the extent of association, as indicated by the  $\bar{C}$  value, was relatively small.

In summary, it can be stated that hypothesis 4 which assumed the presence of a positive relationship between the level of mechanization and the acquisition of technical and mechanical skills should be rejected.

#### Findings related to hypothesis 5

The number of relatives living with and/or being supported by the family was found to be significantly related to the level of mechanization on the farm. The extent of relationship between the two variables was limited and the direction of relationship exhibited was not in the expected direction. Farmers with a "medium" level of mechanization were found to have the least number of relatives living with and/or being supported by them while farmers with a "high" level of mechanization had the most.

### Findings related to hypothesis 6

The absence of children from school was found to be significantly related to the level of farm mechanization as indicated by the chi-square value. A positive and moderate relationship was found to exist between the two variables when Yule's coefficient was used.

### Limitations of this study

Four possible limitations of the study can be stated:

1. The size of the sample was relatively small which made callapsing of some columns necessary to facilitate statistical analysis.
2. Farmers were asked to provide information concerning their wives' and childrens' work. Thus, the measurement of the variables which are related to other family members were not actual measures but as perceived by the farmers themselves. In ideal conditions all members of the family, or at least wives, should be interviewed. This was not possible, though, because of the suspicion it could have created among farmers. The help of a female interviewer throughout the interviewing period, though attempted, could not be secured.
3. This study excludes certain categories of work such as women's work at home for example. This could not have been included without introducing a major source for validity error i.e. errors caused by men's relative ignorance about housework if they were asked to respond to questions related to women's work at home as it could have been the case.
4. By far, the most important shortcoming of this study was the fact that all possible interveining factors were not

considered. In the choice of villages, an attempt was made to control such important factors as religion, type of agricultural area and cultural background. However, some of the important possible intervening factors which were not controlled for were farm income, type of land tenure, degree of urbanization and hired labor.

#### Suggestions for further research

The limitations mentioned above should be overcome if future studies of this nature are to yield more reliable results. In addition, the following suggestions can be offered:

1. Further research in different areas of the country is needed to investigate the influence of using tractors on similar or additional aspects of life such as anomie, for example.
2. In this study, it was found that farmers did not have a precise conception of time. Thus it would be advisable for future studies to measure the amount of work performed and the amount of leisure time available in terms of number of days, possibly, rather than number of hours as it was used in this study.
3. Interviewing could be achieved in a much shorter time if it is done during the winter. Since the interviewing for this thesis was done in the spring many farmers were not found at home even after two or three visits were made. In addition, walking to the distant fields was often necessary to interview the busy farmers.
4. Using case studies, in which families from each different level of mechanization can be selected and studied in depth, can produce more comprehensive and precise results.

### Recommendations

The findings of this research do not lend themselves for the drawing of practical and precise recommendations for action. However, based on the results of this thesis the following general recommendations can be made:

1. Since the progressive mechanization of agriculture can be expected to liberate part of the labor force involved in agriculture, means and measures should be found to employ this category of the population which would otherwise increase unemployment and "hidden unemployment" which is already prevailing in the rural areas. Some of these possible measures can be the creation of small scale industries, or industries which could use locally produced products. The area studied is not rich in any raw materials and the most suitable industries that could be established are food processing industries in which women could also be employed. Another possible measure is the encouragement of local handicraft industries. Such activities or skills were not found in the villages studied, but these could be developed.
2. Since leisure time was found to increase with increasing levels of mechanization, and assuming that agriculture will be progressively mechanized in the area, ways and means should be found to provide basic services to this end. As previously mentioned, collective leisure possibilities were very limited in the villages studied. Although such activities are often

initiated by private enterprises, the government could initiate such action at least in the early stages. Community development workers could play an important role in this respect.

3. Assuming that mechanization of agriculture is desirable, certain measures should be taken by the government to speed up and facilitate such a process. Among these measures, due consideration should be accorded to land consolidation programs since the scattered pattern of land ownership existing in the villages studied, and most other Lebanese villages, could hamper the effective use of tractors. Other measures which can be taken to encourage agricultural mechanization are: the reduction of import taxes on tractors and their spare parts, the provision of agricultural extension men who are specialized in agricultural machinery and the provision of credit facilities to help farmers purchase the needed farm equipment.

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APPENDIX

## INTERVIEW SCHEDULE

1. Date of interview:
2. Name of interviewer:
3. Name of village:
4. Number of village:
5. Name of farmer:
6. Number of farmers
7. Age of farmer:
8. Marital status of farmer:
  1. Single
  2. Married
  3. Widower
  4. Divorced
  5. Separated
9. Degree of education: (Number of years at school)
  1. None
  2. 1 - 3
  3. 4 - 6
  5. Finished high school
  6. Technical or vocational school (specify)
  7. University degree (specify)
10. Children:

	<u>Age</u>	<u>Sex</u>	<u>Marital Status</u>
1.			
2.			
3.			
4.			
5.			

- |     | <u>Age</u> | <u>Sex</u> | <u>Marital Status</u> |
|-----|------------|------------|-----------------------|
| 6.  |            |            |                       |
| 7.  |            |            |                       |
| 8.  |            |            |                       |
| 9.  |            |            |                       |
| 10. |            |            |                       |
| 11. |            |            |                       |
| 12. |            |            |                       |

11. Wife's age:

12. Wife's educational level: (Number of years at school).

1. None

2. 1 - 3

3. 4 - 6

4. 7 - 9

5. Finished high school

6. Technical or vocational school (specify).

7. University degree (specify)

13. Since how many years are you married:

14. To which sect do you belong:

1. Greek orthodox

4. Sunni

2. Maronite

5. Shiite

3. Roman Catholic

6. Other (specify)

15. How many persons other than you, your wife and your single children live with you:

16. What is their relation to your family:

Person

Relation

17. Do you have any relatives who do not live with you but who are economically dependent on your family's income (number).

18. What is their relation to your family:

19. Do you own a tractor:

1. Yes

2. No

20. Have you rented a tractor last year:

1. Yes

2. No

21. Since how many years have you been using a tractor:

22. If answer to 15 or 16 above is yes, what is its trade mark:

23. How many horse powers is it:

24. What accompanying implements does it have:

List of all tractor implements

25. Are you the only owner of the tractor

1. Yes

2. No

26. On what basis do you rent the tractor:

1. Per hour

2. Per day

3. Per operation

4. Per annum

5. Other (specify)

27. Who drives your or the rented tractor:

28. Who repairs the tractors:
29. If something minor happened to your tractor, do you or any member of your family repair it:
30. Is there a person or a garage in the village where the tractor can be repaired:
1. Person
  2. Garage
  3. None

31. If answer to question above is (3) i.e. None, where is your tractor repaired:

32. How many dunums of land do you own:

1. Irrigated ..... 2. Non-irrigated .....

33. How many dunums of land do you share crop:

1. Irrigated ..... 2. Non-irrigated .....

34. How many dunums of land do you share rent:

1. Irrigated ..... 2. Non-irrigated .....

35. What crops did you grow last year:

Crop	No. of dunums	Total yield	Price per kilo	Gross income from crop.
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36. What other occupation do you have other than farming:

37. How much does that occupation bring you as a yearly income:

38. Who other than you is employed in a paid work:

39. What is their total yearly income:

40. For wheat or barley, list the operations in which you use the Tractor:

- |                        |               |                           |
|------------------------|---------------|---------------------------|
| 1. Plowing             | 4. Planting   | 7. Threshing              |
| 2. Levelling           | 5. Weeding    | 8. Straw processing       |
| 3. Seedbed preparation | 6. Harvesting | 9. Transportation         |
|                        |               | 10. Spreading fertilizers |

41. For tomatoes or potatoes what are the operations you perform by tractor:

- |                                   |                                |
|-----------------------------------|--------------------------------|
| 1. Plowing                        | 10. Transportation of crops    |
| 2. Levelling                      | 11. Other operations (specify) |
| 3. Seedbed preparation            |                                |
| 4. Planting                       |                                |
| 5. Irrigation                     |                                |
| 6. Weeding                        |                                |
| 7. Harvesting                     |                                |
| 8. Plowing under (green manuring) |                                |
| 9. Spreading fertilizers          |                                |



49. During which months are you most busy in agricultural work:

1 2 3 4 5 6 7 8 9 10 11 12

50. How many hours do your male and female children help in agricultural work in the field and other than in the field (approximately monthly average):

	<u>Age</u>	<u>Sex</u>	<u>Average No. of hours worked per month</u>
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
13.	Wife		

51. In which operations do your male children help you for growing wheat or barley:

1. Plowing
2. Levelling
3. Seedbed preparation
4. Planting
5. Weeding
6. Harvesting
7. Threshing
8. Straw processing



9. Fertilizer spreading
  10. Transportation
  11. Other operations (specify).
52. In which operation do your male children help you for growing potatoes or tomatoes:
1. Plowing
  2. Levelling
  3. Seedbed preparation
  4. Planting
  5. Irrigation
  6. Weeding
  7. Harvesting
  8. Plowing under (green manuring)
  9. Spreading fertilizers
  10. Transportation of crops
  11. Other operations (specify)
53. In which operations do your female children help you for growing wheat or barley:
1. Plowing
  2. Levelling
  3. Seedbed preparation
  4. Planting
  5. Weeding
  6. Harvesting
  7. Threshing
  8. Straw processing
  9. Fertilizer spreading
  10. Transportation
  11. Other operations (specify)

54. In which operations do your female children help you for growing potatoes or tomatoes:

1. Plowing
2. Levelling
3. Seedbed preparation
4. Plating
5. Irrigation
6. Weeding
7. Harvesting
8. Plowing under (green manuring)
9. Spreading fertilizers
10. Transporation of the crop
11. Other operations (specify)

55. In which operations does your wife help you for growing wheat or barley:

1. Plowing
2. Levelling
3. Seedbed preparation
4. Planting
5. Weeding
6. Harvesting
7. Threshing
8. Straw processing
9. Fertilizer spreading
10. Transporation
11. Other operations (specify)

56. In which operations does your wife help you for growing tomatoes or potatoes:

1. Plowing
2. Levelling

3. Seedbed preparation
4. Planting
5. Irrigation
6. Weeding
7. Harvesting
8. Plowing under (green manuring)
9. Spreading fertilizers
10. Transportation of crop
11. Other operations (specify)

57. Does it sometimes happen to your male children not to be able to go to school because they are needed in the field:

1. Yes
2. No

58. If yes, how many days per year approximately:

59. Does it happen to your female children:

1. Yes
2. No

60. If yes, how many days per year approximately:

61. How many hours do your male children work to help you in agricultural work.

Season

Hours of work/day

Summer

Fall

Winter

Spring

62. How many hours do your female children work to help you in agricultural work:

Season

Hours of work/day

Summer

Fall

Winter

Spring

63. How many hours does your wife work to help you in agricultural work:

<u>Season</u>	<u>Hours of work/day</u>
Summer	
Fall	
Winter	
Spring	

64. How many hours do you work for agricultural work:

<u>Season</u>	<u>Hours of work/day</u>
Summer	
Fall	
Winter	
Spring	

65. Do you think that since you have owned or used a tractor your wife has been helping you:

1. As much as before
2. A little less than before
3. Much less than before
4. A little more than before
5. Much more than before
6. Never helped
7. Other

66. Do you think that since you have owned or used a tractor your male children have been helping you:

1. As much as before
2. A little less than before
3. Much less than before
4. A little more than before
5. Much more than before
6. Never helped
7. Other

67. Do you think that since you have owned or used a tractor your female children have been helping you:

1. As much as before
2. A little less than before
3. Much less than before
4. A little more than before
5. Much more than before
6. Never helped
7. Other

68. Do you think that since you have owned or used a tractor your wife's work has been: \*

1. As tiresome as before
2. A little less tiresome
3. Much less tiresome
4. A little more tiresome
5. Much more tiresome
6. Other (specify)

69. Do you think that since you have owned or used a tractor your male children's work has been:

1. As tiresome as before
2. A little less tiresome
3. Much less tiresome
4. A little more tiresome
5. Much more tiresome
6. Other (specify)

70. Do you think that since you have owned or used a tractor your female children's work has been:

1. As tiresome as before
2. A little less tiresome
3. Much less tiresome
4. A little more tiresome
5. Much more tiresome
6. Other (specify)

71. Do you think that since you have owned or used a tractor your work has been:

1. As tiresome as before
2. A little less tiresome
3. Much less tiresome
4. A little more tiresome
5. Much more tiresome
6. Other (specify)

72. For non-tractor users, who drives the animals for the operations you perform:

73. How many hours of leisure do you have on the average during:

Season

Hours of leisure/day

Summer

Fall

Winter

Spring

74. How many hours of leisure does your wife have on the average during:

Season

Hours of leisure/day

Summer

Fall

Winter

Spring

75. How many hours of leisure do your male children have on the average during:

<u>Season</u>	<u>Hours of leisure/day</u>
Summer	
Fall	
Winter	
Spring	

76. How many hours of leisure do your female children have on the average during:

<u>Season</u>	<u>Hours of leisure/day</u>
Summer	
Fall	
Winter	
Spring	

77. What are the activities on which you spend your leisure time:

78. What are the activities on which your male children spend their leisure time:

79. What are the activities on which your female children spend their leisure time:

80. What in your opinion has changed in your and your family's life since you have owned or used a tractor ?

81. Why did you decide to buy or use a tractor ?

1. More profitable
2. Requires less work
3. More comfortable
4. To lend it to others to make profit
5. Other reasons (please specify)