COMPARATIVE ECONOMICS OF JHUM AND SETTED CULTIVATION

WITH SPECIAL REFERENCE TO EMPLOYMENT, OUTPUT AND MARKETED SURPLUS OF FOODGRAINS

(A CASE STUDY OF AIZAWL DISTRICT, MIZORAM)

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Certified that Mr. Lalrinthanga has worked under my supervision and guidance on a research topic entitled "Comparative Economics of Jhum and Settled Cultivation with Special Reference to Employment, Output and Marketed Surplus of Foodgrains (A Case Study of Aizawl District, Mizoram)" for the degree of Master of Philosophy in Economics, North-Eastern Hill University, Shillong. The work embodies the record of original investigations and no part of it has been submitted for any other degree of other universities.

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C O N T E N T S

Chapter I : Introduction

1.1 Nature and Meaning of the Problem

In developing countries, like India, agriculture is the very backbone of the dominant sector of the economy. The majority of the working population (more than 70% in India)[15] is engaged in farming, and a number of farmers are not able to meet even their own consumption requirements for food-grains except in a few regions where green revolution occurred and matured. The working population engaged in agriculture generates nearly half of the national income.[53] Moreover, among the agricultural products, foodgrains occupy a predominant position in terms of their share both in total output and area under cultivation (55% and 81% respectively in India).[45]

The population of the developing countries has been rising very rapidly. The explosive growth of population has adversely affected the growth of the economy. Even though the gross domestic product has grown quite substantially population growth has reduced the growth of per capita income to a nominal level. The developing economies are predominantly agrarian in nature; the secondary and tertiary sectors have not grown adequately. Consequently, the pressure of numbers is exerted, most of the time, on land. Naturally, ever-increasing numbers tend to get absorbed in agriculture which has created problems of disguised unemployment, low labour productivity, unfavourable land-man ratio and the fragmentation and sub-division of holdings.

Modern developmental processes have been found to be historically associated with the growth of manufacturing industries. Hence, it is often suggested that, in the highly populated areas where pressure on agriculture and primary production happens to be high, industrialisation provides the key to lift the economy out of its shoe-strings. Then the heavy and basic industries are considered to be the king-pin of the growth process. The argument is that if the secondary sectors experience significant development, there will be transfer of surplus labour from agriculture to industries.[24] The transfer of surplus labour from agriculture to industries has been assumed not only to promote economic development, but has also been expected to solve the perennial problem of full or partial unemployment in rural India. However, as agriculture occupies a predominant position in the rural economy, this sector and other allied sectors have to play a crucial role in the process of employment generation. Generally, leading and the new sectors of the economy develop more rapidly than the rest of the economy. But still the new job opportunities may be rendered inadequate by rapid population growth and a mismatch between the skill available and those in demand.

But as an economy moves from lower to higher stages of economic development, the level of income of a country/ region increases and the proportion of its labour force engaged in agriculture and related activities is expected to fall relative to the proportion of work force engaged in

industries, At higher stages of growth, there occurs a shift from agriculture to industries and then from industries to trade and services. But the hypothesis of transfer of the surplus labour from agriculture to the secondary and tertiary sectors assumes implicitly that it will remove the constraints to economic development, such as the scarcity of capital, trained manpower and wage-goods including foodgrains in the development process itself. Of these, the supply of wage-goods in general and foodgrains in particular may be considered to be the greatest stumbling block in the developmental process. This constraint derives its seriousness from the fact that the foodgrains constitute one of the most urgent necessities of life of the majority of the people. Therefore, if the endogenous supply falls short of requirements, either of the following alternatives have to be adopted: (1) allow the population to die of starvation, which is neither human nor plausible in a democratic country like India, or (2) make the short-falls good by necessary imports from abroad, which diverts precious foreign exchange from the developmental activities. Then the absorption of labour in non-primary sectors of the economy is limited by the supply of foodgrains. The fluctuations and inadequacy in supplies destabilises the foodgrain prices which generates inflationary pressure in the economy.[45] Price stability will then hardly be compatible with development.

Thus, economic development pre-supposes the availability of sufficient amount of foodgrains. From the point of

view of economic development, increase in production is, no doubt, essential but is not a sufficient condition. It must be accompanied by an increase of the marketed surplus, and thereby, of investment at a compound rate which should be well above the rate of population growth.[53] The marketed surplus of foodgrains is, thus, of special significance because they are the basic wage-goods.[37]

In the developing countries, both the major part of the investible resources and the basic goods and raw materials have to come from agriculture for the sustaining of development in the long run. In fact, economic development requires an increase in per capita production of the farm sector in order to provide the surplus to feed workers engaged in the non-farm sectors and also to meet the requirements of agro-raw-materials. Thus, farm sector can make a positive contribution to economic development by raising output, and hence, the marketed surplus of foodgrains. In addition, the increased marketed surplus will increase real as well as money incomes of the farmers; and increased amount of cash in the hands of the farmers will result in an enhanced demand for the manufacturers. Thus, the growth pattern will reinforce the sectoral growth. This will further result in an inter-sectoral trade and the consequent commercialisation of agriculture, especially the sub-sector of foodgrains. Irrespective of the physical form of the surplus, the main feature of commercialisation is, basically, that a growing amount of surplus output has to be marketed.[37]

The marketed surplus and its concommitant commercialisation will help not only in increasing production but will also have important effects on distribution pattern, bringing about major changes in the production relations in agriculture with an emphasis on ready market for the labourers.

Thus, the theory of economic development embodied in some of the 'dual economy' models deriving from the seminal contribution of Arthur Lewis (1954-56)[24] suggests that the extraction of agricultural surplus, i.e. the transfer of real resources from agriculture to industry, constitutes the necessary condition for development of underdeveloped societies. Evidently, in the Ranis-Fei[49] extension of the Lewis Model, the transfer of real resources from agriculture to industry, defined as an export-surplus of the farmers, is seen as a sine-qua-non of economic development.

The question of marketed surplus and its role is, therefore, intimately linked up with the commercialisation of agriculture in general and the foodgrains sector in particular. The extent of dependence of the farmers upon the market may be viewed in terms of any one of the following aspects: (1) market dependence for selling, (2) market dependence for consumption. Many times, the cultivator is required to purchase his own requirements for foodgrains from the market. For meeting the pressing needs for cash, poorer farmers may have to sell their produce immediately after the harvesting is over and later they themselves have to purchase their food requirements from the market at higher prices, (3) the role of

non-market transactions, such as payments and receipts in kind and (4) dependence on the market for obtaining agricultural inputs.

As for the first aspect we have had a brief explanation. Dependence of the farmers on the market to meet their consumption requirements of foodgrains is, in a sense, the counterpart of the various aspects of the problem of the marketed surplus. It indicates the extent of commercialisation in economic relations.[51]

Marketed surplus and commercialisation of the production and consumption of foodgrains are, therefore, the inseparable aspects of economic development. Marketable surplus is a function of the lifting of the agrarian economy out of the moriss of subsistence farming which, in its turn, hinges upon technological transformation. Introduction of new technology has many short-run and long-run implications for the entire economy, and for the agriculture in particular.[47] In most of the stagnant societies, the application of known improved technology often leads to a substantial and quick increase in the production of foodgrains and other agricultural crops.[53] After certain minimum infrastructure facilities have been developed, the introduction of new technology can lead to the exploitation of the unexploited potential which can produce the requisite surplus with relatively low investment and within a comparatively short period of time. Once the ground is prepared for the introduction of such techniques, an ever-expanding horizon is

opened up. Thus, technological change, marketed surplus and commercialisation of foodgrains and other agricultural products are positively correlated and can act as an accelerating factor of economic development.

There is also a direct relationship between the type of cultivation and the nature and level of economic development. In India in general, and in the North-Eastern Hill Areas in particular, it has become fashionable in academic and policy discussions to suggest settled cultivation as an alternative to jhum cultivation,[13] and it is supposed to lie at the base of agricultural development. As much harm can be done to developmental efforts on account of policies based on unfounded beliefs, it is necessary to investigate as to whether this view is scientifically sound. As such, a study of the relative requirements of labour and investment expenditure as well as the productivity of labour and capital, cropping pattern, marketable surplus and the extent of commercialization in the settled and jhum cultivation will be of great help in evolving a suitable policy frame for agricultural development and a system of procurement for ensuring food security and public distribution. Only a detailed study can reveal the magnitude of the marketed surplus that can be expected at different levels of output of different crops.

In order to study all these aspects together in a comparative framework, it is essential to have a general equilibrium system for analysing the behavioural propensity

of the tribal jhumias especially with respect to commercialization of foodgrains, sales, consumption, stocking and their investment behaviour. Only in such a framework, scientifically correct and economically meaningful analysis of the marketed surplus of foodgrains at different levels of development and different types of technique can be carried out.

From the past experience of the North-Eastern Hill Areas, especially in Mizoram, it is commonly believed that jhum is much more labour-intensive than the settled cultivation. This is a hypothesis which needs testing by scientific procedure. Similarly, initial investment for converting the jhum land into the settled lots requires high doses of investment, which, most of the farmers are not in a position to afford, and the only way of converting hill cultivation into settled cultivation is through terracing.[13]

An advantage of terracing is that the modern inputs, like fertilizers and water, etc. may also be used to raise per worker and per hectare productivities. This may also help in diversifying the cropping pattern. Currently, only paddy and maize are raised in settled cultivation the cropping pattern of the jhum cultivating is varied and highly diversified. Because of the predominance of the jhum cultivation at present, most of the marketed surplus of foodgrains comes from the jhumias. But the absence of authentic data makes it difficult to determine whether per worker or per hectare output of foodgrains in the jhum cultivation is

significantly different from those of the settled cultivation. However, it has been found from practical experience of some farmers that the terraced cultivation, if provided with enough fertilizers and water supply, could make remarkable difference in output. In addition, the settled cultivation will lead to the preservation of the forest resources. Therefore, the settled cultivation, if it can be successfully practised, will not only result in agricultural development, but will also increase the supply of forest resources which constitute one of the most important raw-materials needed for the development of cottage and small-scale industries. This will also contribute to the environmental preservation.

1.2 Objectives

The main objective of the study are :

1) To analyse the relative advantages and disadvantages of the settled and jhum cultivation.

2) To determine the relative levels of output and the marketed surplus of foodgrains in the jhum and settled cultivation.

3) To analyse the returns to scale and the returns to individual factors in the production processes of the two modes of cultivation.

1.3 Hypothesis

On the basis of the problematic situation and the objectives of the study, the following hypothesis are

formulated as first approximation and for testing them empirically:

1) Average family size of holding in jhum is larger than that of settled cultivation.

2) Family size and holding size are highly related and, therefore, average size of holding in jhum is larger than that of the settled cultivation.

3) Settled/Terrace cultivation absorbs greater quantities of labour than jhum.

4) Marketed surplus per hectare is higher in the settled than that of the jhum cultivation, and

5) The average productivity of land and labour are higher in the settled than the jhum cultivation.

1.4 Sampling Design and Methodology

For purpose of verifying the above hypothesis, we have generated data by means of field surveys. The data have been gathered by means of the Stratified Sampling. The first set of control factors used for purposes of stratification have been jhum and settled cultivation. Within each of these stratum, the villages have been further stratified according to two control factors: (a) distance from the road, and (b) population size.

It is a well-known fact that the nature and extent of resource endowment is a major factor of population density. Generally, a region which is richly endowed with natural resources, e.g. fertility of land, water supply, etc., tends

to attract more population than other areas. The population size is related to the right combination of human and natural resources for economic development. As against this, the area defficient in natural resources may provide greater motivation to human agents to overcome these difficulties. It is also true that the population pressure imparts an impetus to intensify efforts for rapid development. All these forces pull the developmental process in the same positive direction. Therefore, population size may be taken as the proxy of forces that may affect developmental activities favourably or unfavourably.

Similarly, the distance from the road acts as the positively stimulating factor for development. Roadside villages are generally opened up by the development of transport and communication facilities which facilitate the generation of pressure of modern development. The occupations also become more diverse. Opening up of these areas by the development of transports and communications tend to make agriculture much more commercialised and developed than the agriculture of other areas.

On this view, one could expect that most of the remote villages will be sparsely populated, and the villages near the road-side to be more densely populated. The nature and the level of socio-economic development is likely to be more satisfactory in the areas near the road-side than those which are remote. However, such trends have been disturbed in Mizoram where the villages have been regrouped and reorganised from the security view point in the wake of

insurgency during the years 1966-68. The result is that we find big villages not only near the roadside but also in remote areas. Therefore, population size may not be as decisive a factor of development in these areas as it happens to be elsewhere; and it may or may not reflect the level and nature of socio-economic development in accordance with the natural resource endowments. This fact may not allow the developmental activities to be co-terminus with the population size alone in case of Mizoram even though the two control factors, taken together, may have a great bearing on the nature and the extent of socio-economic developments that has taken place in the rural areas of Mizoram. Another important feature of the rural areas of Mizoram which the present investigation observes is that there are numerous villages which practise purely jhum cultivation, while there are hardly any village which practise purely settled cultivation of any one type. What we find is that even if the settled cultivation is adopted in some rural areas, a number of households continue to practise jhum cultivation. We may define such areas as areas of mixed cultivation. Therefore, what we find is the mixed pattern of cultivation being prevalent in these villages of Mizoram. In view of this, the first control factor of stratification becomes jhum vrs. mixed cultivation. According to these control factors we prepared different sub-clusters of villages within each stratum according to the first control factor. Three sub-clusters of villages according to each of the two control factors are prepared. The cluster of villages according to

the population size have been as follows:

1) Cluster of villages with high population,

2) cluster of medium size villages, and

3) cluster of small size villages.

Similarly, the villages have also been divided into three sub-clusters according to the distance from the road as follows:

1) long distance from the road,

2) moderate distance from the road, and

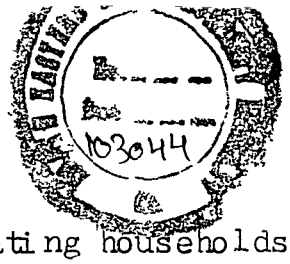
3) short distance from the road or road-side villages.

Thus, within each of the clusters, there would be six sub-clusters of villages.

Even though we have had some rough idea about the range of population size at different villages, yet we prefered to do this classification more accurately after obtaining information from the census data. According to the available information, the highest populated villages have about 1000 households approximately, while the lowest populated villages have about 15 to 25 households approximately. These two extremes provide us the range on the basis of which the cut-off points for the three different sub-clusters of villages according to population size have been decided. Of course some degree of arbitrariness has to be there in deciding the cut-off points. Same is true about distance from the road-side. According to the local practice, 0-5 kms. is considered to be workable or short-distance. Distance upto 15-30 kms from the road may be considered to be average or

moderate, while more than 30 kms. may be considered as long. These distances may be considered to be co-terminus with the categories of short, moderate and long, in terms of the time required to cover these respective distances. As the terrain is relatively more difficult than that in the plains, norms applicable to other regions may not be relevant. Real remote villages may be, however, as far away as 100-120 kms. from the roadside. If we had gone according to these strata, we would have to make a selection of at least one village from each of these clusters. It means that we should have selected six villages each from the two clusters that would be further sub-divided into three sub-clusters. But it was considered to be too costly in terms of time and other resources at the pilot stage of M.Phil dissertation.

In the pilot stage, we have, therefore, taken up only four villages from these clusters. In the first instance, we have chosen a remote small size village and the other village is also small but it is the nearest village to the roadside. Out of the other two villages one is moderate and the other is big in size. One is near to the road and other is a remote village. In order to carry out a comparative study of these two cases, we have tried our utmost to select as much similar villages as is practicable. The small size of the selected villages also facilitate an indepth study of the characteristics to be investigated. Each of the two selected villages have been further stratified according to the other two control factors - the holding size and the type of



cultivation practised. Thus, the cultivating households in each of the four selected villages in the pilot investigation have been further stratified according to the holding size and the type of cultivation practised.

Each cluster of households has been divided into three sub-groups according to per capita cultivated land. The primary sampling unit has been the household. In case of the two small villages selected in the sample from both the clusters, census method has been found to be practicable.

1.5 Area Selected for the Study

Aizawl District of Mizoram has constituted the domain of the sruvey. This area has been selected with a view to the following factors:

1) About two third of the total population of Mizoram is living in Aizawl District.

2) Most of the areas utilized for settled cultivation are located in Aizawl District.

3) The capital of the state, Aizawl, is the chief centre of marketing serviced by a number of primary market centres away from the capital. As the marketed surplus may, among other things, depend upon the marketing facilities, it will facilitate an indepth study of the surplus.

4) A study of this type has never been undertaken within this area, and the developmental efforts are simply based on impressions and beliefs which may have no scientific basis. This study would, therefore, throw light on the empirical validity of these impressions and beliefs.

1.6 Chapterisation

The study has been divided into eight chapters to facilitate a systematic presentation of the analysis as follows:

The first chapter introduces the nature and the meaning of the problem. Chapter II introduces the background of Mizoram economy. Chapter III reviews related studies undertaken by others for different states of India in general, and the different states of the north-eastern India in particular. Chapter IV examines the dominant features of the jhum and settled cultivation. Chapter V deals with the relative employment levels in the jhum and settled cultivation. Chapter VI deals with the estimation of the relative output levels in the two modes of cultivation. Chapter VI is a study of the relative share of jhum and settled cultivations in the marketed surplus of foodgrains. The last chapter concludes the major findings of the present study.

Chapter II : General Background of Mizoram Economy

2.1 Area and Climatic Condition

Mizoram is situated in the north-eastern corner of India, lying between the latitude of 20°2' and 24°27' North and the longitude of 90°20' and 93°29' East. The Tropic of Cancer runs through the state. It is flanked by Bangladesh and Tripura in the west, Burma in the east and south, and Manipur and Cachar District of Assam in the north. The total area of the state is 21,081 square kilometres.[4]

Mizoram is a hilly region, the hills being running from north to south with a tendency to be higher in the east bordering about 900 metres above the sea level. It has a pleasant climate with generally cool summers and not very cold winters. During the winter, the temperature varies from 10°C to 2.°C, while during th_ summers, it varies from 20°C to 29°C. The average rainfall is about 2620 mm.

2.2 Natural Resources

The soil type generally found in Mizoram is a clayey loam-mixed with broken angural shales of varying sizes. Though there is a fair percentage of clay in the soil, the water-holding capacity of the soil is very low; and as a result, the top soils become very dry during the winter. As there has been continuous washing away of the top soil by rain water, the soil becomes more and more acidic in nature, while the portion which are lying in the plains are rich alluvial soil.[4]

Though no minerals of economic value have been discovered so far, there are prospects of finding a number of them. The Department of Industries, at present, looks after various subjects connected with Geology and Mining. A small wing under the supervision of the Central Government Expert and few local staff are engaged in investigation and exploration activities. During the last three years, a number of minerals, such as, slack limestone, coal, etc., have been reported. But the extent and the quality of the prospective minerals have not yet been examined. The Government of Mizoram have attached greater and greater importance to the exploration of mineral resources. A separate Directorate of Geology and Mining is likely to be established in the near future. It is expected that the mineral resources of economic value will soon be discovered.

Mizoram is covered with a thick forest. However, the forest resources have been continuously destroyed mainly by the system of jhum cultivation. Besides there was no Reserved Forest in Mizoram while it was one of the districts of Assam except the Inner Line Forest Reserves which were about 217 square miles. As per available information, the following table depicts the Reserved Forests in the state.[4]

Year	Reserved forest (sq.miles)	Protected forest (sq.miles)	Unclassed forest (sq.miles)	Total (sq.miles)
1934	217	12	7559	7788
1961	217	12	7599	7788
1972-73	2207	396	6040	8643

Thus, these figures show that the forest cover of all types has increased consistently from 1961 to 1972-73.

As for the power resources, the rivers have been found to be capable of generating much more than the requirements of the state. Some Micro-Hydel projects have been successfully carried out. The number of villages electrified as on April 1, 1984, under normal and MNP was as many as 134 villages, and the total installed capacity (Diesel) as per available information was 10.51 MW. But the domestically generated electricity from Micro-Hydel Projects was only 1.00 MW; and there are some Micro-Hydel Projects which are expected to be in operation in the near future.[59]

2.3 Population

The density of population in Mizoram is one of the lowest in India - it is only 15 per square kilometre.[59] However, the rate of population growth is very high. During the decade of 1959-61 the population increased at a rate of 35.61 per cent, and declined to 24.93 per cent during the decade of 1961-71. This decline in the rate of population growth seems to have been the result of the disturbances which started on 31st March, 1966, as a result of which, thousands of youngmen, within the most productive age group had gone underground. Besides, underground activities have disrupted the family lives while the marriages of the single ones appear to have been delayed. Both these factors coupled

with the accelerated death rates seem to have decelerated the population growth. However, during the next decade of 1971-81, the rate of population growth has been doubled.[59] Whereas the population of the state in 1971 was 3,21,686, it has gone up to 4,93,757 in 1981 yielding a rate of growth of 53.49 per cent.

According to the population survey conducted by the Economics and Statistics Department in 1978 and 1979, the birth rate was 35.83% while the death rate was 5.5 per cent. Thus, the net rate of population growth during this period was 30.33 per cent. It is quite possible that 23.16 per cent of the overall growth might have been the result of an influx from Bangladesh and other parts of India especially from the adjoining state of Assam This idea has been approved by an examination of the census data of 1971 and 1981. It shows that the Chakma population during this period has increased by about 77 per cent. This reveals that if proper step is not taken to check the influx of the Chakmas from Bangladesh, they will soon be more than the native population of the state. Besides, the present rate of population growth unaccompanied by adequate economic growth has given rise to a number of problems such as, food shortages, increasing unemployment, etc. In fact, more than 50% of the foodgrequirements have been met every year with the imports from outside the states. If the population growth is not controlled immediately it may cause a lot of socio-economic problems in future.

2.4 Unemployment Problem

Whereas unemployment problem has been the permanent feature of the National Economy, Mizoram, had been fortunate enough in this respect. The state had been endowed abundantly with land while it has been short of manpower in general and technical and scientific manpower in particular. This particular pattern of resource endowment has enabled the state to avert the problem of unemployment that has been confronting the national economy. It is only recently that the problem has emerged in an embryonic form in the economy of Mizoram. This seems to have been the consequence of relatively rapid educational development of the state which has been dominated by the growth of general and literary rather than scientific and technical education. At the end of 1987, the number of persons who registered themselves with the Employment Exchange at Aizawl only was 23,557, out of which 17,696 were males and 5,861 were females.[59] Out of the total number of persons registered, 12,615 were under matriculates, and 10,942 were matriculates and above. Thus, 94.69% of the total registrants were the educated. However, unemployment is not yet a serious problem. Proper development policy and the right steps towards the implementation of the development programmes may contribute to the solution of the present unemployment problem. Besides, this also highlights the need for manpower planning as an essential part of development planning and appropriate

educational policy designed to sub-serve the needs of general economic development.

In fact, Mizoram has one of the highest percentage of literacy in India. The rate of increase in the percentage of literacy is very high and steady. The literacy percentage in 1901 was 0.93 and 3.98 in 1911. In 1971 census it has come up to 53.79 and has reached above 60% at present.[4] But, while the literacy percentage of the state is one of the highest in India, Mizoram is one of the most backward states so far as technical education is concerned. Whereas there are more than one thousand institutions for general education, there are only two institutions for technical education, namely, Industrial Training Institute and Polytechnic Institution. Of all the persons registered in the employment exchange no one of them has a degree (even diploma) in technical education.

2.5 Industries

Mizoram is very backward industrially and it lags behind other states of India. The national programmes for economic development had hardly reached Mizoram until it became a Union Territory in 1972. Even after it has been a Union Territory, there has never been a systematic and meaningful approach towards the development of industries. The Directorate of Industries was created only in 1972, when Mizoram has become a Union Territory. However, the Department was simply running in a casual manner without any proper

initiative. In accordance with the directions from the Central Government, the District Industries centre has been entrusted with the duties of (1) Distribution of industrial loans to artisans; (2) Giving machineries in aid; (3) Running crafts centres and frabric centres; (4) Bee-keeping demonstration; (5) Establishing Industrial estates; (6) Helping establishment of rice farms and oil mills in villages; and (7) Organising emporia to promote sales of handicrafts and handlooms.

As a result of the decision made by the Central Government to give 25% central subsidy on investment to industrial units, 1925 units have come up in different districts of the state. The amount sanctioned and distributed upto October, 1987, was Rs.6,00,74,857. Besides, the Directorate of Indus ries also gives sub idy to artisans for the purchase of sewing machines, carpentry tools, etc. The number of beneficiaries and the amount sanctioned are given below:

Year	No. of Beneficiaries	Amount (Rs.in lakhs)
1984-85	420	31.50
1985-86	1300	9.70
1986-87	800	6.00
Total	2,520	47.20

These figures[38] show that the amount disbursed has been decreasing consistently both in absolute and per production unit terms. This may be due to the declining allocation for the purpose and the consistently rising number of the units selected for the purpose.

As per the advice of the Central Government to various states for setting up State Industrial Development Corporations and State Financial Corporation, the Government of Mizoram has established Zoram Industrial Development Corporation (ZIDCO) as a limited company. Its functions are to look after various commercial transactions, helping the small industries by sanctioning loans for the purchase of land, buildings and plants and machinery. However, unlike other developmental corporations in other states, ZIDCO confines itself to the function of the sanctioning of loans only. At the end of 1987, the total loans sanctioned by ZIDCO amounted to Rs. 11,63,05,709. Experience so far shows that unless and until proper steps are taken to direct its functioning, ZIDCO will never make any proper contribution towards economic development.

In short, the present set up of the Industries Department itself needs reorganisation and the competent, efficient and resourceful leader at the helms of affairs of this department and the corporation.

2.6 Agriculture

Agriculture is the dominant sector of the Mizoram economy. More than 70 p er cent of the people in the state are engaged in agriculture. As has been discussed, Mizoram is a hilly area where most of the cultivable land is situated on hill sides. As a result of the limited area of valley or

plain land available. For cultivation, and because of the prevalence of the age-old primitive practice of jhumming, most of the farmers are engaged in jhum cultivation which is associated with low productivity. In fact, it has been a way of life of the people in the state.

It is unfortunate that agriculture in Mizoram has not experienced much development even after independence. In fact Mizoram and Assam are the two states of the Indian Union in general and the North-Eastern Region in particular that have experienced negative growth of agricultural output and the productivity of land.[9] The factors lying behind this performance of Mizoram agriculture are not difficult to discern. Jhum, the dominant mode of cultivation in the state is primitive; and the implements used in this type of agriculture are simple and primitive ones. Besides, the agriculture in the state has not received the benefit of land augmenting and yield raising inputs like, H.Y.V. seeds, water, fertilizers etc. Then the rising population pressure has led to a decline in the jhum cycle which, in its turn, has contributed to the fall in production and productivity.

This process has been further accelerated by the disturbances and the consequent reorganisation of villages. Until the disturbances, the farmers were more or less self-sufficient in foodgrains and other agricultural goods. But, as a result of the disturbances many young men of the

productive age-groups went underground resulting in the loss of a sizeable amount of human capital. Besides, villages were grouped together by the armed forces as a result of which, a large area of the cultivable land has become far away from the villages and beyond the reach of the farmers. The resultant effect of this is the shortening of the jhum-cycle which has caused a decline in the fertility of the soil leading to the falling output and yield.

Another factor behind agricultural backwardness in the state is the poverty of the farmers compounded by the lack of facilities from institutional finance. The banks and other financial corporations are usually located in the towns which are not interested in sanctioning loans to the farmers for the fear that the farmers may not be able to repay their debts.

Besides, the jhum cultivation, which is the most popular mode of cultivation, is largely at the mercy of nature. The success and the failure of agriculture depends, to a great extent, on weather. Favourable monsoons means success while unfavourable monsoons means disaster.

Rice is the only staple food of the people of the state; and other agricultural products constitute simply the subsidiary production. The production of rice depends largely on the fertility of the soil and weather conditions.

However, an ever-decreasing fertility of the soil due to the declining jhum cycles has badly affected the productivity. Besides the lack of marketing facilities have discouraged the farmers to produce commercial crops which could be produced even on less fertile lands. These problems have been further compounded by the absence of a proper development policy.

Thus, the basic needs of the economy of Mizoram to march forwards in the developmental path is to formulate development programmes on scientific basis according to the needs of the community. There is an urgent need for inducting new techniques of production in all sectors including agriculture. The development and success of many of the industries including cottage and small scale industries also depends largely on the success of agriculture. Unless and untill the right path to development is followed, the state will remain underdeveloped and will continue to lag behind other staces of India, whereas there is a good potential and prospects for economic development if and only if proper development policy is adopted at the right time.

Chapter III : Review of Literature

Literature relating to output, employment and marketed surplus of agriculture has been fairly extensive; and alternative hypotheses have been put forward. However, while the conversion of jhum into settled cultivation has been strongly advocated by economists, sociologists and political thinkers of the North-Eastern Region, there has hardly been any scientific research investigation to find out if there is any reasonable ground based on economic factors for converting jhum into the settled cultivation. The steps that have been taken by the state governments of this region to transfer jhum holdings into the settled ones are, most of the times, simply the results of the beliefs and convictions of the thinkers. If there exist no economic factors that warrant this policy of transforming jhum lands into the settled holdings, a large sum of money spent for the purpose may simply be the wastage of the development funds. It is, therefore, high time to know if there are reasonable grounds for the conversion of jhum into the settled cultivation. As such, the present study aims at finding the relative advantages and disadvantages of the jhum and the settled cultivation with special reference to employment, output and the marketed surplus of foodgrains generated by the two modes of cultivation in order to determine whether investment required for the conversion is warranted by the economic factors. In order to do so, a

review of the literature and hypotheses that have been put forward regarding the output, employment and the marketed surplus may be of great help in putting our approach in a proper context. Though a particular study may have a narrow focus the review of different studies will enable the investigator to view the problem in a wider perspective. Such an attempt will also reveal the gaps in the understanding of the problem, and may help us to have an appreciation of the problem in a proper perspective. In fact, each and every new theoretical development is built upon the earlier research findings; and such published literature constitutes the major source of learning about what has already been found, and also serves as a medium for comparison of the new findings with the existing ones.

The present review, therefore, discusses other studies which would help us to have a proper perspective of the problem under investigation.

3.1 Key Concepts

The concepts of the marketed and marketable surplus have been well distinguished and differentiated though several studies blurr these distinctions. Marketable surplus represents the surplus available for disposal to the farmer. It is the surplus over and above his genuine requirements of family consumption, payment of wages in kind, feed, seed and wastage, etc., which have to be met out of the produce. As

against this, the marketed surplus refers to the amount actually sold. Hence, it represents only that portion of the surplus which is actually brought to the market and placed at the disposal of the non-farming rural population and the urban consumers.[15]

The distinction between these two concepts is of a very high operational significance as the agricultural sector of the developing economies is dominated by the small and marginal farmers, who feel compelled to sell a larger proportion of their output than what they can afford immediately after harvesting of the crops at relatively low prices in order to meet their immediate cash requirements even though they purchase these goods at higher prices in the lean seasons to meet their consumption requirements. These distress sales tend to make their gross sales larger than the net marketed surplus and it also raises the marketed surplus above the level of the marketable surplus. For such farmers, marketable surplus may be less than the marketed surplus. On the other hand, the rich farmers may like to keep whole or part of their surplus in the form of stock. For such farmers, the marketable surplus would be more than the marketed surplus. Thus the marketed surplus in a given year may be less, equal to or more than the marketable surplus depending upon such factors operating in the market economy. The marketed surplus and the marketable surplus are equal

only under ideal conditions. According to Mathur and Ezekiel,[28] which of the terms - marketed and marketable surplus - is more appropriate depends upon the nature of the economy. In the developed countries, marketed surplus may be equal to or may represent only a part of the marketable surplus; whereas in the developing countries, marketed surplus may be more than the marketable surplus. This is because of the fact that the producers of foodgrains in the developed countries refrain whatever is necessary for their own consumption and sell the surplus to the market. On the other hand, producers in the developing countries sell that amount of output which will provide them the necessary cash and retain the balance for their own consumption. Thus, it is consumption rather than the sales which constitutes the residual.

Nadkarni[37] distinguishes between the two concepts of marketed surplus - gross and net. "Gross marketed surplus refers to the actually marketed quantities; and net marketed surplus is the gross marketed surplus minus repurchases of foodgrains". Thus, gross marketeable surplus is the sum of positive marketable surplus net of the purchases of foodgrains. Though marketed (-able) surplus of all agricultural commodities is of significance as it indicates the degree of commercialisation, but the marketed (-able) surplus of foodgrains is of special significance because they are basic wage-goods. In view of this the present study has taken into account the marketed surplus of foodgrains only.

3.2 Marketed Surplus, Employment and Economic Development

In most of the developing countries where large numbers of people are engaged in agriculture as a means of livelihood and where industry and services are not adequately developed, a fundamental pre-condition for economic development is the achievement and maintenance of an adequate surplus of foodgrains or, at least, the reduction of its food deficit by a magnitude which expanding manufactures for export might realistically be expected to cover in the near term.[24] In fact, no country can be expected to go forward with continual economic growth untill the cultivators are producing a surplus over and above their immediate needs.

Increasing agricultural productivity leads to the release of labour force for industrial employment, raises agricultural incomes thereby increasing rural purchasing power needed to buy the industrial goods. It also enables agriculture to supply the major wage-goods (food) to industrial workers at reasonable prices.[25] Thus, increasing agricultural productivity makes important contribution to the general economic development and that, within a considerable limits, at least, it is one of the pre-conditions which must be realised before the stage of take-off into 'self-sustain economic growth' becomes possible. It is equally important to note that the industrial urban development creates a favourable condition for increasing agricultural productivity

and output.[42] However, while an overall increase in agricultural productivity is, no doubt, essential, it may not, by itself, be sufficient to sustain the tempo of economic development. What is far more crucial to the process of economic development is the growth of the marketable and marketed surplus along with the increases in output.

In the underdeveloped countries with a dualistics economic structure and a large subsistence agricultural sector, this sector is supposed to serve as the primary basis for economic development.[49] If we take development as a synonym for industrialisation and also ignore the factors on the demand side, the importance of resource transfer from agriculture is, no doubt, justified. The resource transfer from agriculture becomes crucial in case the industrial sector can neither produce its own food nor import it from abroad.[35] In this case, the industrial sector is heavily dependent on resource transfers (marketed surplus) from agriculture. In general, transfer of resources from agriculture may be functional or dysfunctional depending upon the specific conditions under which development occurs. The obsession with the marketed (-able) surplus as an over-riding constraint has led quite a few economists, such as Nicholls[41] to insist that agriculture must first be developed sufficiently to generate sizeable marketable surplus before any measures towards industrialisation are contemplated.

Some economists are of the opinion that the marketed surplus from agriculture determines directly the growth of non-agricultural sectors. However, these opinions leave many aspects of the development process unexplained, and the marketed surplus can be generated without any effect on the development of other sectors of the economy. Besides, a significant and sustained jump in the marketed surplus is not possible unless there is a chance for selling the surplus production. Again the marketed surplus may not often lead to economic development if the resources so generated go into unproductive lines of investment.[17] Griffin points out how mobilisation of the marketed surplus go towards increasing the number of civil servants, armed forces, and urban consumption rather than towards the investment in industry (for detail see Keith Griffin, 1976, p.119). Besides, lack of an expanding market hinders not only the development of industries but also agriculture. However, this does not mean that the marketed surplus is not necessary for industrial development. What it implies is that underdeveloped economy may be unable to deploy even the scarce marketed surplus for the purpose of industrial growth. Surely, marketed surplus is intimately related to the commercialisation of economic relations, which is inherent in the process of capitalist development. "Under commercialisation the small farmers are as much involved in the market as the big ones though differential advantage and disadvantage" accruing to them may still remain (Nadkarni, 1980, p.11).

The importance of marketed (-able)surplus is not only relevant for industrialisation in a sectoral perspective, but it is also important for development of the concerned holdings and then agricultural development in general. According to Vimal Shah and C.H. Shah[55] "a small marketable surplus leading to lower cash incomes and smaller expenditure on such modern inputs as fertilizers, small investible resources with relatively greater need for investment in traditional items, have acted and likely to act as obstacles to the progress of small farmers. The inevitable result would be the widening of income gap between small and big farmers". It is, therefore, clear that an increase in marketed (-able) surplus leads to an increase in cash incomes, increasing use of modern inputs in agriculture and the release of larger investible resources, thereby promoting the progress of small farmers leading to the reduction of the gap between small and big farmers. Similarly, increasing investible resources and the use of modern inputs lead to the growth of marketable and marketed surplus of foodgrains and other agricultural products. They also lead to increasing labour productivity which have set in motion a self-sustaining process of decreasing costs and increasing output.[36]

Thus, the capitalist development is based on the development of both industry and agriculture; and the development of agriculture involves the release of labour from agricultural sector for employment in the industrial sector,

and release of the marketable surplus of foodgrains and other agricultural products for such labour. Hence, the commercialisation of marketable surplus is a pre-condition for the capitalist development involving the growth of product, land and labour markets.[19]

In the developing countries, the population is usually increasing very rapidly thereby leading to increasing pressures on land. Consequently, disguised and under-employment have become a permanent feature in most of the developing countries. This has led to the fragmentation of holdings and decreasing productivity per worker. In such countries, agricultural development is not a question of increasing productivity per unit of cultivated land alone, what is far more important is the increasing labour productivity. Mechanisation without any release of the labour so displaced from agriculture may not increase per capita production. In fact, the marketable surplus of all classes of farmers diminishes as population pressure increases.[33] If the import of foodgrains does not increase significantly, small farmers, who depend, to a considerable extent, on the market for their own requirements for foodgrains will be faced with the reduced availability of foodgrains as the marketable surplus of large farmers decline.[34] Hence absorption of displaced labour in non-agricultural sectors not only increases the marketed (-able) surplus but it also leads to increasing capacity for using it.

This further results in the expansion of the home market, thereby, leading to economic development.

Thus adopting the special case of Lewis model where the industrial work force is dependent on the marketed surplus of foodgrains from the domestic agriculture for its subsistence, Chakravarty[10] has pointed out that with the increasing excess demand for foodgrains, the terms of trade started shifting in favour of agriculture from the mid-sixties onwards, thus, forcing up the industrial wages. However, even within its own framework, Chakravarty's explanation raises a number of questions which it does not answer. Bagchi[2] has argued that for the post-colonial period, the pace of industrialisation, in particular the deceleration of industrial expansion from about the mid-sixties, is to be explained by the demand conditions. Whatever be the case, the marketed surplus of agriculture has an important contribution to the development of agriculture itself and industrialisation, thereby transforming the nature of employment leading to the reduction in disguised and under-employment. In short, it is a necessary and pre-condition for capitalist development of agriculture.

3.3 Agrarian Structure, Employment, Output and Marketed Surplus

Marketed surplus, output and employment are influenced, to a large extent, by the agrarian structure as

reflected by differences in the size of holdings. As such, a study of the behaviour of output and the marketed surplus across size classes and employment helps us to identify the viability of holdings in different regions which may facilitate evaluation of the agrarian structure. It can also indicate the possible effects of any redistribution of land following land reforms on the size of output and marketed (-able) surplus.[37] Some of the studies on the distribution of output and marketed (-able) surplus by size groups of farmers are based on indirect estimation covering aggregate data while some other studies are based on direct estimation from micro-level data.

Dharma Narain[39] has undertaken the pioneering studies based on indirect estimation for the year 1950-51. He found that the marketed (-able) surplus as a proportion of output has declined as the size of holding increased up to the size group of 10-15 acres, and rose steadily thereafter along with the size of holding. He found that the holdings below 15 acres accounted for 54.4 per cent of the marketed (-able) surplus and those below 10 acres accounted for 46.5 per cent, which is interpreted as indicative of distress sales which presumably had perverse relationship with output and which contributed more than half of the overall marketed surplus. Only a part of the marketed surplus could then be said to constitute a commercial surplus which would have a normal positive slope character.

A study by Utsa Patnaik[43] for the year 1960-61, based on indirect estimation, however, found that the small farmers accounted for a smaller proportion of total sales to the market. Farmers having upto 10 acres of land accounted for 33.2 per cent while the farmers with holdings of upto 15 acres accounted for 44.4 per cent of the total marketed surplus. She found that there is a positive relationship between output and the size of holdings. She did not find any perversity as she found that the proportion of the marketed surplus increased steadily from 20% in the lowest sizeclass of 1 hectare and below to 63% in the highest size-class of 20 hectares and above without any dip in between.

Sharma,[57] however, found that the size-class upto 5 acres was having a negative marketable surplus at both national and all the states except Andhra Pradesh, Karnataka and Tamil Nadu. The size-class at 5-10 acres was found to be deficit in Gujarat and Maharashtra, while it shows positive surplus in other states and at the national level (see pp.327-335). He also studied marketable surplus across size class based on indirect estimation for the year 1960-61 both at national and state level. His conclusion is that the marketable surplus of foodgrains increases consistently with an increase in the size of holdings. However, the size of holdings is only a proxy to output and/or income.

Shri Prakash and Sushma[44] examined the nature and extent of influence exercised by the holding size on employment in Haryana and found that farm exmployment is a positive function of the holding size. Another study by Shri Prakash and others[45] in Punjab reveals that size is not a decisive determinant of the marketed surplus but it might be exercising its influence on the marketed surplus via income and output.

An extreme case of the behaviour of the marketed (-able) surplus of paddy was found in Punjab by Singh and George.[58] According to their study for Amritsar and Karnal Districts, 91% of production of paddy was sold on the whole, the proportion ranging from 88% among small farmers with 1 hectares and to 92% among farmers with 4-5 hectares of land. Their finding shows that even small farmers grow paddy mainly as a cash crop and depend on other crops for consumption. Their finding was also confirmed by the Farm Management Survey[16] for Ferozpur District, Punjab. But Rice is not the the staple diet of Punjab. Adoption of paddy-wheat-paddy-wheat mono-rotating culture in the wake of Green Revolution has enabled paddy to emerge as a cash crop and as a substitute of the conventional cash crops that had been grown in the region in the past.[45]

Asoke Hati's[18] study based on data from Hoogly district, West Bengal (1971-72 and 1972-73) has shown a

somewhat different picture. It was found that the marketable surplus was negative for the size-class of 0.66 hectares and below; for holdings upto .66 to 1.98 hectares, an increase in farm size has practically no effect on the marketable surplus, and the proportion of marketable surplus increases for farm size above 1.98 hectares at an increasing rate as farm size increases.

A study of paddy in Burdwan District of West Bengal (for 1967-69) conducted by Bhargava and Rastogi[7] reveal a different result from that of Hati's in that none of the size class, not even the lowest size class of 1 hectare and below, had a negative marketable surplus.

A study of Canal irrigated areas in the Bellory district of Karnataka by Mishra and Vivekanand[31] showed that even under perennial irrigation, the share of small holdings upto 2 hectares in the total marketed (-able) surplus of crops was only 4%.

Vyas and Maharaja[64] provided a contrast between two regions in their study of Himatnagar (Gujarat) and Desuri (Rajasthan) blocks for the year 1963-64. Their study showed that the small farmers also produce commercial crops though to a smaller extent than the large farmers. But the proportion of the area used for the cultivation of superior cereals, which may be treated as cash crops by small farmers, was

greater than that of the big farmers. In both the areas, the proportion of the marketed surplus has increased progressively with production though the variation was less in Himatnagar. The presence of commercial crops also seems to reduce the marketed surplus of foodgrains as a proportion of output since income from commercial crops can be used to increase the consumption of foodgrains. This type of behaviour pushes up the marketable surplus of even small farmers.

A study of the Vidharba region by Mathur for 1956-57[29] showed that the farmers in small size of holdings have less marketable surplus and they marketed a small portion of their output. Hence, the total receipts of the small farmers will increase less in comparison to the receipts of the big holders. This view is supported by Mandal and Ghosh[27] in that the marketed surplus would increase with an increase in farm size.

According to Mathur and Ezekiel[28] small farmers in developing countries sell only that much amount of output which is necessary to satisfy their cash requirements. However, these farmers have fixed cash requirements. This tends to make short-run supply curve of foodgrains backward bending. Thus, the residual is the amount of output which is retained for consumption and not the amount which is sold.

A study by Mathur and Prakash[30] show the validity of this hypothesis both empirically and algebraically.

However, Dandekar[12] pointed out that Mathur-Esekiel proposition is valid only for a small and a very special class of farmers, who have very little other sources of cash income. He argued that for a large class of small farmers, their own production is not sufficient to meet their needs. As such, they sell little of it and derive their cash income from other sources to meet their cash requirements. According to him, prices of foodgrains affect the farmers, they affect them more as consumers and less as producers. But Dandekar's proposition has been shown to be at variance with the empirical evidence by Indu Bala Tripathi[61] and Sushma.

Ravi Varma and Shankar[62] have calculated the marketed and marketable surplus as a percentage of total output of paddy and wheat for the year 1961-62 for different asset groups. They found that the richer the farmers the higher the marketed surplus. This support the view of Prakash and others that large farmers contribute relatively more to the marketed surplus, and that the size influences the marketed surplus via income and output.

According to a report of National Sample Survey,[40] the peasants make relatively greater contribution as the supplier of the marketed surplus. It showed that expenditure

elasticity for cereals for rural families were .74 in the fourth round, .65 in the fifth round and .54 in the sixth round. This supports the view that, if the demonstration effect is in operation, increments in income of cultivators are likely to be spent, at least partially, on commodities other than foodgrains. This will result in increasing marketed surplus of foodgrains.

Hanumantha Rao[50] argued that the increasing concentration of foodgrains output in the developed region and large farmers is responsible, to a large extent, for the emergence of the marketed surplus. This line of reasoning, however, provides only partial explanation because it considers only the increasing surpluses from rapidly growing region.

Criticising the view that an increase in agricultural production does not lead to an increase in the marketed surplus of agriculture due to fixed cash requirements, Dubey[14] argued that the existence of backward and advanced sectors and their inter-relation should be given attention. In such a situation, an increase in per capita income in the backward sector increases consumption of all commodities produced by industries in the advanced sectors. So the farmers may be interested in selling the surplus production in order to secure the cash necessary to buy commodities produced by the developed

sectors. However, I.B. Tripathi[61] has found that even when agricultural sector has grown quite rapidly in Punjab, cash requirements have shown negative growth. Consumption curves of the farmers are positively sloped, sales curves are negatively slope. So these slopes of the curves are independent of the fixity or otherwise of cash requirements. Krishna [23] also derived results to show that Mathur-Ezekiel hypothesis is valid even if the fixity of cash requirements is relaxed. Mathur-Prakash[30] demonstrated the validity of the hypothesis both empirically and mathematically independently of the fixity of cash requirements. Prakash-Tripathi[46] studies have also furnished empirical evidence to support it by Haryana, Punjab and national data.

A study conducted by Khan and Chawdhury for West Pakistan[22] showed positive elasticity of marketed surplus with respect to output and its value is more than one. Another study by Shah[54] based on cross section data from Gujarat also showed a significantly high positive relationship between outp ut and the marketed surplus. In regression analysis the "Shifters" of market supply function, Shah included the distance from the market centre as a variable, which was found to have a negative and statistically significant impact on market supply (see Shah, C.H., 1965, pp. 181-196).

Thomarajakshi[60] derives direct estimates of marketable surplus for 1952-66 and studied them in relation to net barter

terms of trade of the agricultural sector. In both the linear and log-linear equations, the coefficient with respect to output were positive and significant. Similar estimates by Venkatarmanan and Prahladachar[63] for 1964-65 to 1973-74 showed that agricultural sector's purchases from non-agricultural sectors have increased vastly during this period. Purchases includes fertilizers, persticides, drugs, electricity, diesel oil and repair services. However, total sales of agricultural produce to non-agricultural sectors are greater than the purchases made by the farmers from the latter in recent years. This shows that the increasing use of modern inputs which leads to more output results in greater marketed surplus.

Collin Clark and Turner[11] have found a highly significant negative relationship between agricultural productivity and the share of farm supply retained for self-consumption. Their study is based on cross-section data, the results of which also showed that when agricultural productivity increases, self-supply decreases accordingly. What holds back the generation of marketable surplus is not under-commercialisation but low productivity.

3.4 Jhum vrs. Settled Cultivation

In India in general, and in the North-Eastern Hill Areas in particular, it has been fashionable in academic and

policy discussions to suggest the transfer of jhum land to the settled cultivation. The basic points of arguments, in general are: (a) the destruction of forest resources associated with the jhumming, and (b) that terracing will facilitate the application of modern inputs like fertilizers, water, etc., which are likely to raise per person and per hectare/acre productivities.

As a result of the pre-dominance of the jhum cultivation, a large number of the people in the North-Eastern Hill areas are dependent on jhum cultivation; and the major portion of the cultivable land is used for jhum cultivation.

The percentage of population dependent on jhum in Meghalaya in 1974-75 was 85, which came down to 20% in 1981.[66] According to Borthakur,[8] about 41 per cent of the net area sown in Meghalaya is under shifting cultivation, while, according to the 33rd round of National Sample Survey[40] 32.88 per cent of the total area cultivated was under jhum/shifting cultivation, 27.31% under settled cultivation and 39.78% under mixed farming.

A "Report on Socio-Economic Review (1979-80) Mizoram",[4] has shown that 85 per cent of the workers in rural areas of Mizoram are engaged in agricultural activities, and the Mizoram Agricultural Diary 1987-88[32] shows that 60 per cent of the area used for foodgrains production is under

jhum cultivation and only 12 per cent is under settled cultivation.[59]

These figures in the two North-Eastern States show that the relative importance of jhum as an employment generator and share in area cultivated is much greater in Mizoram than that of Meghalaya. In Mizoram jhum cultivation has been offering employment to 85% of the working population of the rural areas. But the Agricultural Diary has shown that the settled cultivation is much more productive than the jhum cultivation. The productivity per hectare of land in jhum cultivation is .0.75 M.T., while the productivity per hectare of the settled land is 1.45 M.T.[32]

The village grouping which took place in Mizoram as a result of the outbreak of the disturbances in 1966 has adversely affected the productivity of agriculture, because a large area of cultivable land has become beyond the reach of the farmers. This has led to the shortening of the jhum cycle from 8-10 years to 2-4 years, the resultant effect of which is low productivity per unit of land and labour. Besides, a large number of the young men had gone underground resulting in the reduction of the workers. Above all, frequent curfews imposed by the Security Forces had resulted in loss of a number of working days during the period 1966-70,

the resultant effect of which was low productivity of agriculture and then the poverty of the farmers. In short, the village grouping accompanied by frequent curfews had led to a considerable reduction in the level of output; and it has been rightly called by Brig. T. Sailo as a "Misguided Concept".[52]

Brig. T. Sailo in his speech at the National Development Council in New Delhi[13] stated that the vast majority of the cultivators in Mizoram still practised jhuming "which is not only unproductive but destructive to our Forest Wealth ...". He further suggested the reclamation of all the flat lands for W.R.C. and gentle slopes for terrace cultivation. In his speech at the N.E.C. special meeting at New Delhi, Brig. T. Sailo, once again, said that conversion of the jhum lands into settled holdings involves enormous efforts of land reclamation into W.R.C. and hill-side terracing, and this is possible only through an active help from the Central Government.

Dr. B.D. Sharma[56] has authored an interesting article on "Shifting Cultivation and their Development", and stated that jhum cultivation is a relatively labour-intensive form of cultivation and it is feasible only when land-man ratio is highly favourable. He also pointed out that the jhum becomes inappropriate if the population pressures emerge in the economy.

He has, therefore, suggested certain measures to make jhumias leave the jhum cultivation and practise permanent cultivation.

Mayashree Borah[5] has found that the jhum cultivation in Meghalaya is more labour-intensive than the settled cultivation, and the incidence of disguised-unemployment was found to be higher in jhum than in the settled cultivation. Besides, the productivity of land and labour has been found to be higher in settled cultivation than that of the jhum. The study also revealed that output per unit of land is higher in settled cultivation than in the jhum. In short, the results of her study suggested the conversion of jhum into settled cultivation.

One of the problems involved in converting jhum lands into settled plots is that the jhuming has been practised by the people for a long time, and they have a very limited knowledge of the other modes of cultivation. Besides, the problems and the expenditure involved is beyond the capacity of the jhumias who are usually very poor. A study of Meghalaya by D.N. Majumdar has revealed that the planners have not been able to make the jhumias take up permanent cultivation because there is a big communication gap between the planners and the cultivators. This finding has supported the view that the jhumias are too ignorant about other modes of cultivation to use settled cultivation as an alternative to jhumming.

According to P.C. Bora[6] nearly 60% of the people of the North-Eastern region are cultivators, 9.28% are agricultural labourers and 8 per cent depends on allied occupations of agriculture. According to this study, the decline in the jhum cycles from 15-20 to 2-3 years has led to a decline in the production per unit of jhum lands, and it has become an acute problem for the hill people of the North-Eastern Region even for their subsistence. He further pointed out that the recent experiences indicate that the people are not adamant to persist with the shifting cultivation; and he suggested that suitable alternatives must be provided to them to earn their livelihood.

M.P. Jagirdar[20] has pointed out that shifting cultivation is accepted as a destructive practice, it cannot go unabated because of the in-built mechanism of the practice which are decreased productivity, resource degradation, deforestation, etc. He has suggested the rehabilitation of the shifting cultivators to the plains or to the lower levels of the hills and providing them facilities for terrace cultivation, horticulture and commercial crops, etc.

Thus, in the light of the past studies discussed above, we find that the size of holding, employment, output and the marketed surplus are intimately related. Besides, the main suggestion for the development of the North-Eastern

Hill Region is the conversion of jhum lands into settled holdings. So far as the area selected for the present study is concerned, official records are the only available data to support this suggestion that no scientific research investigation has been undertaken to find out the feasibility of this conversion. The present study, is therefore, an attempt to examine the relative advantages and disadvantages of jhum and settled cultivation in order to reveal the facts about the feasibility of this suggestion and to find out if there are economic factors that warrant the conversion of jhum lands into settled holdings.

Chapter IV : Dominant Features of Jhum and Settled Cultivation

In agriculture, land is the most important productive asset. But the quantity and quality of land available for cultivation differ from region to region and even from village to village. If land is abundant, it may reflect through land-man ratio. Relatively high land-man ratio would imply relative abundance of land and scarcity of labour, whereas a low land-man ratio indicates high level of population pressure on land. The nature of the technology and the level of development of agriculture may highly depend upon the relative endowments of the two factors. If land is abundant, extensive form of cultivation would be an obvious choice where the objective would be to optimise the productivity of relatively scarce labour. As against this, if the land-man ratio is adverse and low, the intensive form of cultivation may be more advantageous and optimisation of the productivity of land would facilitate overcoming the land constraint.

But family happens to be the basic unit and nucleus of the society; the adequacy and inadequacy of land has, therefore, to be determined with reference to the family size. Generally, larger the family size, greater will be the quantity of land required; and smaller the family size, smaller would be the requirement of land. The adequacy or the inadequacy of land to provide economically viable and meaningful employment to the family will, thus,

depend upon the family size relative to the size of holding. As the family size tends to vary, the holding size also varies between different units. It has been an observed fact that population pressure generally leads to the sub-division of holding with the result that the small holdings generally pre-dominate the overall size distribution of the holding. So the size distribution of land is highly dependent on the family size.

But in the tribal Mizo society land is owned by the community rather than the individual; and the basis of allotment happens to be the family size. So, family size and holding size are likely to be highly correlated. Larger the family size, greater is the size of holding, and hence land requirement is also high. But this basis of distribution of land contributes to a more equitable pattern of land distribution than what we generally find in non-tribal societies.

Family size is important from the view point of the supply of labour as well. Larger the family size, greater is the labour supply, and smaller the family size, lower is the supply of labour. In case the supply of labour of the family is inadequate, it has to be made good by employing hired labour. At times, the labour shortage attempted to be overcome by means of exchanged labour. This is a very useful institution. As we know, labour is a perishable

commodity, and the requirements of labour peak at a particular season in agriculture, whereas the labour requirement tends to be low at another season. If exchanged labour can be successfully carried out, then it facilitates the storing of perishable commodity of labour. If labour supply is abundant, it can be made good in period of higher requirements. But the supply of family labour is not a function of family size alone. The sex composition of the family plays an important role in this. But family size being the basis of allotment of land, the size distribution of land is less skewed than a non tribal societies.

In view of the above, we have tried to examine the nature of the size distribution of land as well as the size distribution of the family. But we know that the Arithmetic Mean is highly sensitive to extreme values, and for certain purposes, median is supposed to be a better measurement than the mean. We have, therefore, calculated both the Mean and Median family size and holding size. We have also attempted to determine mean and median differences of the family size and holding size in jhum and settled cultivation in order to find out if there are systematic factors at work affecting these variables in the two sub-samples.

4.1 Size of Family

The family size is important on a priority ground for the following reasons:

a) Labour supply

b) Land supply

c) Requirments, and

d) Dependency ratio.

In subsistence and self-sufficient farming, the peasants depend on family labour. It is because (a) the holding size is generally small with the result that the level of income and output of such farmers is relatively low, and therefore, they cannot afford to hire labour. Whatever the labour requirements are, they are met by the supply of family labour; (b) more often then, the owners of the small and marginal farms find the size of holding to be inadequate to absorb even the family labour, with the result that disguised and under-employment is pre-dominantly a feature of family members employed in small and marginal holdings.

It is, therefore, of great importance to know the family size in relation to the size of holding. But most of the North-Eastern Region, including Mizoram economy, is labour scarce and land surplus. This is borned out by a highly favourable land-man ratio. The labour shortage forces the farmers to depend on family labour even if it falls short of their requirements. The defficiency of labour compounded by the absence of a rural labour market, the constraint imposed by the shortage of family labour is often

obtained by exchanged labour and waged labour wherever available; and it is not available in all of Mizoram.

The family size is important from the view point of the supply of land as well. The land is socially owned and the allocation is need-wise. Larger the family size greater is the need and larger is the land area alloted and vice-versa. This transform labour constraint into the constraint of land supply as well.

The requirements of income and output of the family depends on the family size to a large extent; larger the family, larger is the requirements and vice-versa. The larger requirement may impart incentives and inducement to work longer and harder which may reflect in both the productivity of land and labour. However, the sex and age composition of the family is also important. Larger the number of children and women, lower will be the participation rate and greater the dependency ratio. Thus, the age and sex composition affects directly not only land and labour supplies, but also requirements.

In view of the above, if we find systematic difference between the family size of jhum and settled cultivators some of their economic traits may be attributed to this difference of the family size. If this difference do not

exist between the two groups of farmers, then the explanation of certain socio-economic traits of jhum and settled cultivators has to be suggested in terms of factors other than the family size.

The total number of family can be grouped into certain representative groups - size groups. But the size groups may be so large as may render meaningful analysis difficult. In order to overcome this difficulty, central value is used as a representative statistics. But there are five alternative measures of central values, of which the Arithmetic Mean happens to be the most common one. Mean values are generally sensitive to the presence of extreme values. The presence of one or two extreme values may, therefore, accentuate the variability and the size distribution of the family. Median, from this view point, may be a better measure of central value. Keeping this in view, we have used both mean and median as the measure of central value, so that such aspects may not be hidden by a particular measure.

Mean and Median Difference

In view of the above, first of all, we tried to evaluate the mean and median difference of the family size among the jhum and settled cultivators separately. The median family size of jhumias in the two villages taken

together is 6.6. The assumption underlying this is that jhumias of the two villages are taken from the same population and the median family size of these two villages will not differ. The validity of this hypothesis can be tested by testing the mean and median differences of the jhumias in the two villages. As against the median, the mean size of the family of jhumias is 7.7. Thus, the mean size is greater than the median size of the family of the jhumias.

The mean and median family size of settled cultivators are 8.2 and 7.9 respectively. In this case also, we find that the average family size is slightly greater than the median family size. On this basis, we can say that whether we test the mean difference or median difference of the family size of jhum and settled cultivators, it should meet our analytical inferences qualitatively and more quantitatively as well. We, therefore, examined the mean and median differences of the family size of jhum and settled cultivators.

Since the two samples have been drawn independently from the same population, the standard error of the mean difference has been calculated on the following basis:

$$S.E_{\bar{x}_s - \bar{x}_j} = \sqrt{p^2 \left(\frac{1}{n_s} + \frac{1}{n_j}\right)} \qquad (1)$$

The calculated standard error is .83 whereas the observed difference between the mean family size of settled and jhum cultivators is only .73. Thus the ratio of the difference to the standard error is less than one and is equal to .88 which is not statistically significant. The mean difference of the family size between the two modes of cultivators is thus statistically zero.

The standard error of the Median Family Size difference has been calculated as follows:

$$S.E_{m_s - m_j} = \sqrt{SE^2_{m_s} + SE^2_{m_j}} \qquad (2)$$

The observed difference between the median family size of jhum and settled cultivators is 1.2, which is less than the standard error of 2.13. Thus in this case also the ratio of median difference to the standard error is .56, and, thus, the median difference of the family size between the two types of cultivators is statistically zero.

This conforms to our hypothesis that in our case, the testing of either mean difference or median difference of the family size would yield similar results, both qualitatively and quantitatively.

4.2 Size of Holding

The size of holding constitutes the major sresource input in agriculture. Output and employment of other factor

inputs depend, to a large extent, on the size of holding. It is, therefore, important to examine the distribution of holding size to determine:

1) Level of output and employment
2) Technological viability for scientific cultivation,
3) Whether the size of holding is adequate or inadequate, and
4) Economic viability of the farms.

Output and employment happen to be closely related to the size of holding. Larger the size of holding, more is the requirement of labour and higher is the level of output. A large farm has more employment potential than the small farms; and employment of more labour results in more output. The e is not only less mployment potential in small and marginal farms, but also that they may not be adequate to fully absorbs even the family labour. This leads to the predominance of disguised and under-employment in agriculture which is mainly a feature of family labour employed on small and marginal farms.

Large farms are also apt to have better scope for employment of modern technology than small and marginal farms. Large holdings are supposed to be more mechanised and technologically more viable for scientific cultivation than small holdings which, in turn, may reduce their labour requirements per acre of land. However, employment of modern technology in jhum cultivation is limited by the method of cultivation

itself. At the same time, a perusal of the data relating to individual farms does not reveal any tendency for increasing mechanisation with increasing size of holdings in jhum cultivation.

The adequacy or inadequacy of the holding size depends largely on the size of the family. A large family size means more requirements for foodgrains, and, therefore, a larger size of holding and vice-versa. An area of land which is sufficiently large for a small family may not be large enough to meet the requirements of a large family. Whether the size of holding is sufficiently large or not, to meet the requirements of the family for foodgrains may be judged with respect to the family size.

Thus, the econo. ic vaiability of the farms largely depends on the holding size. Larger the holding size, more will be the employment and output potentials to meet the requirements of the family. A large farm is, therefore, supposed to be economically more viable than the small farm.

Mean and Median Differences

In view of the above considerations, we evaluate the mean and median differences of the holding size in jhum and settled cultivation. Since the mean size of family is greater than the median size of family in the two modes of cultivation, the mean size of holding is expected to be more

than the median holding size. The mean size of holding in jhum cultivation of the two villages taken together is 3.5 acres. As against this, the median size of holding is 2.9 acres. Thus, the mean size of holding is greater than the median size of holding in jhum cultivation.

The mean size of holding in settled cultivation is 4.5 acres which is also slightly greater than the median size of holding of 4.4 acres. Thus, we find that the calculated values of the mean and median size of holdings conform to our hypothesis that the mean holding size is greater than the median size of holding.

On the basis of these results we can say that our analytical inferences would not differ qualitatively and quantitatively. Whether we test the differences of the mean or median size of holdings in jhum and settled cut cultivation. All the same, we have examined both the mean amd median differences of holding size of jhum and settled cultivation. Since the two samples are independent and drawn from the same universe, the standard error of the mean difference has been calculated by formula (1).

The calculated standard error of the mean difference is .27, while the observed difference of the holding size in the two modes of cultivation is 1. The ratio of the difference to the standard error is more than three and is

equal to 3.7, which is statistically significant. The mean difference of the holding size between the two modes of cultivation is, thus, statistically significant.

We also found that the observed difference between the median size of holding in jhum and settled cultivation is 1.5, which is much greater than the standard error of .33. The ratio of median difference to the standard error in this case is 4.5, which is also statistically significant.

The above results conform to our hypothesis that, in our case, the testing of either the mean or median difference of the holding size would yield more or less similar results both qualitatively and quantitatively.

Thus, we find that there is a statistically significant difference between the holding size of jhum and settled cultivation, whereas the difference between the family size of the two types of cultivators is not significant statistically. These results established that the difference in the size of holding under jhum and settled cultivation should be attributed to factors other than the family size. It is as if the family size were invariant between jhum and settled cultivation, while the holding size varies between the two. On this evidence, the correlation or the association between these two factors may be expected to be low. However, we will directly test this

hypothesis in a rigorous fashion.

The nature and extent of interrelations between family size and holding size is evaluated by means of regression-correlation analysis worked out for jhum and settled cultivation separately. The coefficient of correlation between these two factors in jhum cultivation is .8, while it is .3 for settled cultivation. The coefficient of correlation is significant statistically in both the cases, correspond t values being 11.47 and 2.61 for 74 and 69 degrees of freedom. But the explained proportion of variation in holding size in jhum is as much as .64 per cent, while it is only 9 per cent of the total in case of settled cultivation. Factors other than family size explain 36 per cent of the total variation in holding size in jhum, while such factors explain as much as 91 per cent of the total variation in holding size in settled cultivation. In this case, the large number of observations appear to have made the correlation coefficient significant in spite of its low magnitude.

In view of thes significant correlation between these two variables we have fitted the regression equations to the data by means of Ordinary Least Squares Method. The estimated equations are given below:

$$L_j = .57 + .39\ F_j \qquad R^2 = .64$$
$$t = (11.47) \qquad F = (131.55)$$
$$L_s = 3.44 + .125\ F_s \qquad R^2 = .09$$
$$t = (2.61) \qquad F = (6.82)$$

where L_j and F_j refer to the holding size and family size of jhum and L_s and F_s those of settled cultivation respectively.

The estimated parameters have the expected signs and are significant in both the cases. Correspond to an unit increase in the family size, the holding size in jhum cultivation increases by .39 acres. So this equation lends empirical support to our hypothesis that holding size depends upon the family size.

But this relation in settled cultivation is relatively weak. Correspond to an unit increase in the family size, holding size increases by .125 acres. Even otherwise, this relation is extremely weak.

The non-significance of the difference between the family size of jhum and settled cultivators implies that the two samples have come from the same population. So far as family size is concerned, there does not seem to be any difference between the parentage of the samples.

The significance of the difference between the holding size in jhum and settled cultivation implies that the two samples cannot be treated as having been drawn from the same population, that every holding size from the population from which it has been drawn differs significantly from the other.

Chapter V : Employment

Labour is the primary factor input in every sector of the economy. Whereas excessive supply of labour creates unemployment problem, labour shortages or scarcity may act as a constraint or an impediment to production and hence economic development. In the developing countries, like India, agriculture is the dominant sector of the economy, and the majority of the working population is engaged in this sector. Besides, rural population in these economies has been growing much more rapidly than the urban or even overall population. Consequently, the pressures of numbers on land has been increasing continuously as an economy moves from lower to higher stages of development. It has been observed that the proportion of its labour force engaged in agriculture and related activities tends to fall relative to the work force engaged in industries.

But this has not materialized to a discernible extent in the Indian Economy in general and the less developed regions in particular despite the impressive growth of the industrial sector of the economy. In fact, the population explosion has subsumed the substantial proportion of the impact of industrialization, and then the tertiary sectors of the economy have grown even more rapidly than either the primary or the secondary sectors of the economy. Consequently, this intermediate stage of transformation has been skirted by the Indian economy.[41]

Since Mizoram is among the least developed states of India, the proportion of labour force engaged in agriculture is very high. All the same, agriculture continues to absorb the largest number of the job-seekers. In a relatively less developed economy like that of Mizoram, agriculture is even more important than what it is in the rest of the country. According to the socio-economic survey conducted by the Department of Economics and Statistics in 1978, 85% of the workers are employed in agriculture. Thus, the nature of employment and the labour productivity in agriculture is of utmost importance as it has a direct bearing upon the economic development of the state.

But the state of Mizoram has one of the lowest density of population in India, and has also experienced labour shortages. Besides, in rural Mizoram, labour market has not developed still though wage labour seems to be emerging slowly. Therefore, family is the main source of the supply of labour. So, the size of the family, its sex composition and dependency ratio are expected to have important effects on the level and nature of employment. Probably, it is because of labour shortages that the distribution of land has been done on the basis of the family size. Thus, the labour supply seems to determine the size of holding. Consequently, the size distribution of the families and the size distribution of the holdings

are found to be highly correlated. We have already found empirical evidence to support this hypothesis. So larger the size of the family, larger will be the size of the holdings. But a large holding requires relatively more labour than the small ones. So, a larger holding is expected to have more employment than the small and marginal farms.

But we have found that the jhum and settled cultivation do not differ significantly in so far as the family size is concerned. Therefore, we do not expect the level of employment in the two modes of cultivation to differ significantly. We have, therefore, tested both the mean and median differences of the family size, holding size and employment between the two modes of cultivation in order to evaluate if there are systematic factors at work affecting the level of employment in the two sub-samples.

5.1 Size of Family and Employment

In the north-eastern states of India, which are labour scarce and land abundant, no organised markets of labour exist in the rural areas. The farmers depend on family labour; and the constraint imposed by shortage of family labour is generally attempted to be made good by exchange-labour. Labour is supposed to be perishable. Interestingly, the institution of exchange labour not only overcomes the difficulty of the absence of labour market,

but it also facilitates the overcoming of the perishability by preserving and storing family labour for periods when it will be needed and will be short of requirements by lending it to others at times when it is in excess of the family requirements.

We have analysed the mean and median levels of the family size and employment in the two modes of cultivation separately; and tested the mean and median differences of the size of the family and the level of employmemt. The mean and median size of the family of jhumias are 7.55 and 6.75 respectively while that of settled cultivators are 8.13 and 7.56 respectively.

The mean is greater than the median in both the cases; and test of the mean and median differences should yield similar results. The standard error of the mean difference of the family size is .4 while the observed mean difference is .58. Thus, the ratio of the difference of the mean family size to its standard error is 1.45 which is not significant statistically. Similarly, the standard error of the median difference is .76 whereas the observed median difference is .81. The ratio of the observed median difference to its standard error is only 1.06 which is also not significant statistically. Thus, the difference of the family size between the two modes of cultivators is statistically zero. Theres results also conform to our

hypothesis that it does not matter whether we test the mean or median difference.

On the basis of this result and the hypothesis that the supply of labour and employment is directly related to the family zie, we do not expect the labour absorption capacities of the two modes of cultivation to be different. But rthe mean and the median values of employment per holding have also been calculated. In jhum they are 3.38 and 2.97 respectively. The mean and median size of employment per holding of settled cultivation are 4.324 and 3.71 respectively. In this case also, the mean size of employment is greater than the median size. Thus, on an average, the employment generated per family in the settled cultivation is 1.28 times the employment provided by jhum. At the median level, the settled cultivation generates 1.25 times more employment opportunities than the jhum. Thus, on this count alone, the programmes of eradication of jhum may be justified. The test of the mean or median difference should yield similar results. The standard error of the mean differences of employment per family is .24, while the observed difference of the mean size of employment per family between the two modes of cultivation is .994. Thus, the ratio of the observed mean difference to its standard error is 4.14, which is statistically significant. The standard error of the median difference is .25, while the observed median difference is .74. The ratio of these two is as high as 2.96 which is also significant statistically. These results supported our hypothesis that whether we test the mean

difference or the median difference, they would yield similar results.

But these results do not support the hypothesis that, in view of the similarity of the family sizes in the two modes of cultivation, same level of employment per family will be generated in agriculture irrespective of the mode of cultivation. It implies that factors other than the family size play an important but differential role in employment generation in the two modes of cultivation.

Since family size is not the only factor which affects the supply of labour, the difference may be caused by the age and sex composition and the dependency ratio as well. It may, however, be noted that women in Mizoram work as much on their farms as men. Therefore, a priori we do not expect the sex composition to exercise a differential influence on employment either within or between the different modes of cultivation. We have examined the sex composition all the same. Hence, the sex composition has not much to do with the differential supply of labour. However, the data show that the ratio of the total population to the total number of workers in the settled cultivation is 2 while it is 2.41 in the jhum cultivation. Thus, the number of workers in population does not appear to differ much. The dependency ratio in the settled cultivation is 1.06 while it is 1.41 in the jhum cultivation. Thus, the dependency ratio is also not substantially different.

Thus among the demographic variables, family size may still be found to have a direct bearing upon employment. The nature and the extent of interrelation between the family size and employment has been examined by means of regression-correlation analysis. The coefficient of correlation in case of jhum is .73 while it has a value of .62 for the settled cultivation. In both the cases, the correlation coefficients are significant, t values being 9.16 and 6.54 for 74 and 69 degrees of freedom. The explained proportion of variation in employment in the jhum is 53 while it is 38 per cent in the settled cultivation. Factors other than the family size explain 47 per cent of the total variation of employment in jhum, while such factors explain as much as 62 per cent of the total variation in the level of employment under the settled cultivation. The estimated regression equations are as follows:

$$E_j = -.72 + .54\, F_j \qquad R^2 = .53$$
$$t = (9.16) \qquad F = (83.5)$$
$$E_s = -.49 + .59\, F_s \qquad R^2 = .38$$
$$t = (6.54) \qquad F = (42.29)$$

where E_j and E_s refer to employment and F_j and F_s are family size in the jhum and settled cultivation respectively.

The estimated parameters have the expected signs and are statistically significant. An unit increase in the

family size leads to an increase of .54 in employment of the jhum cultivation, while an unit increase in the family size of the settled cultivator leads to an increase of .59 in the level of employment. These results conform to our hypothesis that the level of employment depends upon the size of the family. But the systematic differences in the labour absorption capacities of the two modes of cultivation may require the analysis of factors other than the family size also. Therefore, we have examined the holding size as another possible determinant of employment.

5.2 Size of Holding and Employment

As land is the most important input of agricultural production, the use of other factors, like labour, depends largely on the size of holdings. Larger the holding size greater will be the quantities of the co-operating factor inputs, like labour, required in the production process. Accordingly, the size of holding is expected to have positive impacts on the level of employment. It will, therefore, be interesting to know if there exist a systematic relation between the size of holding and the level of employment. And if there is any systematic relation between the two factors, it will be interesting to know the nature and extent of their relationship. In fact, the economic and technological viability of the farms depends largely on the size of holding. A large farm has more employment and output potential, and is supposed to be

economically more viable than the small and marginal farms.

First, we examine the mean and median differences of the size of holding and employment per holding between the jhum and settled cultivation. The mean and median values of the size of holding in the jhum cultivation are 3.6 acres and 3.25 acres respectively, while the values are 4.13 and 3.04 acres respectively in the settled cultivation. Here again the mean value, in both the cases, is more than the the median value; and whether we test the mean difference or the median difference should make no difference. It is obvious that the holdings under settled cultivation are 1.15 times larger than the jhum holdings, while the median holding size under settled cultivation is 1.21 times larger than that of the jhum holdings. But standard error of the mean difference of the holding size is .2, while the observed mean difference is .53 acres. The ratio of these two is 2.65 which is significant. Similarly, the standard error of the median difference of the holding size is .3 while the observed difference is .69. The ratio of these two is 2.3 which is also significant at 5% level. These results conform to our hypothesis that testing of either the mean or median difference will furnish similar results. It is also interesting to note that whereas the differences between the family size of the two modes of cultivation is statistically zero, the holding size differs significantly between

the two, close and significant inter-relations between holding size and family size notwithstanding. Therefore, the differences of employment between the two modes of cultivation may be explained more meaningfully in terms of differences of holding than family size. While the family size operates on the supply side, the holding size represents demand side of labour equation. As the supply constraints as represented by family size are similar in the two modes of production, the differential employment levels may, therefore, be plausibly attributed to the demand side factors.

The estimated values of the mean size of employment per holding is 4.2 and 3.6 in the settled and jhum cultivation respectively. The standard error of mean difference is .2 while the observed difference is .6. The ratio of the two is 3 which is significant statistically at 1% probability level.

The nature and the extent of interrelation between the holding size and the level of employment may be examined by means of coefficient of correlation which has a value of .8 for jhum and is only .3 for the settled cultivation. Both these coefficients are significant, t values being 11.47 and 2.61 for 74 and 69 degrees of freedom. The variation of holding size in the jhum cultivation explains as much as 64 per cent of the total variation in employment, while the holding size explains only 9 per cent of overall change in employment in the settled fields. Factors other than the

size of holding explain only 36 per cent of the total variation in the level of employment in the jhum cultivation; while such factors explain as much as 91 per cent in the settled cultivation.

The estimated regression equations are reported below:

$$E_j = 1.16 + .68\ L_j \qquad R^2 = .64$$
$$t = (11.47) \qquad F = (131.35)$$

$$E_s = 2.9 + .32\ L_s \qquad R^2 = .09$$
$$t = (2.61) \qquad F = (6.82)$$

where L_j and L_s refer to area of land cultivated (or the size of holdings) under jhum and settled respectively. The parameters have the expected signs and are statistically significant also. Corresponding to an unit increase in the holding size, the level of employment under the jhum cultivation increases by .68 persons while a similar change in the settled holdings creates employment for .32 additional workers. But this relation in the settled cultivation is relatively weak. Anyhow, these results lend empirical evidence to our hypothesis that the level of employment depends largely on the size of holding. This also furnishes empirical evidence to support the hypothesis that the demand side factor exercise the decisive influence on employment even in a labour scarce economy like that of Mizoram, and that the supply side factors like family size are not that much effective.

In the light of the above results, it may be interesting to know the relative labour intensity of the two modes of cultivation. We, therefore, examine directly the employment per acre of land in the two sub-samples. The employment level per acre of jhum land is 1.06 and that of settled ones is 1.05 which are more or less equal. Thus, the two types of cultivation/production are equally labour-intensive.

Chapter VI : Estimation of Output

The chief aim of agriculture, like any other productive activities, is to maximise output. But the level of output differs from region to region, from village to village and even from one farm to another. The level off output depends, to a large extent, on the relative factor endowments of different areas. But agricultural output is dependent mainly on two factors: cultivated area of land and the yield per unit of land cultivated. Yield depends upon such factors - as the quality or fertility of land, other agro-climatic conditions and the technology in use.

Since land is the most productive asset of agriculture, the level of output depends largely on the size of land under cultivation. But the quantity and quality of land available for cultivation varies from village to village and from region to region. It is generally assumed that larger size of holding means larger output and vice-versa. A large size of holding can absorb more labour than the small and marginal farms. Larger the holding size more is the reauirements for labour; and more labour leads to more output. The small and marginal farms not only have less employment potential but are generally inadequate to absorb even the family labour. This leads to the predominance of disguised and under-employment problems in agriculture of the developing economy.

Holding size reflects the general economic conditions of the farm house-holds. Larger the holding size, greater

is likely to be the prosperity of the farm households and vice-versa. Besides, large holdings are relatively more amenable to mechanisation, and are economically and technologically more viable than the small and marginal farms. But in jhum cultivation, which constitutes the most popular method of cultivation in Mizoram, the employment of modern technology is limited by the method itself, and settled cultivation is likely to have better scope for technological improvement which tends to raise the level of output both in absolute and average terms.

Thus, the level of output is supposed to be postively related to the holding size and the level of employment. At the same time, a large farm is likely to have more employment potential and is economically and technologically more viable for scientific cultivation than the small holdings.

But the adequacy and inadequacy of land and output depends largely on the size of the family. A large family means more requirement for all necessities, conveniences and especially those of foodgrains that lead to greater requirement for land. A large family is also supposed to have greater supply of labour than the smaller families. The level of output and holding size which is sufficiently large for a small family may be far below the requirements of the large families. Therefore, a positive relation between family and holding size may be postulated.

In Mizo society especially amont the jhumias, land is distributed according to family size. As such, a large family is likely to have a larger size of holding, and is supposed to produce more output than the small families; and a larger size of holding is suppose to yield higher level of output. Thus, the size of the family, holding size and output are supposed to be positively related. Therefore, if the family size differ significantly between jhum and settled cultivators, this may lead to significant differences between holding size and output between the two modes of production, such differences between output levels should be attributed to the size differences of the holdings via differential family sizes.

For considering the size distribution both the holdings and the families have been classified into appropriate size groups. In order to overcome the difficulty the difficulty that may arise due to size groups that may be so large as may render meaningful analysis difficult, central value is used as a representative statistics. In view of the Arithmetic mean being generally sensitive to the presence of extreme values, Median is also used as the measure of central value so that such aspects may not be hidden by the Arithmetic Mean.

In view of the above considerations, we have tried to examine the nature of the size distribution of the farm

households with respect to their influence on output. As the supply of family labour depends upon the family size, it may be interesting to examine if the productivity of land and labour differ between holdings af different size groups and between the settled and jhum holdings. We have therefore, examined the relative land-labour productivity in settled and jhum cultivation.

6.1 Size of Family and Output

The family size is an important factor as a source of labour supply and hence as a determinant of the holding size, consumption requirements and dependency ratio all of which have important impacts on output. As the state faces labour shortage, labour supply may exercise constraining influence on outpout even otherwise, In general, larger the size of the family, more is the supply of labour and vice-versa.

Mean and Median Differences of Family Size

We have examined the Mean and Median differences of the family size between jhum and settled cultivations. The median family size of jhumias in the two villages taken together is 6.83. As against this, the mean size of the family of jhumias is 7.68 which is greater than the median size. The mean and median family size of settled cultivators are 8.25 and 7.95 respectively. In this case also,

the mean size is slightly greater than the median family size. On this bases, we assumed that whether we test the difference between the mean or median family size of jhum and settled cultivators, it should meet our analytical purpose qualitatively and quantitatively. Thus, we have examined both the mean and median family size of jhum and settled cultivators. Since the two samples are assumed to have been drawn independently from the same population, the standard error of the mean difference has been calculated by formula (1). The standard error of the mean differences is .41, while the observed difference is .57. Thus, the ratio of the observed difference to the standard error is 1.39, which is not significant statistically. The standard error of median difference is .73, whereas the observed difference is 1.12. The ratio between the observed median difference to the standard error is equal to 1.5, which is also not significant statistically. These results both conform to our hypothesis that testing of the mean and median differences should yield similar results both qualitatively and quantitatively. Thus, the difference between the family size of the two types of cultivators is statistically zero.

Our test of the mean and median differences in the holding size reported in the previous chapter have shown that the size of holding in settled cultivation is

significantly larger than that of jhum. The estimated results of the correlation between the two factors - family size and holding size - has shown that the coefficient of correlation is significant in both the cases; and the explained proportion of the variation in holding size is 64 per cent in jhum, while it is 9 per cent in settled cultivation. The calculated values of the regression coefficients have shown that an unit increase in the family size of jhumias is followed by a .39 acres increase in the holding size, while an unit increase in the family size of the settled cultivators leads to an increase in the holding size by .125 acres.

Mean and Median Difference of Output

We have also tested the mean and median differences of output with respect to the size of the family. The calculated values of the mean and median output in jhum are 19.8 quintals and 17.39 quintals respectively for settled cultivation. The standard error of the mean difference of output is .64, while the observed difference is 5.2. Thus, the ratio of the mean difference to the standard error is 8.125 which is statistically significant. Thus, on an average, the settled cultivation yields significantly higher level of output than jhum cultivation. In fact, the average level of output of the settled cultivation is 1.4 times of the corresponding output level of jhum cultivation. Thus,

the conversion of jhum into settled holdings is a desirable objective on economic grounds. This will mitigate the food deficit of the state to some extent. It will also ameliorate the economic conditions of the farmers. It will lead towards optimum use of land resources, and it will also prevent the environmental degradation associated with the jhum. The differential levels of output of the two modes of cultivation also warrants the investment required for the conversion programmes. Over a period of time, the differential output will itself pay for the requisite investment.

The observed difference between the median output levels of the two modes of cultivation is 5.91 and the standard error is 2.48. The ratio of the difference to the standard error is 2.48 which is statistically significant at 5% level. Thus, this result also conforms to our hypothesis that testing of mean or median difference should yield more or less similar results.

The nature and extent of interrelation between the family size and the level of output is examined by means of regression-correlation analysis worked out for jhum and settled cultivation separately. The coefficient of correlation between these two variables in jhum cultivation is .74, while it is .36 for the settled cultivation. In both the cases, the coefficient of correation is significant correspond t values being 9.49, and 3.2, for 74 and 69 degrees of

freedom. Thus, 55 per cent of the total variation in the output of jhum cultivation is accounted by the variation of the family size which may be acting as a proxy of the supplies of land and labour to the cultivating households. But the family size accounts for only 13 per cent of the total variation of output in settled cultivation which is relatively low, though significant. Factors other than family size explain 45 per cent of the total variation of output in jhum, while such factors explain as much as 87 per cent of the total variation in the output of settled cultivation. In this case, the large number of observations appears to have made the correlation coefficient significant in spite of its low magnitude.

In view of the significant correlation between these two variables, we have fitted the regression equation by means of Ordinary Least Squares Method. The estimated equations are given below :

$$O_j = 14.97 + .63\, F_j \qquad R^2 = .55$$
$$t = (9.49) \qquad F = (90.44)$$
$$O_s = 23.28 + .2\, F_s \qquad R^2 = .13$$
$$t = (3.2) \qquad F = (10.31)$$

where Q_j and F_j refer to output and family size of jhum respectively and O_s and F_s refer to the output and family size of settled cultivation respectively.

The estimated parameters have the expected values and are significant in both cases. Correspond to an unit increase in the family size, the output level of jhum increases by .63 quintals, so this equation gives empirical support to our hypothesis that the level of output depends upon the size of the family. But the relation is relatively weak in case of the settled cultivation. Correspond to an unit increase in the family size, the level of output increases by .2 quintals. Even otherwise, this relation appears to be weak as has been explained earlier.

6.2 Size of Holding and Output

Output generally depends upon the quantity of factor inputs, their quality and the technology employed in the production process. So far as agriculture is cocerned, the quantity and the quality of land cultivated is the single most important factor input. Size of holding generally reflects the potential inputs of land into the agricultural processes. In fact, the availability of other factor inputs like labour, the nature and level of technology, water, fertilizers, power, high quality seeds, etc. are highly interrelated with the holding size.

Larger farms have greater employment potentials than the small and marginal farms; and such farms offer greater scope for high level technology. A farm which has more

employment potential and is economically and technologically viable has greater output potential. As such a large farm is supposed to produce more output than the small and marginal farms. In short, larger the size of holding, higher will be the level of output, and smaller the size of holding lower will be the level of output.

Therefore, the analysis of the differences of the mean and median holding size under jhum and settled cultivation may throw light on the differential output levels of the two modes of cultivation. The mean size of holdings under jhum and settled cultivation are 3.658 and 4.35 acres which are greater than the corresponding median size of holdings of 3.255 and 4.29 acres respectively. Thus, the mean holding size under settled cultivation is 1.19 times the holding size under jhum. But the corresponding median holding size under settled cultivation is 1.32 times the corresponding median holding size under the jhum.

The mean size of output is expected to be higher than the median size of output of the two types of cultivation. The mean size of output of jhum in the two villages taken together is 21.63 quintals, while the corresponding median size of output is 18.46 quintals. Similarly, the mean size of output intthe settled cultivation is 24.88 quintals as against the median size of output of 21.4 quintals. Thus, the mean output level of the settled field

is 1.15 times the average output of jhum, while the median output is 1.16 times the median output of jhum. Thus, the values of the mean and median output levels conform to the hypothesis that the mean size of output is likely to be greater than the median output level. These results show that the productivity of land under settled conditions exceeds the corresponding average productivity of land under jhum.

On the basis of these results, we believe that the analytical inferences would not differ qualitatively and quantitatively, whether we test the mean difference or the median difference of holding size and output of the jhum and settled cultivation. But we have examined the mean and median differences of the holding size both in terms of the mean and median differences. Since the two samples are independent and drawn from the same universe, the standard error of the mean and median differences have been calculated by formula (1) and (2) respectively.

The calculated standard error of the mean difference of output is .53 while the observed difference between the mean size of output of the two types of cultivation is 3.25. The ratio of the observed difference to the standard error is equal to 6.13, which is statistically significant. These differential output levels may be attributed to the differences of holding size. The mean and median holding size are smaller under jhum than the corresponding size of

holding of settled cultivation. The mean and median size of holding of the two types of cultivation differ significantly, the corresponding t values being 3.7 and 4.5 respectively.

The observed difference between the median output levels of jhum and settled cultivation is 3.44, while the standard error of the difference is 2.8. The ratio of the observed difference to the standard error is 1.23 which is not significant statistically. Since our interest is not to find out the representative level of output but to find the difference in the average level of output between the two types of cultivation, the mean difference test and its statistical significance is quite enough to solve the purpose irrespective of the non-significance of the median difference.

On the basis of the above evidence, the correlation or association between the holding size and output levels may be expected to be high. We have directly tested the hypothesis by means of regression-correlation analysis worked out for jhum and settled cultivation separately. The coefficient of correlation between these two variables for jhum is .77, while it is .6 for the settled cultivation. In both the cases, the coefficient of correlation is statistically signfficant correspond t values being 10.26 and 6.23 for 74 and 69 degrees of freedom.

Thus, 59.3 per cent of the total variation in the output of jhum is explained by the changes in the size of holdings. Consequently, 40.7 per cent of the overall variation of output is explained by factors other than the holding size. As against this, changes in holding size explain only 36 per cent of the overall variation of the output of settled cultivation. The residual factors, thus, explain as much as 64 per cent of the output variation in this case. Therefore, these other factors excercise much greater degree of influence on output in case of the settled than the jhum cultivation. This is also evident from the estimated regression equations for the two cases which are as follows :

$$O_j = 18.4 + .88\ L_j \qquad R^2 = .5929$$
$$t = (10.26) \qquad F = (105.27)$$

$$O_s = 22.5 + .544\ L_s \qquad R^2 = .36$$
$$t = (6.23) \qquad F = (38.81)$$

where O_j and O_s refer to output, and L_j and L_s refer to holding size in jhum and settled cultivation respectively.

The estimated parameters have the expected values and are significant in both the cases. Correspond to an unit increase in the holding size, the level of output in jhum increases by .88 quintals. So this equation gives empirical support to our hypothesis that the size of output depends upon the size of holding.

In settled cultivation, an unit increase in the holding size leads to an increase in the level of output by .544 quintals. So, this equation also lends empirical support to our hypothesis. These increases at the margin also support our view that holding size exercises greater influence on output of jhum than that of settled holdings.

6.3 Employment and Output

Labour is an indispensable input in each and every line of production. In agriculture also, the importance of labour as an input cannot be belittled. Agricultural productivity depends, to some extent on the labour services. More labour means more production and vice-versa. Besides, the quantum of labour employed in the production furnishes income and hence the means of livelihood of those who get employment. Wages, in fact, happen to be the sole source of income to most of the workers who do not own any other factor of production such as land and/or capital. But the labour absorption capacity differs from sector to sector and even within the same sectors of the economy. Labour absorption capacity depends largely upon the nature of technology that is used in the production process.

Thus, the difference of employment level in the two modes of cultivation is likely to have some effects in production and productivity. If there is no such difference, the difference in output, if it exist, has to be explained

in terms of factors other than employment. The total number of labour employed can be grouped into certain representative size groups with reference to output. In order to examine such differences we have tested both the mean and median differences of employment and output of the two types of cultivation.

The mean size of employment in jhum is 3.5, while the median size of employment is 3.27 which is less than the mean employment level. The mean and median employment levels in settled cultivation are 4.32 and 3.71, respectively. In this case also, the median is less than the mean; and it does not matter whether we test the difference between the mean or median levels of employment in settled and jhum cultivation. But we examined both the mean and median differences of employment in the two types of cultivation. It is obvious that the average employment generated by a settled cultivation per holding is 1.23 times the mean employment level in jhum. Similarly, the median employment level in settled cultivation per holding is 1.13 times the the corresponding median level in jhum. Thus, the settled cultivation produces not only higher output level but it also furnishes more employment than the jhum. On both these counts one can recommend control, if not total elimination, of jhum.

The calculated standard error of the mean difference is .34, whereas the observed difference is .82. The ratio

of the difference to the standard error is 2.41 which is statistically significant at 5 per cent probability level. The standard error of the median difference is .34, while the observed difference is .44 which is 1.3 times the standard error and is not significant. These results dod not support our hypothesis that it is immaterial whether we test the mean or median difference. Irrespective of the fact whether we adopt mean or median as a measure of central value, the employment in the settled cultivation is consistently higher than that of jhum, statistical non-significance of the median difference notwithstanding.

We have already found that the average output of settled holdings is greater than those under jhum. Therefore, the output and employment differences may be systematically inter-related with each other. But we cannot draw any firm conclusion about the labour production. In order to be more specific, we have, therefore, directly examined output per worker in jhum and settled cultivation. The level of output per workers in jhum is 5.5 quintals, while for the settled cultivation, it is 6.85 quintals. Thus, the labour productivity of the settled holdings is 1.25 times that of jhum. It is, thus, obvious that both the primary factors of production, viz. land and labour, are more productively and efficiently utilised in settled than jhum cultivation.

The correlation or association between the two variables - employment and output - may be expected to be high. Thus, the nature and extent of interrelation between the two variables is evaluated by means of regression-correlation analysis. To our surprise, we find that the correlation coefficient between these two factors is .7 for jhum and only .28 for the settled cultivation. However, both the correlation coefficient are significant correspond t values being (8.433) and (2.423) for 74 and 69 degrees of freedom.

The explained proportion of variation in output in jhum is as much as 49 per cent, while it is only 7.84 per cent of the total change in case of settled cultivation. Factors, other than the employment, explain as much as 51 per cent of the total variation in the output of jhum, while such factors explain as much as 92.16 per cent of the total variation in the output of settled cultivation. The low magnitude of the explained proportion of variation in case of settled cultivation implies that the factors, other than labour, are more important determinants of output. Use of land-augmenting and output-raising inputs like water, fertilizers, etc., may hold the key to the explanation of the variation of output in settled cultivation.

In view of these results, we have fitted the regression equations to the data by means of Ordinary Least

Squares Method. The estimated equations are as follows :

$$O_j = 18.57 + .56\ E_j \qquad R^2 = .49$$
$$t = (8.432) \qquad F = (71.098)$$

$$O_s = 25.12 + .2\ E_s \qquad R^2 = (.0784)$$
$$t = (2.423) \qquad F = (5.9)$$

where O_j and E_j refer to output and employment of jhum and O_s and E_s refer to that of settled cultivation respectively.

The estimated parameters have the expected signs and values which are also significant in both cases. Correspond to an unit increase in the employment level, the output level of jhum increases by .56 quintals. So this equation has given empirical support to our hypothesis that output depends upon the level of employment.

But this relation, in settled cultivation, is relatively weak. Correspond to an unit increase in the employment level, output increases only by .2 quintals. Even otherwise, these results lend empirical support to the inferences that we have drawn from the analysis of correlation coefficient.

6.4 Production Function

We have also estimated the Cobb-Douglas Production Function by means of Ordinary Least Squares Technique. Area

under cultivation -L, and the level of employment -E, have been used to explain the level of output in jhum and settled cultivation separately. The estimated regression equations are reported below :

$$\text{Log } O_j = .886 + .4 \log L_j + .5 \log E_j \qquad R^2 = .98$$
$$t = \quad (7.36) \qquad\qquad (8.45) \qquad\qquad F = (294)$$

$$\text{Log } O_s = .386 + 3.14 \text{ Log } L_s + 1.15 \text{ Log } E_s \qquad R^2 = .95$$
$$t = \quad (8.14) \qquad\qquad (3.309) \qquad\qquad F = 158.33$$

where O_j, L_j and E_j refer to output, land and employment (labour) of jhum; and O_s, L_s and E_s refer to those of settled cultivation, respectively.

The function fits the data well as the estimated functions explain 98 and 95 per cent of total variation in output in jhum and settled cultivation respectively. The elasticity coefficients have the expected signs and they are also statistically significant. The sum of the two elasticities in jhum is .9 which indicates that production is taking place under diminishing returns to scale. The returns for a scale can be discussed from the equation of the marginal and average productivities. The average productivity is to be evaluated at the Geometrical Mean Level and the marginal productivity can then be derived as follows :

$$O = a.L^{\alpha}. E^{\beta}$$

(a) The marginal productivity of labour

$$MP_L = \frac{\partial Q}{\partial L} = \alpha \cdot aL^{\alpha-1} E^{\beta}$$

$$= \alpha (a.L^{\alpha} E^{\beta}) L^{-1}$$

$$= \alpha \frac{Q}{L} = \alpha (AP_L)$$

where the AP_L is the average productivity of land.

(b) Similarly, $MR_E = \beta \frac{Q}{E} = \beta (AP_E)$

where the AP_E refers to the marginal productivity of labour.

Our calculation shows that the marginal and the average productivity of land in jhum cultivation are 1.4 and 3.5 respectively; whereas the marginal and average productivity of labour is a bit higher than this, having the value 1.8 and 3.7 respectively. Now if production takes place under constant returns to scale, the marginal and average productivity will be equal. Marginal productivity exceeds the average productivity only when production takes place under Increasing Returns to Scale. Thus, these results also confirm that there are Diminishing Returns to overall outlay as well as to the individual primary factors of production. The estimated factors-productivity also imply that the overall scale of operation exceeds the optimum scale. The diminishing returns could be averted if the operations are scaled down to the optimum level, which may not be conductive to growth though it may lead to the improvement in efficiencies.

As against the jhum, the sum of the two elasticities of output in case of settled cultivation is much greater than one which is indicative of the fact that the productive processes under settled cultivation operates under increasing returns. This is also confirmed by the estimated values of the marginal and average productivities of the factor inputs. The marginal productivity of land is 11.7 and the average productivity is only 3.7. Thus, the marginal productivity is approximately three times of the average productivity in settled cultivation. Similarly, the marginal productivity of labour is 3.2 while the average productivity is 2.8 which is slightly lower than the marginal productivity.

Thus, production under settled cultivation operates under overall Increasing Returns to Scales. Besides, the returns to the two primary factors are also increasing. Even more important than this is the fact that the marginal productivities of land and labour in settled cultivation are larger than their values in jhum. It suggests that if land is transferred from jhum to settled cultivation till the marginal factor productivities in both types of cultivation are equalised, the transfer would move the systems into optimality.

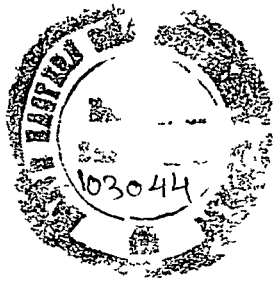
As Diminishing Marginal Returns could be averted by the updating of the technology, such transfer of land and labour from jhum to settled cultivation would be associated

with such technological improvement. The difference in the marginal and average productivities of the two primary factors between the two types of cultivation indicates that the investment required for the conversion of jhum into settled cultivation are warranted by the economic factors in the interest of the farmers themselves.

Chapter VII : Marketed Surplus

The economic conditions of developing countries differ considerably from those of the advanced and developed countries. In advanced countries agriculture constitutes only a small part of their economy; it happens to be completely commercialised and developed like any other sector of the economy. But in developing countries, agriculture happens to be the backbone of the economy; and only a small part of it has been commercialised and developed. Consequently, most of the output is produced for the market and only a negligible proportion of their output is retained for self consumption by the farmers of the developed West. As against this, the agricultural sector is dominated by the subsistence farming by the small and marginal farmers of the developing economies. Naturally, an extremely small proportion of output emerges as the marketable surplus in such economies.

Whereas the farmers in the developed countries keep their savings in terms of money, the farmers in developing countries sell only that amount of output which is needed to satisfy their cash requirements, and they keep the balance of their output for self-consumption and other purposes. Whatever they save is also saved in kind. Like the farmers in advanced countries, better-off farmers in the developing economies may keep their savings in money terms. But in these countries, such farmers



constitute only a microscopic minority, and the majority of the farmers is that of small and marginal farmers whose size of output depends, to a large extent, on the climatic conditions. These farmers usually sell just that portion of their output which suffices to meet their cash requirements and save the balance for personal needs and as a precaution for any adverse weather conditions that may occur next year.

Since Mizoram is economically one of the most backward states in India, there has been almost no agricultural development. Its agriculture, especially jhum cultivation, is solely dependent on weather conditions. Unfavourable monsoons means low productivity of agriculture, while favourable monsoon lead to highe productivity and production in the agricultural sector of the economy. Commercialisation is far from complete, and the lack of marketing facilities and absence of good communications also hinder commercialisation of agriculture. As such, the aim of the farmers is not to produce for the market but to produce enough foodgrains to meet their own requirements.

Before emergency which surfaced in Mizoram in 1966, the Mizo farmers had been more or less self-sufficient in the production of foodgrains. But as a result of the disturbances, many villages had been grouped together, from the security view point, by the armed forces; and a large

area of cultivable land has been rendered beyond the reach of the farmers. As such, there has been a decrease in the supply of land available to the farmers which has thereby led to the shortening of the jhum cycles. Shortening of the jhum cycles in its turn has led to a decrease in the fertility of the soil, and the productivity of land per acre has been reduced. Besides new lands available for cultivation appear to be less fertile than the ones that the farmers had to leave for the reorganisation of the villages. Both these factors have led to the decline of the productivity of land. As a result, agriculture could not meet even the consumption requirements of foodgrains of the farmers.

It is, therefore, a known fact that the marketable surplus, over and above the self-consumption would be negative. But it does not mean that the marketed surplus would also be negative. This is due to the existence of the distress sales. Besides, larger and medium farmers may still possess some positive marketable surplus though the farmers as a whole, small and marginal farmers may have no positive surpluses to offer to the market. All the same, whatever be the level of output of foodgrains, it is important to look into the marketed surplus of foodgrains to understand the extent to which agriculture has been commercialised; and also to know which of the two modes of cultivation - jhum and settled - have been more commercialised and possess a

greater potential for development and commercialization.

As family happens to be the basic unit of the societies and since in Mizoram the size of holdings is directly related to the family size, we have expected that the family size would have some effect not only on output but on the marketed surplus also. The positive effect of the family size upon output has made us to believe that the marketed surplus would also be positively related to the family size. As the size grows there is an increase in not only consumption requirements of foodgrains but the consumption requirements of other commodities also rise. In order to meet the consumption needs, the farmers with large family would have been required to sell more than the farmers having small families.

But land is the most important output constraining factor of agriculture. Larger the size of the holding larger will be the amount of output and vice-versa. As such the size of holding is expected to have an important bearing on the marketed surplus. We have found that the holding size has a positive effect on the level of output, and while some other factors have an indirect effect on the marketed surplus, the output is supposed to have a direct impact upon the marketed surplus.

In view of the above considerations, we have examined the nature of the marketed surplus with reference

to the family size, holding size and the output level. We have, therefore, attempted to determine the mean and median differences of the marketed surplus of foodgrains with reference to the above factors in order to find out if there are systematic factors at work affecting the marketed surplus in the two modes of cultivation.

7.1 Family Size and Marketed Surplus

We have found that there is no statistical difference between the size of the family in the two sub-samples. On this evidence, we have expected that there would be no significant difference between the size of the marketed surplus in the two modes of cultivation. At the same time, we believe that there should be a positive relation between the family size and the marketed surplus. However, it is plausible to argue for the inverse relation between the family size and marketed surplus. If the holdings owned by the families of the different size groups do not differ in yield, then the larger family means greater requirements of foodgrains for self-consumption and hence, smaller quantities of the marketable surplus.

Mean Difference

Mean value and the median value of the marketed surplus of foodgrains for jhum cultivation are 3.7 quintals and 3 quintals respectively, while the corresponding values

of the marketed surplus of foodgrains for the settled cultivation are 4.7 and 3.7 quintals respectively. In both types of cultivation the mean value is more than the median value in case of marketed surplus also. The mean and median differences of the marketed surplus of the two types of cultivation are more or less similar. Mean level of the marketed surplus in the settled cultivation is 1.27 times the surplus in the jhum while the median level of the marketed surplus in the settled cultivation is 1.23 times that of cultivation. The calculated standard aerror of the mean difference is .34 whereas the observed difference is 1(one). The ratio of the mean difference to the standard error is 2.94 which is significant statistically. Hence we can say that the difference in the size of the marketed surplus of foodgrains between jhum and settled cultivation is statistically different from zero.

In order to test our hypothesis about the relation between family size and the marketed surplus, we have calculated the coefficient of correlation for jhum and settled cultivation separately. The coefficient of correlation between these two variables in jhum is -.54, while it is -.014 in settled cultivation. In both the cases, there is an inverse relation between the family size and the marketed surplus of foodgrains. Thus, these results do not support our hypothesis of there being a direct relation

between the family size and the level of the marketed surplus in either mode of cultivation. As against this, these results support the alternative hypothesis of size being inversely related to the level of the marketed surplus. It implies that the greater consumption requirements of the larger families leave them with a smaller surplus. Therefore, the larger family size tends to make cultivation converge towards subsistence farming by hindering greater production for the market. This may be construed as an impediment to the process of commercialisation and general development of agriculture. The proportion of measures to control population especially in the rural Mizoram can thus be justified on economic grounds. But the coefficient of correlation between these two variables is significant in jhum only corresponding t value being -5.49, while the correlation coefficient for the settled cultivation is not significant, t value being -.845. But in jhum also, changes in family size explain only 29.13 per cent of the total variation in the marketed surplus. But family size explains only 0.02 per cent of the total variation of the marketed surplus in the settled cultivation. Thus we can say that family size has nothing to do with the variation in the marketed surplus of foodgrains in the settled cultivation.

The regression equations of the marketed surplus of foodgrains (m.f.) on the family size (F) are:

$$mf_j = -.8.4 - .63\ F_j \qquad R^2 = .29$$
$$t = (-5.49) \qquad F = (30.22)$$

$$mf_s = 1.42 - .03\ F_s \qquad R^2 = .02$$
$$t = (-0.845) \qquad F = (1.4)$$

where mf_j and mf_s = marketed surplus of jhum and settled cultivation respectively.

The estimated parameters have the negative signs and these are significant in case of jhum cultivation only. Corresponding to an unit increase in the family size, the marketed surplus in the jhum cultivation decreases by .63 quintals, while an increase or decrease in the family size among the settled cultivators have almost an imperceptible effect on the marketed surplus of foodgrains.

7.2 Size of Holding and Marketed Surplus

As land is the essential input of agriculture without which there can be no production, the size of holding is expected to have an important effect on output and hence the marketed surplus. Since the size of holding is significantly larger in the settled cultivation than that of jhum, the marketed surplus per holding is likely to be greater in the settled cultivation than in the jhum cultivation.

The mean and median levels of marketed surplus per holding in the jhum cultivation are 3.62 and 2.1 quintals

respectively, while those for the settled cultivation are 5.08 and 4.2 quintals respectively. The mean values are consistently larger than their respective median values. The marketed surplus per holding in the settled cultivation is 1.4 times that of the jhum; whereas the corresponding median level in the settled cultivation is twice as large as that in jhum. Both these differences are likely to be significantly different from zero.

In fact, the standard error of the mean difference is .3 while the observed difference is 1.46. The ratio of the mean difference to its standard error is 4.87 which is statistically significant. The standard error of the median difference is 0.79 while the observed difference is 2.1. Thus, the ratio of the mean difference to the standard error is 2.7 which is also statistically significant. These results have, therefore, given empirical support to our hypothesis that there would be a significant difference in the average size of the marketed surplus per holding of the settled and jhum cultivation.

The coefficient of correlation between these two variables worked out for jhum cultivation is .5 while the coefficient of correlation for the settled cultivation is .453. In both the cases the coefficient of correlation is significant, corresponding t values being 4.97 and 4.22, for 74 and 69 degrees of freedom. The explained proportion

of variation of the marketed surplus in jhum ucultivation is 25 per cent, while it is 20.52 per cent in the settled cultivation. Factors other than the holding size explain as much as 75 per cent of the total variation in the marketed surplus of jhum cultivation, whereas such factors explain 79.48 per cent of the total variation in settled cultivation. Thus, these results have given empirical support to our hypothesis that there would be a positive relation between the holding size and the marketed surplus though we need factors other than the holding size also to explain the changes in the marketed surplus.

The estimated regression equations are as follows :

In jhum, $mf_j = -.5 + 1.02\ L_j$ $\quad R^2 = .25$

$t = (4.97)$ $\quad F = (24.7)$

and in settled cultivation

$mf_s = -3.56 + 1.64\ L_s$ $\quad R^2 = .2052$

$t = (4.22)$ $\quad F = (17.8)$

In the above equations, the parameters have the expected signs and are significant in both the cases. Corresponding to an unit (acre) increase in the size of holding, the marketed surplus increases by 1.02 quintals in jhum and by 1.64 quintals in the settled cultivation. These results have given empirical support to our hypothesis that the marketed surplus depends upon the holding size to some

extent.

7.3 Output and Marketed Surplus

Whereas certain factors have indirect effects on the marketed surplus, output exercises direct influence on the marketed surplus of foddgrains. Since rice is the staple diet and the main food crop of Mizoram, the chief aim and purpose of the farmers is to produce enough rice. Other foodgrains are simply the minor products of agriculture and thus constitute only a microscopic proportion of the agricultural output. So, the present study focusses mainly upon the output and the marketed surplus of rice. As rise is the staple food of the people, the farmers usually like to keep a sufficient amount to meet their own consumption requirements. As s ch, if the farmers re able to meet the cash requirements for other purposes, usually, they do not like to sell their output of foodgrains unless they produce more than their requirements for a given period, usually one year. Even if they had produced a surplus over and above their own requirements for the year, they usually prefer to save in kind as a precaution against the future shortages that may arise due to unfavourable weather. But the immediate cash requirements compels them to sell a certain portion of their output even if they could not produce enough for self-consumption for the year. It implies that the major driving force behind the farmers' sales of their output in the market is the urgency

and the size of their cash requirements. Another important factor affecting the marketed surplus is the level of output produced within a specific period. Then given the level of output and the cash requirements of the farmers, price determines as to how much they should sell to the market and how much they should stock for their current and future consumption. Thus higher the price, smaller will be the marketed surplus for meeting the given cash requirements, and lower the price the higher will be the marketed surplus. Therefore, the short run supply curve may be negatively sloped[27,42]. This is compatible to the hypothesis of backward bending short run supply curve proposed by Dharam Narain[36] and Mathur-Ezekiel[25].

We have, therefore, attempted to test the mean and median differences in order to know if there is a systematic influence of output on the marketed surplus. The mean and median levels of output in the settled cultivation are 26.5 and 24.82 quintals respectively, while the mean and median levels of the marketed surplus are 4.82 and 3.35 respectively. With the jhum, the mean and median values of output are 20.53 and 18 quintals respectively, while the mean and median levels of marketed surplus are 3.65 and 2.1 quintals respectively. Obviously, the difference between the levels of output and the marketed surplus is retain for satisfying the self-consumption requirements though this

ratained portion may not suffice to meet the requirements in toto. In that case, marketed surplus will be larger than the marketable surplus. This aspect has been examined separately.

The standard errors of the mean and median differences of output are .53 and 2.45 while the observed differences are 5.97 and 6.82 respectively. Thus the ratio of the mean difference to its standard error is 11.26, while the ratio of median difference to the standard error is 2.8 both of which are statistically significant.

In view of the significant difference in the size of output, we expect to find a significant difference in the levels of the marketed surplus also. The standard error of the mean difference is .34, while the observed difference is 1.17. Thus, the ratio of the difference to the standard error is 3.44, which is significant statistically. Thus, this result lends empirical support to our hypothesis that the marketed surplus will be higher in that mode of cultivation which produces greater output.

But the exact nature and the extent of interrelation between these two variables can be evaluated by means of regression-correlation analysis. The coefficient of correlation for the settled cultivation is .7 while it is .58 in the jhum. In both the cases, the coefficient

of correlation is significant, t values being 8.14 and 6.14 for 69 and 74 degrees of freedom. The explained proportion of variation in the marketed surplus in the settled cultivation is 49 per cent, while it is 34 per cent in the jhum cultivation. Factors other than output explain 51 per cent of the total variation in the marketes surplus of the settled cultivation; and such factors explain 66 per cent of the total variation of the marketed surplus in the jhum cultivation.

The estimated regression equations are as follows:

$$mf_j = .109 + .89 \cdot Of_j \qquad R^2 = .34$$
$$t = (6.14) \qquad F = (38.2)$$

and

$$mf_s = -1.08 + .84\ Of_s \qquad R^2 = .49$$
$$t = (8.14) \qquad F = (66.29)$$

where Of_j and Of_s refer to the output of jhum and settled cultivation respectively.

The regression parameters in both the cases are significant. Corresponding to an unit increase in output, the marketed surplus in the jhum cultivation increases by .89 quintals, while in the settled cultivation it increases by .84 quintals. So these results lend empirical support to our hypothesis that the marketed surplus of foodgrains depend largely upon output.

On this evidence, we can infer that the differences between the marketed surplus of the two modes of cultivation are systematically embedded between their output differences. But we cannot conclude that the settled cultivation is inherently much more commercialised than the jhum or that the jhum is more representative of the subsistence farming than the settled cultivation. But one may invert the problem and pose the question on whether the greater degree of commercialisation leads to higher output. Alternatively, it may be hypothesised that the greater cash requirements lead to larger sales which in turn necessitates higher production.

This hypothesis may be trested by the regression of output (of) on the marketed surplus (mf). The estimated equations are given below :

In jhum, $Of_j = -.897 + .38\ mf_j$ $\quad R^2 = .34$

$t = (6.14)$ $\quad F = (38.2)$

and in settled

$Of_s = -.178 + .61\ mf_s$ $\quad R^2 = .49$

$t = (8.14)$ $\quad F = (66.29)$

The parameters of the equations are significant in both the cases. Corresponding to an unit increase in the marketed surplus, output increases by .38 quintals in the jhum cultivation, while that of settled cultivation increases by .61 quintals. Thus, the output of the settled

cultivation is much more responsive to the changes in the marketed surplus than the response of output of the jhum cultivation. Therefore, it may not be erroneous on the basis of all these results taken together, we infer that the settled cultivation represents a relatively higher degree of commercialisation than the jhuming.

The data have shown that the total output of foodgrains in the two jhuming villages taken together is 1515 quintals, while the total quantity consumed is 1563 quintals. Thus, the output has fallen short of farmers' own consumption requirements by 48 quintals. On the other hand, the total output of the settled cultivation in the two villages taken together is as much as 2022.8 quintals as against the quantity consumed of 1629 quintals. Thus, the marketable surplus in the settled cultivation is 393.8 quintals, while that of jhum is -48 quintals. It appears, therefore, that the settled farmers produce, as a whole, a surplus of 393.8 quintals over and above their own consumption requirements, while the jhumias cannot meet even their own needsfor consumption. It has also been revealed that the time/period of sales of foodgrains of the jhumias, in most of the cases, is just after the harvesting of the crop, whereas the settled cultivators sell a portion of their output just after harvesting and another portion of the total sales is marketed during the spring and autumn seasons when foodgrains

are usually scarce and prices are higher. Thus, the difference between the total sales of the two periods and the sales after harvesting represent the stocks that these farmers carry in order to reap the benefits of the differential prices that prevail in the seasons of plentiful and scarce supplies. This evidence, therefore, reveals that the marketed surplus of the jhumias represents particularly the 'distress sales', the positive marketed surplus notwithstanding. It also reveals that settled cultivation is much more commercialised than the jhum cultivation.

Chapter VIII : Conclusion

The study has been designed to analyse the comparative economics of the jhum and settled cultivation. The main thrust of the study has been to examine the comparative levels of output, employment and the marketed surplus of foodgrains of the two modes of cultivation in Mizoram. The major findings of the study are as follows :

1. Whereas the average size of the family of the jhum and the settled cultivators is statistically the same, the average holding size of the settled cultivators is larger than that of the jhumias.

2. But the family size exerts a much greater degree of influence on the holding size of the jhumias than that of the settled cultivators.

3. Employment per holding of the settled cultivators is more than that of the jhumias, while the employment per acre of cultivated area in the two types of cultivation is the same. Thus, the two modes of cultivation are equally labour intensive.

4. Output per family, per holding and per acre is larger in the settled cultivation than at the jhum. Besides, the labour productivity and the productivity of land are higher in the settled than in the jhum cultivation.

5. Primary factor inputs - land and babour - have significant impacts (50.3 and 49 per cent of the total

variation respectively) on the level of output in the jhum cultivation, while factors, other than the primary factors mentioned above, have greater impact upon the output level of the settled cultivation. This suggests that the settled cultivation is much more modernised than the jhum.

6. Production under jhum cultivation is taking place under the diminishing returns to scale, while the settled cultivation operates under the overall increasing returns to scale. What is even more important is the fact that the marginal productivities of land and labour in the settled cultivation are larger than their corresponding levels in the jhum.

7. On an average, the overall marketed surplus and the marketed surplus of foodgrains of the settled holdings are greater than those of the jhum. As a whole, the settled farmers produce much greater surplus of foodgrains over and above their consumption requirements, while the jhumias find it difficult to meet even their own requirements for consumption. As such, sales of foodgrains by the jhumias are nothing but 'distress sales'.

In the light of the above evidences, the conversion of the jhum holdings into the settled ones is an economically desirable objective. Such conversion may mitigate the food deficit of the state to some extent, and it will lead to the amelioration of the poverty of the farmers. Besides, it will

pave the way towards optimum use of the land resources, and it will also prevent the environmental degradation associated with the shifting/jhum cultivation.

The differential marginal productivities of land and labour in the two modes of cultivation suggest that if land is transferred from the jhum to settled cultivation till the marginal factor productivities in both types of cultivation are equalised, the transfer would move the system towards optimality. Such transfer of land and labour from the jhum to the settled cultivation would be associated with the technological improvement thereby leading to an end of the diminishing returns that operates in the jhum cultivation.

The differential levels of output and the difference in the marginal productivities of the primary inputs in the two types of cultivation indicate that the investment required for the conversion of jhum into the settled cultivation is warranted by the economic factors, and this will also promote the interest of the farmers. Over a period of time, the differential levels of output and the differential levels of productivities of the primary factor inputs will themselves pay for the requisite investment.

In case the farmers are too poor or not adequately enthused to undertake the investment warranted by the conversion of the jhum into the settled cultivation, public investment should no more be delayed. It may be either in the

form of full subsidy or part subsidy and part loan to the jhumias. Besides, the yield augmenting inputs may also be provided simultaneously.

A study of the jhum cultivation in Meghalaya undertaken by Miss Mayashree Borah, under the supervision of Prof. Shri Prakash, has also furnished similar results except that jhum is more labour-intensive than the settled cultivation in Meghalaya. This difference seems to arise from the use of standardised employment in her study while for want of information, we could not standardise our employment data by the number of man-hours worked per day. But overall thrust of the two sets of results is more or less similar in other respects highlighting the desirability of the conversion of jhum into settled cultivation.

Thus, the results of the present study and the results for Meghalaya have shown that even though there might have been some differences between the socio-economic conditions of the farmers in the two states, the economic factors at work in the two states are generally the same. These results suggest that the upliftment of the farmers in the North-Eastern Hill Regions may be brought about through the conversion of the jhum land into the settled holdings. Such a conversion will lead to the updating of the agricultural technology and, as a result, agriculture, which is the basic sector of the North-Eastern Economy, will move towards optimum use pattern of the

existing resource inputs especially land and labour. This will lead to the development of agro-based industries. Thus, over a period of time, the overall economy of the North-Eastern Region will move towards optimum development.

Table-I

Bivariate Frequency Tables showing Family Size(F) - Holding Size(L) Relationship

(a) Jhum Cultivation

L ↓ \ F →	1-3	3-5	5-7	7-9	9-11	11-13	13-15	15-17	17-19	Total
1-2	2	3	1	-	-	-	-	-	-	6
2-3	1	7	18	7	2	1	-	-	-	36
3-4	-	3	6	6	2	1	-	-	-	18
4-5	-	1	1	1	1	-	-	-	-	4
5-6	-	-	-	-	2	-	1	1	-	4
6-7	-	-	-	-	2	-	-	1	-	3
7-8	-	-	-	-	-	1	-	1	-	2
8-9	-	-	-	-	-	-	1	-	-	1
9-10	-	-	-	-	-	-	-	-	2	2
Total	3	14	26	14	9	3	2	3	2	76

(b) Settled Cultivation

L ↓ \ F →	1-3	3-5	5-7	7-9	9-11	11-13	13-15	15-17	Total
1-2	-	-	-	-	-	-	-	-	2
2-3	1	3	1	3	-	-	-	-	8
3-4	-	5	2	5	3	2	1	1	19
4-5	-	3	2	7	4	2	-	1	19
5-6	-	1	4	2	2	3	-	1	13
6-7	-	2	-	1	1	-	1	1	6
7-8	-	1	-	1	1	-	-	-	3
8-9	-	-	-	-	-	-	-	1	1
Total	1	15	11	19	11	7	2	5	71

Table-II

Bivariate Frequency Tables of Family Size(F) - Employment (E) Relationship

(a) Jhum Cultivation

E ↓ \ F →	1-3	3-5	5-7	7-9	9-11	11-13	13-15	15-17	17-19	Total
1-2	2	1	-	-	-	-	-	-	-	3
2-3	1	8	18	7	2	-	-	-	-	36
3-4	-	4	6	7	1	1	-	-	1	20
4-5	-	1	-	1	3	1	1	1	-	8
5-6	-	-	-	-	4	1	-	-	-	5
6-7	-	-	-	-	-	-	1	1	-	2
7-8	-	-	-	-	-	-	-	-	1	1
8-9	-	-	-	-	-	-	-	1	-	1
Total	3	14	24	15	10	3	2	3	2	76

(b) Settled Cultivation

E ↓ \ F →	below 3	3-6	6-9	9-12	12-15	15-18	Total
below 2	-	2	1	-	-	-	3
2-4	1	17	14	3	3	-	38
4-6	-	2	6	9	3	-	20
6-8	-	1	3	-	-	-	4
8-10	-	-	-	1	-	1	2
10-12	-	-	-	-	1	3	4
Total	1	22	24	13	7	4	71

able-III

Bivariate Frequency Tables of Holding Size(L) - Employment(E) Relationship

(a) Jhum Cultivation

E ↓ \ L →	(In acres) below 2	2-4	4-6	6-8	8-10	Total
below 2	3	-	-	-	-	3
2-4	3	49	3	-	-	55
4-6	-	2	6	5	-	13
6-8	-	-	-	1	2	3
8-10	-	-	1	-	1	2
Total	6	51	10	6	3	76

(b) Settled Cultivation

E ↓ \ L →	below 1.5	1.5-3.0	3.0-4.5	4.5-6.0	6.0-7.5	7.5-9.0	Total
below 2	-	1	2	-	-	-	3
2-4	2	7	20	6	4	-	39
4-6	-	1	12	4	3	-	20
6-8	-	-	2	2	-	-	4
8-10	-	-	1	-	1	-	2
10-12	-	-	2	-	-	1	3
Total	2	9	39	12	8	1	71

Table-IV

Bivariate Frequency Tables of Family Size(F) - Output(O) Relationship

(a) Jhum Cultivation

O ↓ \ F →	1-3	3-5	5-7	7-9	9-11	11-13	13-15	15-17	17-19	Total
below 7	-	2	-	-	-	-	-	-	-	2
7-14	2	4	12	2	1	-	-	-	-	21
14-21	1	7	9	8	3	2	1	-	-	31
21-28	-	-	1	4	3	-	1	-	-	9-
28-35	-	-	2	-	3	-	-	-	-	5
35-42	-	-	-	1	-	1	-	2	-	4
42-49	-	-	-	-	-	-	1	-	1	2
49-56	-	-	-	-	-	-	-	1	-	1
56-63	-	-	-	-	-	-	-	-	1	1
Total	3	13	24	15	10	3	3	3	2	76

(b) Settled Cultivation

O ↓ \ F →	1-3	3-5	5-7	7-9	9-11	11-13	13-15	15-17	Total
below 13	-	2	2	1	1	-	-	1	7
13-26	1	9	5	12	3	3	1	2	36
26-39	-	3	3	6	6	4	1	1	24
39-52	-	-	-	1	1	-	-	-	2
52-65	-	-	1	-	-	-	-	-	1
65-78	-	-	-	-	-	-	-	-	0
78-91	-	-	-	-	-	-	-	-	0
91-104	-	-	-	-	-	-	-	1	1
Total	1	14	11	20	11	7	2	5	71

Table-V

Bivariate Frequency Tables of Holding Size(L) - Output(O) Relationship

(a) Jhum Cultivation

O ↓ \ L → (in acres)	below 2	2-4	4-6	6-8	8-10	Total
in quintals						
6-18	6	31	-	-	-	37
18-30	-	18	7	1	-	26
30-42	-	1	2	3	-	6
42-54	-	1	2	1	2	5
54-66	-	-	-	1	1	2
Total	6	51	10	6	3	76

(b) Settled Cultivation

↓ O \ L →	below 2	2-4	4-6	6-8	8-10	Total
in quintals						
5-25	2	25	15	-	-	42
25-45	-	3	16	7	-	26
45-65	-	1	-	1	-	2
65-85	-	-	-	-	-	0
85-105	-	-	-	-	-	1
Total	2	29	31	8	1	71

Table-VI

Bivariate Frequency Tables of Employment(E) - Output(O) Relationship

(a) Jhum Cultivation

O ↓ \ E →	below 2	2-4	4-6	6-8	6-10	Total
In quintals						
6-18	3	34	1	-	-	38
18-30	-	20	7	-	-	27
30-42	-	1	5	-	1	7
42-54	-	-	-	3	-	3
54-66	-	-	-	-	1	1
Total	3	55	13	3	2	76

(b) Settled Cultivation

↓O \ E →	below 2	2-4	4-6	6-8	8-10	10-12	Total
below 18	2	10	2	2	-	1	17
18-36	1	24	15	1	2	2	45
36-54	-	4	3	-	-	-	7
54-72	-	-	-	1	-	-	1
72-90	-	-	-	-	-	-	0
90-108	-	-	-	-	-	1	1
Total	3	38	20	4	2	4	71

Table-VII

Bivariate Frequency Tables of Family Size(F) - Marketed Surplus(mf) Relationship

(a) Jhum Cultivation

mf ↓ \ F →	below 4	4-8	8-12	12-16	16-20	Total
below 3	3	31	8	2	1	45
3-6	3	6	7	-	-	16
6-9	-	3	1	2	-	6
9-12	2	2	1	1	2	8
12-15	1	-	-	-	-	1
Total	9	42	17	5	3	76

(b) Jhum Cultivation

mf ↓ \ F →	below 3	3-6	6-9	9-12	12-15	15-18	Total
below 6	-	13	21	11	8	3	56
6-12	1	7	3	1	-	-	12
12-18	-	1	-	-	-	-	1
18-24	-	-	1	-	-	-	1
24-30	-	-	-	-	-	-	0
30-36	-	-	-	-	-	1	1
Total	1	21	25	12	8	4	71

Table-VIII

Bivariate Frequency Tables of Holding Size(L) - Marketed Surplus (mf) Relationship

(a) Jhum Cultivation

mf ↓ \ L →	below 2	2-4	4-6	6-8	8-10	Total
below 2.5	3	38	3	1	-	45
2.5-5.0	3	4	-	1	-	8
5.0-7.5	-	5	3	3	1	12
7.5-10.0	-	1	1	1	1	4
10.0-12.5	-	3	3	-	1	7
Total	6	51	10	6	3	76

(b) Settled Cultivation

mf ↓ \ L →	below 2	2-4	4-6	6-8	8-10	Total
below 7	2	26	26	5	-	59
7-14	-	2	5	3	-	10
14-21	-	-	1	-	-	1
21-28	-	-	-	-	-	0
28-35	-	-	-	-	-	1
Total	2	28	32	8	1	71

Table-IX

Bivariate Frequency Tables of Output (O) - Marketed Surplus(mf) Relationship

(a) Jhum Cultivation

mf ↓ \ O → (in quintals)	6-18	18-30	30-42	42-54	54-66	Total
below 2.5	30	13	2	-	-	45
2.5-5.0	5	3	-	-	-	8
5.0-7.5	2	5	3	2	-	12
7.5-10.0	-	2	1	-	-	3
10.0-12.5	1	4	1	1	1	8
Total	38	27	7	3	1	76

(b) Settled Cultivation

mf ↓ \ O → (in quintals)	below 15	15-30	30-45	45-60	60-75	75-90	90-105	Total
below 5	8	35	10	-	-	-	-	53
5-10	-	5	4	-	-	-	-	9
10-15	-	2	4	1	-	-	-	7
15-20	-	-	-	-	-	-	-	0
20-25	-	-	-	1	-	-	-	1
25-30	-	-	-	-	-	-	1	1
Total	8	42	18	2	0	0	1	71

Table-X

Results

Tests of Mean Differences between Variatbles in the Jhum and Settled Cultivation

Sl. No.	Aspects studied	Observed Differences.	't' Values
1	Size of family	0.73	1.2
2	Size of holding	1.00	3.7
3	Employment generated by the family	0.58	1.45
4	Employment per holding	0.6	3.0
5	Output per family	6.93	12.37
6	Output per holding	3.25	5.4
7	Marketed surplus per family	1.00	2.94
8	Marketed surplus per holding	1.46	4.87

Table - XI

Results

Interrelation of Different Variables

Sl. No.	Aspects studied		'r'	't'	'b'	'a'	'R^2'	'F'
1	Holding size & Family size	(a) Jhum	.8	11.47	.39	.57	.64	131.55
		(b) Settled	.3	2.61	.125	3.44	.09	6.82
2	Family size & Employment	(a) Jhum	.73	9.16	.54	-.72	.53	83.50
		(b) Settled	.62	6.54	.59	-.49	.38	42.29
3	Holding size & Employment	(a) Jhum	.8	11.47	.68	1.16	.64	131.55
		(b) Settled	.3	2.61	.32	2.9	.09	6.82
4	Family size & Output	(a) Jhum	.74	9.49	.63	14.97	.55	90.44
		(b) Settled	.36	3.2	.21	23.28	.13	10.31
5	Holding size & Output	(a) Jhum	.77	10.26	.88	18.4	.5929	105.27
		(b) Settled	.6	6.23	.544	22.5	.36	38.8125
6	Employment & Output	(a) Jhum	.7	8.433	.56	18.57	.49	71.098
		(b) Settled	.28	2.423	.2	25.12	.0784	5.9
7	Family size & Marketed Surplus	(a) Jhum	-.54	-5.43	-.63	-8.4	.29	30.22
		(b) Settled	-.014	-0.12	-.03	1.42	.0002	0.014
8	Holding size & Marketed Surplus	(a) Jhum	.5	4.97	1.02	-.5	.25	24.7
		(b) Settled	.453	4.22	1.64	-3.56	.2052	17.8
9	Output & Marketed Surplus	(a) Jhum	.58	6.14	.89	.109	.34	38.2
		(b) Settled	.7	8.14	.84	-1.08	.49	66.29
10	Elasticity of Output (to Scale of Production)	(a) Jhum	.99	15.81	.9	.866	.98	294
		(b) Settled	.974	11.449	4.29	.386	.95	158.33

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Abbreviations

D.I.P.R. & T	= Directorate of Information, Public Relation and Tourism.
E.J	= Economic Journal
E.W.	= Economic Weekly
E.P.W.	= Economic and Political Weekly
I.J.A.E.	= Indian Journal of Agricultural Economics
J.P.E.	= Journal of Political Economy
N.C.E.R.	= National Council for Economic Research
N.E.C.	= North-Eastern Council
N.E.H.U.	= North-Eastern Hill University
N.S.S.	= National Sample Survey
Z.I.D.C.O.	= Zoram Industrial Development Corporation