CHAPTER VI
SUMMARY AND CONCLUSIONS

Comprehensive studies relating to ecology and nutrition on tribal populations of India are almost absent. Growth pattern and nutrition related data on the tribal groups with the simplest technology will provide clues for the differences as a result of the ecosystems.

Some believe the more the tribals are dependent on the natural forest, the better are they nutritionally. The present study was attempted to test this hypothesis. Genetically similar tribal groups of Madhya Pradesh living in different ecological settings with the extent of forest as the main variable have been selected for the study.

The Bhils of Jhabua and Kathiawara blocks of Jhabua district represented the least forest zone, the Gonds of Pharasgaon and Geedam blocks of Bastar district represented the maximum forest zone and the Gonds of Pratapur and Khadgaon blocks of Sarguja District represented the intermediate category.

A total of 9,708 individuals of all ages from birth to old age were covered from 3,506 households in the three areas. Clinical assessment was done on all subjects. Six anthropometric measurements consisting of body weight, height, arm circumference, fat fold at triceps, head circumference and chest circumference were taken on all subjects. Nine more measurements were taken on all adult males.

Data was collected on all the households on (1) demographic aspects (2) family socio-economic status and (3) socio-cultural aspects. Dietary intake of both the household and individual members was assessed in every fourth household covered for demographic aspects.
The statistical tools included mean and standard deviation, nutritional classification and the discriminant analysis and formation of composite index.

The genetic and environmental influences acted at different ages of growth and development. The subjects have been classified into groups of preschool age, school age, adolescent age and adults. Comparisons have been made between tribal groups in the three ecological zones by the above age groups.

The preschool Gonds of Sarguja are taller and slightly heavier than the Bastar Gonds and Jhabua Bhils. They are also taller and heavier than their counterparts of Madhya Pradesh and Udaipur. The preschoolers of Sarguja Gonds and Jhabua Bhils are taller and heavier and those of Bastar Gonds are shorter and lighter compared to their counterparts in rural Madhya Pradesh. The tribal preschoolers had lower mid arm circumference values but higher FFT values compared to their rural counterparts.

The school age boys and girls of Sarguja Gonds and Jhabua Bhils are similar in height and both are taller than the Bastar Gonds. However, the weights of Sarguja Gonds are higher than those of Bastar Gonds and Jhabua Bhils. The Sarguja Gonds and Jhabua Bhils are taller and heavier while the Bastar Gonds are similar to their rural counterparts in Madhya Pradesh both in height and weight. While mid-arm circumference values of all these groups and the FFT values of Bastar Gonds are lower, the FFT of both sexes of Sarguja Gonds and Jhabua Bhils are higher compared to their counterparts in rural Madhya Pradesh.

The adolescent boys and girls of Sarguja Gonds are higher than those of Bastar Gonds and Jhabua Bhils and also their rural counterparts only at certain ages and more or less similar at many age groups. The mid arm circum-
ference values are higher in both sexes of Sarguja Gonds compared to their counterparts of Bastar Gonds, Jhabua Bhils and rural Madhya Pradesh. The FFT values of the groups are similar.

The adult men of Sarguja Gonds and Jhabua Bhils are taller than Bastar Gonds and the adult women of Sarguja Gonds are also heavier than Bastar Gonds and Jhabua Bhils. The adults of either sex from all the zones are shorter and lighter with lower mid arm circumference and similar FFT compared to their rural counterparts in Madhya Pradesh. The mean heights of the study groups are more or less similar to published data on these tribal groups from these areas.

Thus the three tribal groups do not differ significantly in the mean height, weight and arm circumference values in the adolescent years. However, at certain ages of preschool, school age groups and in all age groups of adults, the mean values of height, weight and arm circumference are significantly different. There are significant differences in most of the other measurements between the three groups.

The per cent of normal children (Gomez Classification) is higher in Sarguja Gonds and Jhabua Bhils compared to Bastar Gonds. In the per cent of normals and stunted and wasted, the Sarguja and Bastar Gonds are similar and are better than Jhabua Bhils. The mean values of all anthropometric measurements of all ages and both sexes of well-to-do Indians upto 22 years of age and NCHS data on the adult are much higher compared to the tribal groups in the three zones.

The discriminant analysis indicated the following:

Two functions only could be derived and these contained all the information in the discriminating variables in all the age and sex groups. The sum of Eigen values in all age and sex groups is always hundred per cent indicating
that the total variance existing in the dependant variable is accounted for. Function I is the most important one and is capable of separating the group, all by itself.

The stepwise discriminant analysis indicated that the weight is the simple and most powerful discriminator in 1-4 and 50-59 year age groups, FFT in all other age groups of males. However, the fat fold calf is found to be most powerful discriminator in adults when all fifteen measurements are included in the analysis. In the case of females, arm circumference in 1-4, 12-21, 30-39, 40-49 age groups, body weight in 5-11 and 21-29 year age groups, height in 50-59 year age group and FFT in 60+ age group are found to be the best discriminating variables.

In the males, FFT has the maximum contribution to the Function I in all the age groups except in 50-59 and 60+ in which the arm circumference has the maximum contribution. The function I thus reflects the fat component. The function II reflects the 'non-fat' component with height in 1-4, 5-11 and 21-29 year age groups and arm circumference in 12-20 year age groups and weight in the rest of the age groups contributing the maximum to that function.

In adult males the function I reflects 'fat component' and the function II reflects 'boney and soft tissue' component, when all the fifteen measurements are used, where FF calf has the maximum contribution to function I in all age groups and bi-acromial diameter in 21-29, 30-39 and 40-49 year age groups and in pooled adult males.

In the females also the function I reflects 'fat component' with FFT contributing maximum to the function in all the age groups. The function II does not reflect clearly either fat or boney components.
The results of discriminant analysis indicated that the males of the three tribal groups from the three zones are significantly different from each other except in the 5-11 year age group where Sarguja Gonds and Jhabua Bhils are similar. The females of the tribal groups from the three zones are also significantly discriminated morphologically from each other.

The means of group centroids of the females of Sarguja Gonds and Jhabua Bhils are significantly higher than Bastar Gonds in the preschool and school age groups. In the adolescents and adults, the means of group centroids of Sarguja Gonds are significantly different from both Jhabua Bhils and Bastar Gonds. The Jhabua Bhils in turn have significantly higher mean values for group centroids compared to Bastar Gonds in the above age groups.

The results indicate that FFT is the best discriminator of the four, height, weight, arm circumference and fat fold at triceps. However, FF calf becomes the best discriminating variable in adult males, when more measurements are included in the analysis.

The Sarguja Gonds are found to be better in growth pattern and nutritional status compared to Bastar Gonds and Bhils. The Bhils, in turn, are found to be better than Bastar Gonds. Thus the growth pattern of Bastar Gonds living in the dense forest is poor while that of Sarguja Gonds living in the intermediate category is the best.

The various ecological factors like geographical, agricultural, demographic, economic and health are included in a composite index and given appropriate scores. The mean values of the composite index are the highest (128) in Sarguja and the lowest (78) in Bastar and intermediate (107) in Jhabua. The mean values of the index of the three zones are significantly different from each other.
The results of classification indicated that the percentage of individuals correctly classified as to the tribal group they actually belonged to is around 60 in most of the groups with height, weight, arm circumference, and FFT and around 90 in adult males with fifteen anthropometric measurements as discriminating variables.

Thus the results indicated that the statureal differences in the adolescents of the three groups of the present study, which seemed to show genetically negligible variation, while the eco-sensitive parameters like weight, arm circumference and FFT are significantly different. This confirms the observations of Jhonston et al (1976) that genetic factors influence growth more in the adolescent period.

The mean values of Body Mass Index are comparatively higher in the Sarguja Gonds compared to Bastar Gonds and Jhabua Bhils. However, these values are higher in the Bastar Gonds compared to Jhabua Bhil males and in the females, the Bhils have higher mean body mass index values compared to Gonds of Bastar.

The Sarguja area has the moderate forest and rainfall. The literacy level is higher, the family size is small and the per capita income is more from agriculture and labour and the utilization of health facilities is high. The result is better growth and nutritional status. However, the Bastar area has the maximum forest and rainfall. The literacy level is very low, the family size is more and the per capita income is the lowest mostly from agriculture. The utilization of health facilities is also the minimum. The result is poor growth and nutritional status.
The study thus indicated that living in a dense forest by itself is not conducive for better growth and the role of the whole complex of ecological factors play an important role in the determination of growth pattern of a tribal community.