Chapter III
MATERIALS AND METHODS

In this chapter we shall discuss the materials collected for the present study and methods that have been applied. The present research study on dental anthropology of the Mizo has been carried out in Aizawl Town, Mizoram.

AREA OF STUDY

This chapter is an introductory statement of the general background of the study area, which will not give any detail but it is drawn with an intention for giving general ideas of the proposed area to the readers. Mizoram, one of the smallest among Indian States is located in the eastern corner of India surrounded by Myanmar in the east and south, Tripura in the north-west, Assam and Manipur in the north. Mizoram has been placing the second most literate as well as second most urbanize among the Indian States with low density of population (42). It holds the most concentrated states of Tribal Population with predominantly Christian population. Previously most of them were animists or having tribal beliefs, which is replaced by Christianity at the dawn of the 20th Century. Since 1950, the term Lushai has been superseded by the term Mizo. It is a matter of their pride when people recognize the tribes of Mizoram as a single tribe the Mizo instead of the Lushai (Sen, 1992).

Mizoram became a full-fledged state on the 20th February 1987; which is the 23rd state in India. Mizoram is located between 21°.58' to 24°.35' North latitude and 92°.15' to 93°.29' East longitude. At present Mizoram has eight administrative districts, these are
Aizawl, Lunglei, Champhai, Mamit, Kolasib, Serchhip, Saiha and Lawngtlai districts. The total population of Mizoram as per provisional reports of Census India 2011 is 1,091,014. Aizawl town is situated approximately 1,132 meters above the sea-level and occupy an area of 1543.60 sq. kms. Aizawl town comprises of 48,109 households and a population of 2,56,399 (Statistical Handbook, Mizoram 2006).

The people

The term ‘Mizo’ is a collective name for the people inhabiting Mizoram, possessing one language, same origin and a common way of life. The Mizos are racially belong to the Mongoloid stock and linguistically belong to the Tibeto-Burman linguistic group. Etymologically, the word ‘Mizo’ means Hillman. The word is derived from two Mizo words ‘Mi’ and ‘Zo’, means man and hill respectively.

A Mizo family was constituted through the institution of marriage. The system that existed in regard to the exercise of leadership in the family was patriarchal. The husband or the father has the right to command over the wife or mother in the family unit. In all affairs relating to family life such as; celebration, issues of inheritance, etc., the husband or the father exercised power. In regard to recognition of descent of the married couple, patrilineal system was in vogue, i.e., an heir was recognized through the male line (Nag, 1993).

The staple food of the Mizo is rice and millet. They are non-vegetarian. They are fond of meat, and eat almost every kind of animal. They also eat fish and egg. They take different kinds of vegetables, leafy vegetables and varieties of edible roots and herbs available in the jhum and forest. They also consume varieties of seasonal fruits like...
mango, orange, banana, pineapple and also few varieties of jungle fruits. Consumption of milk is not very common among them, instead they drink tea. The locally made rice beer is their favourite drink. The cigarette and pipes are very common in the village. Due to the influence of Christianity and education, many of them stopped taking rice beer.

The major economic resources of the Mizo are land and forest. The traditional practice of shifting cultivation has remained the primary occupation of the community. Some of them are also engaged in plough or wet cultivation in the plain valleys. The land belongs to community as a whole. The principle crop is rice. They also grow other crops and vegetables like maize, millet, beans, peas, zinger, chilli, potatoes, and sweet gourd. Some of the Mizo are found to be good horticulturists. They are very fond of meat and are expert in hunting with the help of different kinds of traps, bow and arrow and handmade guns.

The Mizo, in general are aware of the importance of education. The progress in this regard has been tremendous. Almost every village has government or private schools. There are many colleges, high schools, middle schools and even a university campus at Aizawl all of which are fully utilized by the people, indicating their growing interest in education.

Mizo, in general are healthy. The women look healthier than the man and do more work. Sanitary conditions of villages are not satisfactory, though a considerable change has occurred in the villages, where a number of educated people live. In the past, they were totally depending on the indigenous herbal medicine or on the spiritual activities of the priest to cure various kinds of diseases. Nowadays a considerable
change has taken place; they are now largely dependent on modern medicines. Drinking water is not easily available to the Mizo. They depend on natural resources like rivers, springs, rainwater (Sengupta, 1995).

Climate

Climatic condition of Mizoram is mostly favourable. It enjoys almost the whole year a pleasant climate as it is neither extremely hot during summer nor desperately cold during winter. There is certain local variation with experiencing cooler climate in the eastern part where there is high altitude and warmer climate in the western side as a low-lying areas. Generally, Mizoram has 20°C to 29°C during summer and 10°C to 21.3°C during winter. The maximum diurnal temperature may reach as high as 32°C and the diurnal fluctuations of temperature are also high varying between 10°C and 15°C. The whole of Mizoram is under the influence of North West monsoon. It usually starts from the month of June to September and receiving the highest rainfall in the months of June and August. Winter season set on November to February with the month of January scored the coldest period. The dry season start from the month of October to March. The hottest month is mid-march. Continuous heavy rainfall caused intolerable damages in this hilly region troubling transport and communication system with landslide and other natural calamities. The monsoon highly affects the eastern part of the state where there is maximum rainfall resulting blockages of roads due to landslide every year (Sen, 1992).
LOCATION MAPS OF STUDY AREA

Map 1: Map of India

Map 2: Map of Mizoram

Map 3: Map of Study area
The fieldwork for the present study was conducted among the Mizo of Aizawl town, Mizoram. A total of 69 localities in Aizawl town have been identified and listed out. Seven (7) localities were selected from the above 69 localities by adopting systematic sampling method and a house to house survey was conducted. The subjects were drawn only from the Mizo households for collecting data on dental anthropology.

All the educational background information of the parents as well as the subjects, their occupation, income of the family, the number of family members, food habits and dental care of the subjects was recorded with the help of interview schedule. The following methods were followed to collect data for the present study:

DENTAL ERUPTION

The recommendation of Wheeler (1988) for morphological features was followed to study differences between deciduous and permanent teeth.

For the eruption of the deciduous teeth, observations were made on both the sexes of age group between 3 ½ months and 33 months keeping ±3 months to the range of eruption given by Logan and Kronfield (1933).

For the eruption of permanent teeth, observations were made on both the sexes of age group between 4 years and 23 years keeping ±2 years to the range of eruption given by Logan and Kronfield (1933).

Dental eruptions of the subjects were examined with the help of dental mirror in sufficient day light. If any part of the crown has pierced the gum to become visible, the tooth was considered emerged. Some missing teeth were counted as erupted when the
subject could recall their emergence and/or extraction. Standard techniques of data collection on dental eruption as given by Weiner and Lourie (1981) were followed.

In all the populations' special care was taken to determine the actual ages of the subjects. All the subjects were Christians and thus were requested to show their baptismal certificates for the birth date record. The subjects who could not show their baptismal certificate or those whose parents failed to give the correct information were not included in the sample. The sample comprises of only those subjects whose both parents were from same tribe. Age of an individual was calculated according to the decimal age calendar given by Weiner and Lourie, (1969) from his/her birthday to the date of his/her examination.

The coding of teeth is as follows: I, C, P, and M stand for incisor, canine, premolar, and molar, respectively. The numeral signifies the tooth's position. Positioning of the numeral on lower or upper end of the latter signifies mandibular or maxillary tooth, respectively. The third molars are not included for the present study as there are very high variations in emergence time of this tooth. The other additional background information in each subject was gathered, which includes their religion, parent's income, and personal habits such as smoking, chewing, and diet. Eruption status of deciduous and permanent dentition for each and every child was recorded.
DENTAL AND ORAL PATHOLOGY

For oral and dental pathology samples were collected from all the age groups of both the sexes.

Dental Caries: Since dental caries has to be assessed for the entire dentition, all the teeth of the subjects were examined. Following WHO's (1977) recommendations, the teeth in either type of dentition were examined and diagnosed sound when they are unaffected by caries, and decayed, filled and missing owing to caries. Dental probe, dental mirror, spatula and torch were used to examine the subject's teeth. The methods of direct visual observation were followed during the investigation.

The dental caries was noticed in the labial, buccal, lingual, mesial as well as in the occlusal sides of the teeth. For its correct observation and assessment, each of the subjects was asked to open his /her mouth, a torch was focused and entire dentition was screened as thoroughly. It is well known variables such as age, sex, heredity socio-economic level and intrauterine and postnatal environment influence the sequence and timing of tooth emergence. The information on time of tooth emergence in human is valuable in assessing diversity seen between populations. The dental status of an individual at a particular age, especially in the younger age groups, provides an index of physiological maturity for the clinician. The chronology of tooth emergence has often been used in the medico-legal cases for the estimation of age.

Periodontal diseases: The method detailed by Russell (1976) was used to score periodontal index per person. The Periodontal Index (PI) was intended to estimate
deeper periodontal disease than the P.M.A Index by measuring the presence or absence of gingival inflammation, its severity, pocket formation, and loss of masticatory function. The criteria given below are used to examine all of the gingival tissues surrounding each tooth. Because it measures both reversible and irreversible aspects of periodontal disease, it illustrates an epidemiologic Index with a true biologic gradient. A PI Score per individual is determined by summing all of the tooth scores and dividing by the number of teeth examined.

Periodontal Index (Russell)

<table>
<thead>
<tr>
<th>Score</th>
<th>Criteria and Scoring for Field Studies</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td><strong>Negative:</strong> There is neither over inflammation in the investing tissue nor loss of function due to destruction of supporting tissues.</td>
</tr>
<tr>
<td>1</td>
<td><strong>Mild Gingivitis:</strong> There is an overt area of inflammation in the free gingiva but this area does not circumscribe the tooth.</td>
</tr>
<tr>
<td>2</td>
<td><strong>Gingivitis:</strong> Inflammation completely circumscribes the tooth, but there is no apparent break in the epithelial attachment.</td>
</tr>
<tr>
<td>6</td>
<td><strong>Gingivitis with pocket formation:</strong> The epithelial attachment has been broken and there is a pocket. There is no interference with normal masticatory function, the tooth is firm and has not drifted.</td>
</tr>
<tr>
<td>8</td>
<td><strong>Advanced destruction with loss of masticatory function:</strong> The tooth may be loose; may have drifted; may sound dull on percussion with a metallic, instrument; may be depressible in its socket.</td>
</tr>
</tbody>
</table>
Sum of individual scores
Periodontal index score per person = ------------------------------­
Number of teeth present

<table>
<thead>
<tr>
<th>Clinical Condition</th>
<th>Group P1 Scores*</th>
<th>Stage of Disease</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clinically normal supportive tissues</td>
<td>0 to 0.2</td>
<td>Reversible</td>
</tr>
<tr>
<td>Simple gingivitis</td>
<td>0.3 to 0.9</td>
<td></td>
</tr>
<tr>
<td>Beginning destructive periodontal disease</td>
<td>0.7 to 1.9</td>
<td></td>
</tr>
<tr>
<td>Established destructive periodontal disease</td>
<td>1.6 to 5.0</td>
<td>Irreversible</td>
</tr>
<tr>
<td>Terminal disease</td>
<td>3.8 to 8.0</td>
<td></td>
</tr>
</tbody>
</table>

ORAL HYGIENE

**Debris Index (DI-S):** For the Debris Index (DI-S) a dental explorer was placed on the incisal third of the tooth and moved towards the gingival third. The debris index score per person was obtained by totalling the debris score per tooth surfaces and dividing by the number of surface examined.

Criteria for scoring Oral Debris (DI-S) component of OHI-S

0 - No debris or stain present

1 - Soft debris covering not more than one third of the tooth surface

2 - Soft debris covering more than one third but not more than two thirds of the exposed tooth surface

3 - Soft debris covering more than two thirds of the exposed tooth surface.
Calculus Index (CI-S): The calculus index (CI-S) was performed by gently placing a dental explorer into the distal gingival crevice and drawing it sub-gingivally from the distal contact area to the mesial contact area (i.e. one half of a tooth’s circumference is considered a scoring unit).

The Calculus Index score per person was obtained by totaling the Calculus score per tooth surface and dividing by the number of surfaces examined. The OHI-S score per person is the total of the DI-S and CI-S scores per person.

The clinical levels of oral cleanliness for debris that can be associated with Group Simplified Debris Index Scores are as follows-

- Good  0.3 to 1.6
- Fair   0.7 to 1.8
- Poor   1.9 to 3.0

Criteria for Scoring Calculus (CI-S)

Component of OHI-S

0 - No Calculus present
1 - Supragingival calculus covering not more than one third of the exposed tooth surface.
2 - Supragingival calculus covering more than one third but not more than two thirds of the exposed tooth surface.
3 - Supragingival calculus covering more than two thirds of the exposed tooth surface.
The clinical levels of oral hygiene that can be associated with group OHI-S scores are as follows:

<table>
<thead>
<tr>
<th>Level</th>
<th>Score Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Good</td>
<td>0.0 to 1.2</td>
</tr>
<tr>
<td>Fair</td>
<td>1.3 to 3.0</td>
</tr>
<tr>
<td>Poor</td>
<td>3.1 to 6.0</td>
</tr>
</tbody>
</table>

The significance of the OHI-S is that like Russell's Periodontal Index.

It has been used extensively throughout the world and has contributed greatly to our understanding of periodontal disease. It is also used in the National Health Survey. The high degree of correlation (r=0.82) between OHI-S and PI make it possible, knowing one of the scores, to calculate the other score using regression analysis. The major strength of the OHI-S is its use in epidemiological surveys and in evaluating dental health education programmes. It can also be used to evaluate an individual's level of oral cleanliness and, to a more limited extent, can be used in clinical trials. The index is easy to use because the criteria are objective, the examination may be performed quickly, and a high level of reproducibility is possible with a minimum of training sessions.

DENTAL MORPHOLOGY

The occurrence of supernumerary teeth or hyperdontia and hypodontia, carabelli’s trait, shovel-shaped incisors, diastema, crowding and cingulum of teeth, were recorded as suggested by Weiner and Lourie (1981).
SOCIO-ECONOMIC CATEGORIES

In the present study, certain socio-economic variables were classified arbitrarily into different groups and/or categories with a view to understanding their influence on demographic variables. Our classification may be briefly described as follows:

a. **Income groups:** Data on household income were collected directly from the heads of the households. The per capita monthly income of the households was classified as follows:

- Below 50\textsuperscript{th} percentile (below Rs. 7500) = Low income group
- 50\textsuperscript{th} to 75\textsuperscript{th} percentile (Rs. 7500-13300) = Middle income group
- Above 75\textsuperscript{th} percentile (above Rs. 13300) = High income group

b. **Educational level:** Data on educational attainment of individuals in the present study were arbitrarily classified into three categories such as:

i. Illiterate – are those individuals who were unable to read and write and those who had no education.

ii. Literate – those who can read and write and had formal education.

c. **Family size:** The family size was classified into three categories. The individuals who lived in a household with less than 5 family members were considered as having a **Small Family Size.** The **Medium Family Size** includes those individuals who lived in a household with 5 - 6 family members and the individuals who lived in a household with more than 6 family members were grouped in **Large Family Size.**
DATA ANALYSIS

The entire data was tabulated for statistical analysis, like percentage frequencies and median ages. The age of an individual was calculated (according to the decimal age calendar given by Weiner and Lourie, 1981) from his/her date of birth to the date of investigations. To compute the median emergence time for each individual tooth, probit transformation was used (Fisher and Yeates, 1948). Accordingly, for each tooth the proportion of emergence at various age levels was transformed into probits. The calculations were done for the two sides' pooled data. The probit values were then plotted on graph paper, and the visually best fitted slope was obtained through a series of iterations. The regression line thus obtained was used to determine the estimated age of emergence (read as a projection of the probit value 5 on the horizontal scale) and estimated standard deviation (difference between the projection of the probit values 5 and 4). To find out the association, if any, between the prevalence of dental pathology and variables such as sex, income, eating habits, dentifrices used and dental pathology, chi-square test was used.