DENTAL ANTHROPOLOGY OF THE MIZO OF AIZAWL TOWN, MIZORAM

ABSTRACT

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ABSTRACT

"Dental anthropology is defined as a study of people (and their close relatives) from the evidence provided by teeth" (Hillson, 1996). Dental anthropology is a subfield of physical anthropology under the broad discipline of anthropology which is concerned with the study of human teeth - one of the anatomical systems of man. One of the main themes of dental anthropology has been a study of variation in size and shape of the teeth, as recorded in casts of living mouths or seen in the skulls of archaeological and fossil collections. Dental anthropology studies the variation in size and shape of the teeth, the development of teeth in relation to age, their appearance in the mouth, and the processes of wear and other changes that occur once they are in place. It also includes the microscopic traces, preserved inside the tissues of the teeth, of the growth and ageing processes. Yet another area of interest is the study of dental diseases in relation to diet and other factors, and the most recent development is the study of the biochemistry of dental tissues (Hillson, 1996).

Dental anthropology is academically located within the human bone biology studies. Its main goal is to recognize attributes in the teeth form which can help us create bicultural dynamics of human populations, specially related to health–illness state, feeding habits and micro evolutionary transformations, related themselves to the ethno genesis of current and ancient times. In Dental anthropology, teeth are used to obtain information on culture, health, diet, variability and evolutionary trends as well as eruption and dental pathologies in the past and modern populations.

The abundant published literature available on the Southeast Asian, East Asian and Pacific populations demonstrates the existence of similarities and dissimilarities in the distribution of frequencies of different dental characteristics among different populations which are as notable and significant as those that can be encountered in other biogenetic markers such as blood-groups and red cell enzymes, demographics, etc. that greatly render it possible to compare and classify populations. More such work is, however, necessary to substantiate these hypotheses.

Dental anthropology much like those of other subfields of anthropology can be applied to the welfare of the mankind in the areas of dental development, pathology, morphology, forensic deontology and odontometry. The area of dental development can be used in the application of tooth eruption times and calcification standards in the nationwide nutritional survey, in the diagnosis and treatment of children with growth disturbances, in solving a number of orthodontic problems including malocclusion, in the age estimation of skulls of unknown age, in the evaluation of racial differences and primate evolution, in the determination of personal identity or individuality of persons involved in different crimes-accidents-explosions etc. and tooth formation standards based on the study of crown and root development of teeth in clinical assessment of early or late dental maturity.

While the area of dental morphology is generally used in the understanding of biological history and racial classifications of human populations as also in micro-evolutionary studies, it is necessary to assess the incidence of malocclusion cases in relation to a number of genetic and non-genetic factors to plan and gear up treatment

needs. It is urgently needed to undertake carefully planned research investigations into the dental anthropology of the people to obtain and standardize the findings for application to different situations concerning their oral health, forensic and related problems in India in general and Northeast India in particular. Tooth morphology provides few clues as to age, sex, body size, elapsed time since death, etc., so its primary usage is in discerning the ethnic affiliation or race of an individual (Scott and Turner II, 2000).

In the area of dental pathology, dental caries and periodontal disease are the most common oral problems of man. In view of the alarming increase in the prevalence rates of these diseases in the human populations, it is of outmost importance to study these diseases in relation to different demographic, socio-economic, environmental and hereditary factors to delineate standards and levels of health for the public health planner to devise and extend preventive and treatment services to the well-being of one and all.

With this end in view we have undertaken a study on the dental anthropology of the Mizo of Aizawl, Mizoram with the following objectives:

1. To assess the eruption pattern of different types of teeth, both deciduous and permanent, their eruption age and order, in both boys and girls.

2. To record the various morphological patterns of teeth.

3. To assess the prevalence of dental pathology and impact of food habits, including chewing of betel nut, tobacco and smoking on dental health.

4. To find out the relationships of eruption pattern, dental pathology and frequency occurrence of various morphological traits with certain demographic and socio-economic variables such as age, sex, income and education.

The fieldwork for the present study was conducted among the Mizo of Aizawl town, Mizoram. 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 belonging 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 (Nag, 1993).

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.

Data were collected on eruption of the deciduous and permanent teeth, dental and oral pathology and dental morphology. All the educational background information of the parents as well as the subjects, their age ,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.

Dental eruption

Dental *eruption* is generally defined as the time when any part of the crown has emerged through the gingival surface (Rami Reddy, 1986). The term *emergence* refers

to the moment any portion of the crown piers the gingiva. Actual penetration of the gingiva is merely a transitory stage in the total process of tooth eruption. It refers to the movement of a tooth towards its final occlusal position.

Unlike in permanent teeth eruption times there is no significant difference in the eruption times of deciduous teeth in children of same physical health in many ethnic groups as well as between males and females, through the role of genetic factors has been shown by twin studies.

Dental caries

Dental caries is a pathological condition of the teeth resulting in the decalcification of the dentine or enamel and the disintegration of the remaining organic material often leading to the loss of the teeth and occurs in association with other conditions such as periodontal disease, which causes recession of the alveolar bone resulting in loosening of the teeth and their subsequent loss; dental enamel hypoplasia, which is a developmental enamel defect is the deciduous and permanent teeth seen as transverse lines, pits, and grooves on the enamel surface; ante-mortem or tooth loss; and attrition, which is the gradual wearing away of the hard parts of the teeth.

The extra-oral causes are hereditary; high sugar intake, nutritional deficiency in calcium, phosphorous, fluorides, vitamins A, C and D and proteins, soft foods, and bottle feeding. Laus (1981), however, reduces them only to four to five well known factors which cause dental caries; low fluoride levels in drinking water, food products containing large quantities of sugar, bad childhood health in general, and inadequate quantities of

saliva and disturbance of its optimal composition. Hereditary predisposition of dental tissue to caries appears to be another factor. The most important factors that contribute to the disease are consumption of food products with increased quantities of sugar and fluoride-lacking drinking water. When the disease acquires a high degree of severity the affected individual finds it difficult to eat and swallow and at times resulting in speech problems and fever.

Periodontal disease

Periodontal disease is the most common oral health problem of man and also a major problem in modern dental practice. Palaeopathological studies indicate that man has been subject to periodontal disease since prehistoric times, and our earliest historical records reveal an awareness of periodontal disease and need for treating it.

Pyorrhea or periodontal disease unlike dental caries is the disease of the periodontium or the supporting structures of the teeth namely the gum, alveolar bone, periodical membrane and cementum.

Gingivitis, inflammation of the gingiva, is the most common form of gingival disease. Inflammation is almost always present in all form of gingival disease because of the bacterial plaque, which cause inflammation and irritational factors that favour its accumulation and are very often present in the gingival environment.

Dental Morphology

Tooth morphology is defined as the subject which deals with the external and internal structure, morphology, function, eruption and shedding of all the teeth in the

mouth. The mouth is called as oral cavity in medical term. Human beings have two jaws in which all the teeth are fixed. (Kumar, 2007).

Supernumerary Teeth: Supernumerary teeth or hyperdontia are extra teeth beyond the normal number unlike hypodontia or decrease in the number of teeth both representing numerical variations in the teeth.

Carabelli's Cusp: The cusp of Carabelli's is an accessory cusp that develops as an elevation or tubercle on the lingual surface of the mesiolingual cusp (protocone) or surface of the maxillary molars particularly the first one. Regarding the location of the trait, it may be stated that the cusps occurs on the mesial half of the lingual surface of the deciduous second molars and permanent first molar whereas on the permanent second molar the structure is more distally located.

Shovel-Shaped Incisors: The term shoveling, first introduced by Muhlreiter in 1870 according to El-Najjar and Mc Williams (1978), is used to described a condition resulting from a combination of a concave lingual surface and elevated mesial and distal marginal ridges enclosing a central fossa in the upper and lower incisor teeth.

Diastema: Diastema is a space or gap present between the maxillary central incisors or between the maxillary lateral incisors and canines. The former one is called median diastema which is more frequently observed in the maxilla while the second type, the lateral diastema is occasionally combined with lack of or a reduction in the size of the lateral incisors.

Crowding: Crowding is another non-metric trait; which is complex in nature. There is unanimity as to whether this trait which is prominent in modern man, as an inherent constitutional variable, Lasker (1950), but the fact is that the crowding of teeth results due to the inheritance of large teeth from one parent and small jaw from the other, which are determined before birth. This is unlike in the case of spacing which occurs between teeth when the jaw is large and teeth are small. Thus, the existence of crowding as also spacing indicates that the tooth size need not be in complete accord with the jaw size.

Cingulum or Lingual Cusp: El-Najjar and McWilliams (1978) following Black and Wheeler define cingulum as "the lingual cusp known of an anterior tooth. A self or swelling which is found on the tooth just above the cervical line is the site of the development of many supernumerary cusps". According to Segal (1963), "the ridge found on the lingual lobes of the incisors and the canine is termed the 'cervical ridge', or the 'cingulum'. It is more specifically in the cervical portion of the lingual surface.

Occlusion: Dental occlusion is the relationship between the masticatory surface of the maxillary and mandibular teeth, when the mouth is closed. Individuals with correct or normal occlusion have their teeth of either jaw arranged in well-formed arches, elliptic maxilla and parabolic mandible, presence of contact between individual teeth and between each tooth of one jaw with two teeth of opposing jaw barring the mandibular central incisors and maxillary wisdom teeth, all forwardly placed mandibular teeth but central incisors, smaller arch than the upper one to facilitate the occlusion of the former

inside the latter showing the upper incisors covering the lower incisors and the coincidence between the two jaws in the midline.

MATERIALS AND METHODS

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 1/2 months and 33 months keeping ±3 months to the range of eruption.

For the eruption of permanent teeth, observation was made on both the sexes of age group between 4 years and 23 years keeping ±2 years to the range of eruption.

Dental eruption of the subject was 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.

Dental and oral pathology

For Dental Pathology samples were collected from all the age groups of both the sexes.

a. 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 was examined and diagnosed sound when they are un-affected by caries, and decayed, filled and missing owing to caries. Dental probe, dental mirror, spatula and torch are used to examine the subject's teeth. The method of direct visual observation was followed during the investigation.

b. Periodontal Diseases: The method detailed by Russel (1976) is used to score periodontal index per person.

c. Oral Hygiene: Simplified oral hygiene index given by Greene and Vermillion (1964) was applied.

Dental morphology

The occurrence of supernumerary teeth or hyperdontia and hypodontia, carabelli's trait, shovel-shaped incisors, diastema, crowding, cingulumand occlusion 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 50th percentile (below Rs. 7500) = Low income group.

50th to 75th percentile (Rs. 7500-13300) = Middle income group.

Above 75th 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 data collected for the present study were quantified and analysed statistically, using Microsoft office excel worksheet and by manually. 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. Median age of eruption is computed by Probit transformation method suggested by Fisher and Yeates (1957). 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 between the prevalence of dental pathology and variables such as age, sex, income, education and dental caries, chi-square test is used.

FINDINGS OF THE PRESENT STUDY

The findings of the present study may be briefly summarised as follows:

Dental eruption

1. The first deciduous tooth to erupt is the mandibular central incisor in boys, whereas in girls, the central incisor is erupted at the same time in both the jaws.
2. The deciduous teeth completed eruption at 37-42 months of age in both the sexes.
3. The first permanent tooth erupts at 5 years of age, in both boys and girls.
4. Except the third molar, all the permanent teeth completed eruption by 15 years of age, in both the sexes.
5. The third molar starts erupting at 14 years and 15 years of age in females and males respectively.
6. By 24 years of age, more than 50% of the third molars are found erupted in both the jaws and sexes.

7. The median age of eruption is lower in females except in the mandibular canine and first premolar and the maxillary central incisor and second molar, whereas, the maxillary first premolar is erupted at the same time in both the sexes.

8. The eruption of all the permanent teeth except the third molar takes place between the median ages 6.1 (± 0.15)years to 12.1 (±0.10) years in males and 5.9 (±0.15 years to 12.2 (±0.20) years in females.

9. The order of eruption of the permanent teeth is as follows:

Male: $M_1 > I_1 > M^1 > I^1 > I_2 > I^2 > P_1 > P^1 > C_0 > P_2 > C^0 = P^2 > M^2 > M_2 > M_3 > M^3$

Female: $M_1 = M^1 > I_1 > I^1 > I_2 > I^2 > P_1 > P^1 > C_0 > C^0 > P_2 > P^2 > M_2 > M^2 > M_3 > M^3$

Dental pathology

10. Prevalence of dental caries was observed earliest at the age group of 13-18 months in both the sexes, where, only mild and moderate forms of caries were recorded.

11. The severe form of caries is first observed at 37-42 months and 43-48 months age groups, in males and females respectively.

12. In both the sexes, the frequency of caries affected found higher in posterior teeth than that of the anterior teeth.

13. Prevalence of dental caries is higher among the illiterates compared to the literate subjects.

14. Prevalence of dental caries is observed highest in the low income group among the Mizo.

15. Prevalence of caries is found to be less among the *kuhva* (betel nut and leaf with lime) chewers, compared to the non-chewers in both the sexes.

16. Difference between the smokers and non-smokers, and tobacco chewers and non-chewers are statistically insignificant in respect of the prevalence of dental caries.

17. The incidence of gingivitis decreases as the age increases till 16-20 years and then gradually increases.

18. No poor form of OHI (DI-S) is observed in the 16-30 years age group in both the sexes.

19. Prevalence of poor form of OHI (CI-S) decreased from 6-10 years to 21-25 years age group and from 6-10 years to 16-20 years age group in males and females respectively, and then again increases with the increase of age.

20. More than 70% of the subjects are under the score of Good (0.0-1.2) in both the sexes in respect of the prevalence of OHI-S.

21. Periodontal disease is observed higher among the non-chewers of *kuhva* (betel nut and leaf with lime) than the chewers and, the same is observed higher among the smokers than the non-smokers.

22. The prevalence of periodontal disease is observed higher in males than female subjects irrespective of the tobacco chewers and non-chewers. Out of 1631 individuals belonging to the tobacco chewers, 1005 (61.62%), and out of 3520 non-chewers, 1470 (41.76%) have periodontal disease.

23. Lowest prevalence of the OHI (CI-S) was found in males (9.32%) belong to the large families and the females (8.41%) belong to the medium families.

24. No significant differences were observed in the prevalence of OHI (DI-S) in respect of the family size.

25. Highest prevalence (21.94%) of the OHI (S) was observed among the individuals who belong to the large family size, followed by the small family size (21.25%) among the males and the same trend was observed in the females also. However, the differences in respect of family sizes are not significant.

26. Highest percentage of gingivitis in males is observed in large family size (18.46%) followed by the medium family size (18.42%) and lowest was recorded in the small family size. Same trend was observed in the females also. However, no significant difference was observed between the sexes.

27. In both males and females, the percentage of periodontal diseases is recorded highest in the low income group followed by middle income group.

28. The percentage of individuals having OHI (DI-S) is highest in the lower income group (12.95% in males; 13.22% in females) and lowest in high income group (7.41% in males; 8.29% in females).

29. Females show less prevalence OHI (CI-S) than their male counterpart. In both the sexes, the prevalence of OHI (CI-S) found highest among the individuals belonging to the low income group (male 10.70%; female 10.51%) followed by the middle income group (9.93% in males; 9.56% in females) and lowest in the high income group (male- 7.89%; females- 7.32%).

30. The prevalence of OHI (S) found to be highest in the low income group followed by middle income group and lowest in the high income group in both the sexes. When compared between the males and females, males show slightly higher prevalence of OHI (S) in all the income groups than the females.

31. The percentage of gingivitis decreases as the income level increases. There is no significant difference observed between males and females in respect of the prevalence of gingivitis.

Dental Morphology

32. No supernumerary teeth are observed in the deciduous teeth as well as in the permanent dentition upto 10 years of age in both the sexes.

33. The highest frequency of supernumerary teeth is observed at 16-20 years and 21-25 years age groups in males (3.69%) and females (3.65%) respectively.

34. The incidence of carabelli's anomaly is found highest among 4 years age group in boys (14.06%) and girls (12.28%). However, this trait does not follow any specific pattern regarding its distribution.

35. The occurrence of carabelli's anomaly is slightly higher in males (8.59%) compared to their female counterpart (7.48%).

36. The incidence of shovelling in both the jaws is found to be slightly higher in females than in males.

37. The occurrence of diastema is higher in the lower age group in both the boys and girls.

38. In respect of the deciduous dentition, the incidence of diastema is recorded higher in both the jaws of the boys than that of the girls.

39. The incidence of crowding in the deciduous teeth is comparatively low in both the sexes.

40. The frequency of crowding in the permanent teeth is found to be higher in the anterior teeth compared to the posterior teeth in both the jaws and sexes.

41. No incidence of cingulum is found below 1 year of age and 12-14 years of age in boys and girls. The highest frequency of cingulim is recorded at 5 years and 6 years of age in the girls and boys respectively.

42. In all the quadrants of both the jaws, the incidence of cingulum in the permanent teeth is found to be higher in the central incisor than that of the lateral incisor in both the sexes.

43. The incidence of occlusion is recorded as 52.39% over-bite, 47.24% normal-bite and 0.37% under-bite among the males; whereas in females, the incidence of occlusion is 54.01% over-bite, 45.77% normal bite and 0.22% under-bite.

CONCLUDING REMARKS

The present study was conducted to examine the dental eruption, dental and oral pathology and dental morphology among the Mizo of Aizawl town, Mizoram. Medial incisor is the earliest deciduous tooth to erupt in the lower jaw of both the sexes. Deciduous tooth have completed their eruption at 37-42 months of age in both the sexes. The first permanent tooth to emerge is the mandibular first molar and the last to erupt is the maxillary second molar (excepting, M3) in both the boys and girls. By 15 years of age, all the teeth except the third molar have completed their eruption. Except the mandibular canine and first premolar and maxillary medial incisor and second molar, all

the teeth in female erupt earlier than their male counterpart. A comparative study of emergence of permanent teeth (excluding ,M3) among some Indian populations by jaw and sex shows that in all the populations, the mandibular first premolar erupts earlier than their maxillary counterpart; however, the eruption takes place at the same time among females also.

The occurrence of dental caries was observed earliest at of 13-18 months age in both the sexes, where, only mild and moderate forms of caries were recorded. The frequency of caries affected teeth is higher in the posterior teeth than the anterior teeth in both males and females. In both the sexes of the Mizo of Aizawl town, the prevalence of caries appears in low frequency among the *kuhva* (betel nut and leaf with lime) chewers, compared to that of the non-chewers.

The present study reveals that the chewing of *Kuhva* to certain extent protects the teeth from the dental caries and periodontal diseases in the present population. However, smoking and tobacco chewing show negative effect in the dental health. The prevalence of the OHI (CI-S),OHI (DI-S) is also affected by certain socio-economic factors like the family size, literacy, income etc. High income, small family size and high education are negatively associated with the dental and the oral diseases.

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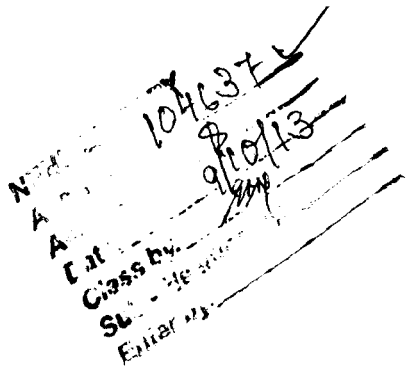

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DECLARATION

I, C. Lalrammuana, hereby declare that the subject matter of this thesis is the record of work done by me, that the contents of this thesis did not form the basis of the award of any previous degree to me or to the best of my knowledge to anybody else, and that the thesis has not been submitted by me for any research degree in any University/Institute.

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Certified that the thesis entitled "Dental Anthropology of the Mizo of Aizawl Town, Mizoram" submitted by Mr. C. Lalrammuana for the Degree of Doctor of Philosophy in the Department of Anthropology, North-Eastern Hill University, Shillong, embodies the record of original investigation carried out by him under my supervision. He has been duly registered bearing the registration number 1189 of 6.9.2007. The thesis presented is worthy of being considered for the award of the Ph.D. Degree. The contents of this thesis did not form a basis of any previous degree to him or to the best of my knowledge to anybody else, and the thesis had not been submitted for any degree of any other University.

Limbu 4.9.12

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(C.LALRAMMUANA)

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Chapter I

INTRODUCTION

Anthropology is a science, which deals with the comparative study of man as a physical and cultural being. It has two main branches – cultural or social anthropology and physical anthropology. Cultural anthropology studies man as a cultural being, his works, behaviour, social patterns etc. while physical anthropology is concerned with the study of human biological evolution and variation.

The primary aim of the contemporary physical anthropological and human population genetic researches has been to expound the nature of biological variations in different human populations as the meaning of these differences in the understanding of the ongoing evolutionary process. But the systems used have been varying from time to time based on the technological development as well as the nature of the subject. Among the other systems regularly studied in this context, human dentition is of special interest and occupies important place long since (Rami Reddy, 1986).

'Dental anthropology' a sub-branch of physical anthropology is a term used as early as 1900 when the subject gained academic and research importance (Turner II, 1978), although its root lay in the seventies of the 19^{th} century, has shown by a number of investigations. The different aspects that can be studied under this sub-branch of anthropology are morphology, metrics, health, evolution, growth, genetics, usage, forensics and ethnographic treatment-all serving as research tools and areas of academic and applied studies (Rami Reddy, 1986).

"Dental anthropology is defined as a study of people (and their close relatives) from the evidence provided by teeth" (Hillson, 1996). Dental anthropology is a subfield of physical anthropology under the broad discipline of anthropology which is concerned with the study of human teeth - one of the anatomical systems of man. One of the main themes of dental anthropology has been a study of variation in size and shape of the teeth, as recorded in casts of living mouths or seen in the skulls of archaeological and fossil collections. Dental anthropology studies the variation in size and shape of the teeth, the development of teeth in relation to age, their appearance in the mouth, and the processes of wear and other changes that occur once they are in place. It also includes the microscopic traces, preserved inside the tissues of the teeth, of the growth and ageing processes. Yet another area of interest is the study of dental diseases in relation to diet and other factors, and the most recent development is the study of the biochemistry of dental tissues (Hillson, 1996).

Many contributors to this area of research come from fields outside of anthropology, notably dentistry, genetics, anatomy, and palaeontology. It encompasses a broad range of subjects which, in turn, have finer levels of specialization. Some workers concentrate on developmental aspects of the dentition, from tooth germ formation to developmental defects of crown. Others focus on post-eruptive changes such as ordinary crown wear and culturally-prescribed dental modification. The study of dental pathologies, in particular caries, patterns of tooth loss, and periodontal disease, provides yet another avenue of research. Researchers interested in those elements of human

dentition that have some underlying genetic basis of study of tooth size and morphology (Cadien, 1972).

Teeth being the hardest and most durable materials of all parts of the body due to the presence of enamel and dentine in them preserve well and hence account for a large proposition of the human and pre-human fossils remains available for study. The environment has revealed by many a study postulating modes of inheritance for different dental traits (Kraus, 1951; Turner II, 1967). Dental anthropology is academically located within the human bone biology studies. Its main goal is to recognize attributes in the teeth form which can help us create bicultural dynamics of human populations, specially related to health–illness state, feeding habits and micro evolutionary transformations, related themselves to the ethno genesis of current and ancient times. In Dental anthropology, teeth are used to obtain information on culture, health, diet, variability and evolutionary trends as well as eruption and dental pathologies in the past and modern populations.

The abundant published literature available on the Southeast Asian, East Asian and Pacific populations demonstrates the existence of similarities and dissimilarities in the distribution of frequencies of different dental characteristics among different populations which are as notable and significant as those that can be encountered in other biogenetic markers such as blood-groups and red cell enzymes, demographics, etc. that greatly render it possible to compare and classify populations. The large genetic component and high habitability of dentition have been demonstrated by a number of genetic studies, which facilitated the postulation of the modes of inheritance for various

dental traits (Lundstrom, 1948 and 1963; Kraus, 1951; Turner II, 1967 and Cadien, 1972). More such work is, however, necessary to substantiate these hypotheses.

In most of the foreign countries dental anthropological researches till recently were devoted to bring to light phenotypic trait frequencies and their distribution pattern basing on which attempts were made to contemplate on the question of population interrelationships. In recent years, however, emphasis has been shifted to the study of dental genetic and development to deduce conceptual model explaining the ways in which the genes operates in bringing about dental variations and their adaptive nature as reflected in the cultural and behavioral changes occurring in different populations in time and space. Cadien (1972) opines thus: "... there are definite genetic factors that influence the entire dentition, those that affect only certain groups of teeth; and those that act upon single tooth. These must be sorted out before the differences between human populations can be fully understood".

While this tremendous turnout of research work of high quality and great intrinsic value in dental anthropology of foreign populations resulted in abundant body of published literature outside India, while very few studies at micro or macro-levels has been done in India in general and Northeast India in particular.

Uses

Dental anthropology much like those of other subfields of anthropology can be applied to the welfare of the mankind in the areas of dental development, pathology, morphology, forensic deontology and odontometry. The area of dental development can be used in the application of tooth eruption times and calcification standards in the

nationwide nutritional survey, in the diagnosis and treatment of children with growth disturbances, in solving a number of orthodontic problems including malocclusion, in the age estimation of skulls of unknown age, in the evaluation of racial differences and primate evolution, in the determination of personal identity or individuality of persons involved in different crimes-accidents-explosions etc. and tooth formation standards based on the study of crown and root development of teeth in clinical assessment of early or late dental maturity.

In the area of dental pathology, dental caries and periodontal disease are the most common oral problems of man. In view of the alarming increase in the prevalence rates of these diseases in the human populations, it is of outmost importance to study these diseases in relation to different demographic, socio-economic, environmental and hereditary factors to delineate standards and levels of health for the public health planner to devise and extend preventive and treatment services to the well-being of one and all.

While the area of dental morphology is generally used in the understanding of biological history and racial classifications of human populations as also in micro-evolutionary studies, it is necessary to assess the incidence of malocclusion cases in relation to a number of genetic and non-genetic factors to plan and gear up treatment needs.

In the area of forensic deontology, teeth identification made by employing different methods and sophisticated equipment can be used linking the victim or the suspect to a particular crime/accident. Similarly, in the area of odontometry, standards of tooth size are applied in the personal identity or establishment of the individuality of a

person, and also in orthodontic diagnosis and treatment. Norms of tooth size, dental arch size and shape, tooth spacing and crowding obtained in relation to different variables can be used as a frame of reference to understand those of individual subjects viewed and their practical implications. It is urgently needed to undertake carefully planned research investigations into the dental anthropology of the people to obtain and standardize the findings for application to different situations concerning their oral health, forensic and related problems in India in general and Northeast India in particular. Tooth morphology provides few clues as to age, sex, body size, elapsed time since death, etc., so its primary usage is in discerning the ethnic affiliation or race of an individual (Scott and Turner II, 2000).

History and development

In pre-Darwinian times, the nascent field of physical anthropology focused on human racial variation and classification. Teeth played almost no role in these early discussions, as workers focused on externally visible characteristics like skin, hair, eye colour, hair and nose form, stature, etc. By the end of the nineteenth century with but few exceptions teeth had yet to enter anthropological consciousness in any significant way (Scott and Turner II, 2000). Dental anthropology began in the eighties of the eighteen century when physical anthropological investigations centered mainly round the analysis of the morphology of the skeletons and teeth, though as a subject of academic research, its importance was not recognized until 1900. The root of the dental anthropology lay in the seventies of the 19^{th} century as shown by a number of investigations, when the subject got its breakthrough for the first time.

In 1927, Krogman published the first comprehensive review of research on primate dentition. This hundred page treatise, comprising an entire issue of the journal of dental research, should be considered a cornerstone in the field. It is obvious that to Krogman (1927), dental anthropology included the study of dental growth, theories of dental origin, primate dentition and population variation.

Following Krogman's work, research on dental anthropology proliferated in numerous anthropological and dental research journals. In addition, there were a number of special journal issues, dissertations, monographs, and books developed to this subject (e.g. Moorrees, 1957; Wolpoff, 1971; Kurten, 1982; Rami Reddy, 1985). In the American Journal of Physical Anthropology alone, annual report of the editorial notes that dental papers comprised about 11% of the total manuscripts submitted in 1985. This is not a new trend, but rather a continuation of interest that has existed since the early days of the journal. While anthropology was very much alive on the individual level, there was no forum in which to communicate with others in the field to facilitate the exchange of ideas. The Dental Anthropological Association (DAA) was officially, created in 1986 during the American Association of Physical Anthropologists (AAPA) meeting in Albuquerque, New Mexico, and established the 'Dental Anthropology Newsletter' as its official publications. Since its inception, the DAA has sponsored symposia and scientific sessions where it exemplifies the diversity in dental anthropology, including interest in recent and archaeological populations as well as variation in methodological approaches and scientific results.

The term Dental anthropology first appears in the title of an article published in 1900 by George Buschan, although Klatsky and Fisher are credited with its formal introduction. The field is rooted in French, German, and English encyclopedic mammalian deontological treatises of the past two centuries. That teeth poses qualities valuable for anthropological study (i.e. they are durable; evolutionary conservative and yet adaptable; rich with genetically determined traits; and reflective of behaviour, ecology, and diet) was recognized by such 19th century natural historians as L. Rousseau, G. Koch, J. Henle, and R. Owen.

In the early 20th century, scholars began to pay attention to teeth as an additional system that began to provide insight into human variation. Most of the emphasis was on human skeletal remains because techniques for making impressions of the living were limited. Ales Hrdlicka, who had access to an enormous sample of Native American skeletal remains at the Smithsonian Institution, was among the first to note interesting dental morphological distinctions between major human groups. In particular, Hrdlicka (1911, 1920) noted that American Indians were distinguished from other human populations by the development of pronounced marginal ridges on the lingual surface of the upper incisors (i.e. shovelling). W.K. Gregory (1922), in his opus the origin and evolution of the human dentition, also noted morphological attributes of recent humans,but he did not feel that intergroup variation was pronounced or significant.

Although Hrdlicka authored many books, he never wrote one devoted entirely to teeth. The task was left to other pioneers in this field, including T.D. Campbell (1925) in Austria and J.C.M. Shaw (1931) in South Africa. These workers studied the size,

morphology, number, wear, and pathology of Australian aboriginals and South African black populations, respectively. Given the paucity of Comparative data, their books were largely descriptive in nature. To complement these early dental monographs, other significant contributors during this period include R.W. Leigh's (1925) analysis of oral pathology under varied environmental conditions , W.M. Krogman's (1927) paper on anthropological aspects of human teeth , C. Nelson's (1938) study of the Pecos Pueblo population , and M.S. Goldstein's (1948) work on the teeth of Texas Indian crania. Other key contributions at this time were Percy Butler's (1937, 1939) articles on the field effect in the mammalian dentition one of the most influential papers in the history of dental anthropology, A.A. Dahlberg's (1945). "The changing dentition of man" applied Butler's concept of dental fields to human teeth, forever changing the minor in which anthropologists would analyze metric, morphologic, and numeric variation in the dentition.

P.O. Pederson's (1949), The East Greenland Eskimo Dentition, with its extensive set of observations on Inuit and a bibliography citing articles in a diverse array of languages, ushered in a new age for dental anthropology. At this time, following key theoretical developments that led to the modern evolutionary synthesis, anthropologists started paying more heed to genetics and process, and less to typology and classification. G.W. Lasker's (1950) paper "Genetic analysis of racial traits of the teeth" set the stage for new ways of thinking about the inheritance and utility of dental morphological variation. In the late 1940's, Dahlberg (1951) initiated a major dental casting project among the Pima Indians of Arizona. After modest beginning with plaster casts made

from wax bite impressions, Al and Thelma Dahlberg went on to collect over 8000 Pima Indian casts. From this foundation, Dahlberg was able to build up some of the first characterizations of the extant American Indian dentition.

The 1950's saw a flurry activity in the anthropological uses of the teeth. C.F.A. Moorrees (1957) published 'The Aleut Dentition', which covered all facets of dental anthropology, from size, morphology, and number to pathology and oral tori. T. Murphy (1959a, 1959b) developed new standards for scoring tooth crown wear based on the pattern of dentine exposure, a scheme that provided for more information on wear than the Broca scale of the late 19th century. Lasker (1950) discussed the potential uses of dental morphology in the interpretation of forensic remains, while Bertram Kraus (1951, 1957) conducted pioneering work in dental genetics and odontology. S.M. Garn, along with his colleagues at the Fels Institute, began publishing dozens of articles that focused on dental variation, development, and interactions between variables.

Although the term "dental anthropology "had been used earlier, one of the crystallizing events of the field was the publication of Dental Anthropology, edited by Don R. Brothwell (1963). This work emanated from the Symposia of the Society for the Study of Human Biology. A perusal of the contents is telling. Of 15 contributions, 3 dealt with primate teeth, 1 with fossil hominid teeth, and 11 with recent human populations. That balance approximates the overall focus of dental research during the middle of the 20th century.

Following the publication of dental Anthropology, the field greatly expanded in terms of practitioners and publications. From 1963 to the present, many articles and dissertations have dealt with various aspects of the human dentition. Topical trends include an ever increasing emphasis on methodologically standardized studies of tooth crown and root morphology dimensions, increased interest in oral health concerns, especially the negative impacts of agriculture, and a greatly expanded interest in the study of developmental stresses measured by growth defects, in particular linear enamel hyperplasia. The International Symposium of Dental Morphology, which met in 1965, would meet on regular basis across the next decades, leaving in its wake a number of significant edited volumes that highlighted current research on dental ontogeny, genetics and variation.

Recent development in the fields, since 1991,there has been at least 3 broadly influenced developments in the fields (1) the Dental Anthropology Association founded in 1986, enlarged the size of its small Newsletter, changed name to Dental Anthropology, and adopt at the standards and styles of a professional journal, all carried out under the editorship by Alice M.(Sue) Haeussler, (2) English translations were made for the large and largely unread body of dental anthropology studies written in Russia , and a dental anthropological research programme was initiated in the People's Republic of China, (3) the publication of several books designed to be used as textbooks, as well as scientific references, in dental anthropology. There are, of course, many other advances since 1991, including increased course offerings in dental anthropology in a number of universities and colleges, continued publication of the assembled papers for

the International Dental Morphology meetings, development of new methods, descriptions of new fossil dentitions, and new synthesis on human and non-human dental variation among other subjects.

Dental Eruption

Historically, the term eruption has been used to denote the tooth emerging through the gingiva, but then it became more completely defined to mean continuous tooth movement from the dental bud to occlusal contact. However, not all tables of dental chronologies reflect the latter definition of eruption; the terms eruption and emergence are used here at this time in such a way as to avoid any confusion between historical use of eruption and its more recent expanded meaning.

Emergence of the primary dentition takes place between the sixth and thirtieth months of postnatal life. It takes from 2 to 3 years for the primary dentition to be completed beginning with the initial calcification of the primary central incisor to the completion of the roots of the primary second molar. The emergence of the primary dentition through the alveolar mucous membrane is an important time for the development of oral motor behaviour and the acquisition of masticator skills (Bosma, 1963). At this time of development, the presence of "teething" problems suggests how the primary dentition can affect the development of future neurobehavioral mechanisms, including jaw movements and mastication. Learning of mastication may be highly dependent on the stage and development of the dentition (e.g., type and number of teeth

present and occlusal relations); the maturation of the neuromuscular system, and such factor as diet.

Dental *eruption* is generally defined as the time when any part of the crown has emerged through the gingival surface (Rami Reddy, 1986). The term *emergence* refers to the moment any portion of the crown piers the gingiva. Actual penetration of the gingiva is merely a transitory stage in the total process of tooth eruption. It refers to the movement of a tooth towards its final occlusal position. The process by which the crown of the developing tooth passes through its interrosseous surroundings and is maintained in normal occlusion within the oral cavity is known as tooth eruption. Tooth eruption is generally defined as the time when any part of the crown of the tooth has emerged through the gingival surface. In the words of Rabinow (1973), "... dental maturation is a continuum, comparable to skeletal maturation. One may calculate dental ages through the entire growth period, from foetal life to adolescence, by accessing stages of tooth formation, crown calcification, root development and eruption status from appropriate roentgenograms (oblique jaw views or pantomograms) and comparing the developmental status of each tooth with appropriate norms".

The age and order of eruption of deciduous and permanent teeth show as much marked variation between one individual and the other as among the different racial groups within the same region or outside. As such Hellman (1923), six decades ago, remarked: "The arrival of a comet which makes its appearance once in many years, can be accurately calculated to a small fraction in time, but notwithstanding the inestimably greater frequency with which the event of eruption occurs, the appearance of a tooth

defines accurate forecast", which is perhaps valid even today. Therefore, one can establish a trend or a constant if a larger sample is studied from a racial group.

Unlike in permanent teeth eruption times there is no significant difference in the eruption times of deciduous teeth in children of same physical health in many ethnic groups as well as between males and females, through the role of genetic factors has been shown by twin studies. After the crown and part of the root are formed, the tooth penetrates the mucous membrane and makes its entry into the mouth. Further formation of root is supposed to be an active factor in pushing the crown towards its final position in the mouth. Eruption of the tooth is said to be completed when most of the crown is in evidence and when it has made contact with its antagonists in the opposing jaw. Eruption may and usually does continue after this; i.e. more of the crown may become exposed and the tooth may move further occlusally to accommodate itself to new conditions.

The Primary/Deciduous Dentition

There are totally 20 teeth in children and 32 in adults. The teeth in children are known as deciduous or primary teeth. The teeth in adults are known as permanent teeth. The primary tooth remains intact until a child is about 6 years of age. From 6 years onward permanent teeth start appearing in the mouth replacing the primary teeth, i.e. the permanent teeth occupy the place where the primary teeth were present. When permanent teeth start erupting, the primary or deciduous teeth fall off that is called

shedding. Thus, 20 deciduous teeth are replaced by 32 permanent teeth. The total teeth are collectively called dentition, i.e. deciduous dentition and permanent dentition.

Three different types of teeth are present in the deciduous dentition.

1. Incisors
2. Canines
3. Molars

The number and type of teeth present in the oral cavity in one of the face (either left side or right side) in primary dentition are expressed by the following formula.

$$\frac{2}{2}\,i \;\frac{1}{1}\,c \;\frac{2}{2}\,m = 10$$

In this formula each tooth is represented by its initial letter. 'i' for incisor, 'c' for canine and 'm' for molar. Each letter is followed by a horizontal line and the number of each type of tooth is placed above the line for maxilla (upper jaw) and below the line for the mandible (lower jaw). The formula includes one side only. The above formula should be read thus:

Incisors – two maxillary and two mandibular

Canines – one maxillary and one mandibular

Molars – two maxillary and two mandibular (Kumar, 2007).

The entire deciduous dentition is designated by the notation:

A	B	C	D	E	F	G	H	I	J
T	S	R	Q	P	O	N	M	L	K

The Permanent Dentition

The permanent set of teeth which are 32 in number are larger in size and continue to function throughout the life span of an individual if well care. These teeth start eruption, generally, from the age of 5 1/2 to 6 years and have fully erupted and come into occlusion by the age of 21 years or so. All the deciduous teeth are replaced by the permanent teeth during the age of 6 to 13 years. The care of deciduous teeth is equally important as care of the permanent teeth because they not only function in the early childhood but they also act as guides to permanent (development) successors as well as help in proper development of the jaws. The diseases which affect the deciduous teeth could also be passed on to the permanent teeth.

The transition to the permanent dentition begins with the emergence and eruption of the first permanent molars, shedding of the deciduous incisors, and emergence and eruption of the permanent incisors. After the shedding of the deciduous canines and molars, emergence and eruption of the permanent canines and premolars, and emergence and eruption of the second permanent dentition is completed except for the third molars. The permanent or succedaneous teeth replace the exfoliated deciduous teeth in a sequence of eruption that exhibit great variety. The number of teeth in adults, including third molars when present, is 32.

The permanent dental formula in human is:

$$I\ \frac{2}{2}\ C\ \frac{1}{1}\ P\ \frac{2}{2}\ M\ \frac{3}{3} = 16$$

In a clinical notation system for the permanent dentition, the maxillary teeth are numbered from 1 to 16, beginning with the right third molar. Beginning with the mandibular left third molar, the teeth are number 17 through 32. Thus, the right maxillary first molar is designated as 3, the maxillary left central incisor as 9, and the mandibular right first molar as 30. The entire dentition is designated by the notation:

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
32	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17

The usual order in which the permanent teeth appear is as follows:

1. First Molars
2. Mandibular Central and Lateral Incisors
3. Maxillary Central Incisors
4. Maxillary Lateral Incisors
5. Mandibular Canines
6. First Premolars
7. Second Premolars
8. Maxillary Canines
9. Second Molars
10. Third Molars.

It has been suggested that a certain sequence or eruption of the teeth is considered to be favourable to the development of a normal occlusion.

Major contrasts between primary and permanent teeth

In comparison with their counterparts in the permanent dentition, the primary teeth are smaller in overall size and crown dimensions. They have markedly more prominent cervical ridges, are narrower at their "necks", are lighter in colour, and have roots that are more widely flared; in addition, the buccolingual diameter of primary molar teeth is less than that of permanent teeth (Finn, 1957). More specifically, in comparison with permanent teeth, the following differences are noted:

1. The crowns of primary anterior teeth are wider mesiodistally in comparison with their crown length than are the permanent teeth.
2. The roots of primary anterior teeth are narrower and longer comparatively. Narrow roots with wide crowns present an arrangement at the cervical third of crown and root that differs markedly from the permanent anterior teeth.
3. The roots of the primary molars accordingly are longer and more slender and flare more, extending out beyond projected outlines of the crowns. This flare allows more room between the roots for the development of permanent tooth crowns.
4. The cervical ridges of enamel of the anterior teeth are more prominent. These bulges must be considered seriously when they are involved in any operative procedure.

5. The crowns and roots of primary molars at their cervical portions are more slender mesiodistally.
6. The cervical ridges buccally on the primary molars are much more pronounced, especially on the first molars maxillary and mandibular.
7. The buccal and lingual surfaces of primary molar are flatter above the cervical curvatures than those of permanent molars, thereby narrowing the occlusal surfaces.
8. The primary teeth are usually less pigmented and are whiter in appearance than the permanent teeth.

Dental Caries

Dental caries or tooth decay and pyorrhea or periodontal diseases are the commonest diseases of the mouth. The former being the disease of the tooth proper and the later, that of the supporting structures of the tooth. Both these disease have afflicted not only the human races all over the world since pre-historic times up-to-date but also the non-human primates.

Dental caries is a pathological condition of the teeth resulting in the decalcification of the dentine or enamel and the disintegration of the remaining organic material often leading to the loss of the teeth and occurs in association with other conditions such as periodontal disease, which causes recession of the alveolar bone resulting in loosening of the teeth and their subsequent loss; dental enamel hypoplasia, which is a developmental enamel defect is the deciduous and permanent teeth seen as

transverse lines, pits, and grooves on the enamel surface; ante-mortem or tooth loss; and attrition, which is the gradual wearing away of the hard parts of the teeth.

The FDI (International Dental Federation) Commission on Classification and Statistics for Oral Conditions (COSTOC) in its recommendation to the World Health Organization, on the classification of epidemiologic studies of dental caries and definitions of related terms (1975), defined dental caries "as a localized, pathologic process of bacterial origin, that results in the demineralization of the hard tooth structures and progression to cavitation. Caries, being a disease process, starts with a microscopic cavity. Hence, it is necessary to specify tooth decay as dental caries ...". It is characterized by the molecular decay of bone softening the enamel and dentine in which it becomes thin and dark and usually breaks down with the formation of pus. It is generally held that there are micro-organisms of the type *Lactobacillus acidophilus odontolycticus* in the mouth which are cariogenic in nature and produce acids by acting on food debris lodging around the teeth. These acids largely dissolve the hard tissues of the teeth leading to dental caries. German scientists named Leber and Rottenstein in 1867, and Underwood and Mills in 1881, propounded the Acidogenic theory based on the experiments conducted on animals. Experiments confirmed this facts, because the existence of micro-organisms in man's mouth is necessary to ensure the physiological functions in the body, although it is still unknown which type of micro-organism or virus is responsible for the disease as many kinds of them produce acids under varying circumstances ranging from neglect of oral hygiene to sugar containing food debris.

James (1979) lists a number of contributory factors causing tooth decay which he divides into two broad categories namely- intra-oral and extra-oral causes. Included in the intra-oral causes are the dental plaque consisting of food and bacteria in a creamish film sticking to the teeth; anatomy of the tooth – shaped, form and structure; position of the teeth; dental appliances and restoration; and lack of saliva flow. The extra-oral causes are hereditary; high sugar intake, nutritional deficiency in calcium, phosphorous, fluorides, vitamins A, C and D and proteins, soft foods, and bottle feeding. Laus (1981), however, reduces them only to four to five well known factors which cause dental caries; low fluoride levels in drinking water, food products containing large quantities of sugar, bad childhood health in general, and inadequate quantities of saliva and disturbance of its optimal composition. Hereditary predisposition of dental tissue to caries appears to be another factor. The most important factors that contribute to the disease are consumption of food products with increased quantities of sugar and fluoride-lacking drinking water. When the disease acquires a high degree of severity the affected individual finds it difficult to eat and swallow and at times resulting in speech problems and fever.

First of all, there is a loss of polish and translucency of the tooth surface, i.e. it changes the colour from white to brown or black. The area becomes soft and porous and the food starts getting lodged into it. The person becomes sensitive to cold and hot drinks and sweet and sour things. It gives mild to severe toothache depending upon the nearness and involvement of the pulp. The tooth becomes tender and is not able to chew food with it. In Sushruta Samhita the symptoms are described thus: "The tooth becomes

loose and perforated by black holes accompanied by a copious flow of saliva. The appearance of an extremely diffused smell with a sudden aggression of the accompanying pain without any apparent cause is also one of its specific features". Once the pulp is involved, it becomes a passage for the oral micro-organisms to travel into the bone, smelling appear into that area and other complications of inflammation follow.

Caries of the teeth could be acute or rampant when the susceptibility is very high. Almost all surfaces are affected. Even the very immune areas, viz. the cervical and proximal surfaces of mandibular incisors are involved. The other type is chronic or slow growing. It may involve one tooth or a group of teeth at the same time. There is another type called arrested, where further progress of caries does not take place because the area had become self-clean sample and secondary detain has formed.

It has been labelled as a disease of the Western countries but this is not true. It is very much prevalent in our country. Different surveys conducted in this country reveal that the incidence is on the increase in the developing countries. More and more children are affected by it. It is second important disease next to pyorrhea for loss of teeth in Indians. Shourie (1946) made a comprehensive survey of children from various parts of India. He reported that 44.5% of the children were free from caries which was considered to be much higher than that recorded in children in England and U.S.A. The incidence of caries in deciduous teeth was higher in girls than in boys. Urban children in all age groups showed more caries than the rural children.

Dental and Oral Pathology

Periodontal disease

Periodontal disease is the most common oral health problem of man and also a major problem in modern dental practice. Palaeopathological studies indicate that man has been subject to periodontal disease since prehistoric times, and our earliest historical records reveal an awareness of periodontal disease and need for treating it.

Periodontal disease was the commonest of all disease which there was evidence in the embalmed bodies of the Egyptians of 4000 years ago. Oral hygiene was practiced by the Sumerians of 3000 B.C., and elaborately decorated golden toothpicks found in the excavations at Ur in Mesopotamia suggest an interest in cleanliness of the mouth. In the oldest known Chinese medical work, written about 2500 B.C. by Hwang Fi, oral disease is divided into three types, as follows: 1) FongYa or inflammatory conditions; 2) YaKon or diseases of the soft investing tissues of the teeth; 3) ChongYa or dental caries. Gingival inflammations, periodontal abscesses, and gingival ulcerations are described in accurate detail. One gingival condition is described as follows: "The gingivae are pale or violet red, hard and lumpy, sometimes bleeding; the toothache is continuous". Herbal remedies, "Zn-hine-tong", are mentioned for the treatment for these conditions. The Chinese were among the earliest people to use the "chew stick' as a toothpick and toothbrush to clean to the teeth and massage the gingival tissues.

Among the ancient Greeks, Hippocrates of Cos (460-335 B.C.) was the father of modern medicine, the first to institute a systematic examination of the patients pulse,

temperature, respiration, secretion, sputum and pains. He discussed the function and eruption of the teeth and also the etiology of periodontal disease.

Among the Romans, Aulus Cornelius Celsus (first century A.D.) referred to diseases which affect the soft parts of the mouth and their treatment as follows: "If the gums separate from the teeth, it is beneficial to chew unripe pears and apples and keep their juices in the mouth". He described looseness of the teeth caused by the weakness of their roots or by flaccidity of the gums and noted that in these cases it is necessary to touch the gums lightly with a red hot iron and then smear them with honey. The Romans were very interested in oral hygiene.

Rhazes (850-923), an Arabian of the Middle Ages, recommended opium, oil of roses, and honey in the treatment of periodontal disease. To strengthen loosened teeth he recommended astringent mouth washes and dentifrice powders. He described a procedure of scarification of the gingiva, and strong counterirritants in the treatment of disease of the gums.

In the fifteenth century, Valescus of Montpellier (1382-1417) stated that in order to treat disease of the gums, tartar must be removed little by little either with iron instruments or with dentifrices. In the fourteenth century and fifteenth centuries references is also made to white wine, roasted salt, and aromatic substances as adjuncts in periodontal therapy.

With the beginning of the eighteenth century dentistry developed the early signs of scientific curiosity which were the precursors of present day research disciplines. Pierre Fauchard (1678-1761), the father of modern dentistry, in the first and second

editions of his epochal treatise "Le ChirurgenDentiste" discussed many aspects of the subject of periodontology. He described chronic periodontal disease as a "kind of scurvy" which attacked the gums, the alveoli, and the teeth.

With the beginning of the twentieth century there developed a prolific group of clinicians and scientists throughout the world with a major interest in the periodontal field. The periodontium is the investing and supporting tissues of the tooth, and consists of the periodontal ligament, the gingiva, cementum, and alveolar bone. The cementum is considered a part of the periodontal ligament. The periodontium is subject to morphological functional variations as well as changes with age.

Pyorrhea or periodontal disease unlike dental caries is the disease of the periodontium or the supporting structures of the teeth namely the gum, alveolar bone, periodical membrane and cementum. Inflammation and dystrophy are the two ways by which the disease of the periodontium occurs. Inflammation of the gums or gingiva results in gingivitis manifested as change in colour, enlargement, bleeding, puffiness, friability, ulceration or sloughing. Gingivitis is the first stage of the periodontal disease when the gums are affected. Accumulation of tartar (calculus), the scaly yellowish or brownish hard chalk-like substance that forms at the gums around the teeth, is the most common cause of gingivitis, others being the bacterial infection, acute necrotizing ulcerative gingivitis, mouth-breathing habit, axis and contour of the teeth, faulty dental fillings, presence of food particles between the teeth, abrasions, cuts, fingernail and fishbone injuries, puberty and pregnancy periods, skin disease, syphilis, tuberculosis, leukaemia or blood cancer, vitamin-C deficiency, etc. Periodontal disease or

periodontitis is the extension of gingivitis when inflammatory conditions spread to deeper structures leading to characterized by degenerating factors affect the gums and periodontium resulting in the fall of certain teeth. Thus periodontal disease, which is also widespread a disease as dental caries, leads to tooth loss, bad smell tooth spacing, deterioration in the general bodily health, etc.

The term periodontal disease has received different meanings and is used rather ambiguously. It is used in a general sense to encompass all diseases of the periodontium in much the same way as are terms such as liver disease and kidney disease. It may be considered synonymous with periodontopathia, although this term is not in current use.

Periodontal disease may be of different types. The most common by far is also called periodontal disease; in old text-books and papers it was called pyorrhea, periodontoclasia, periclasia, etc. This disease is initiated by plaque accumulation in the gingivo-dental area and is basically inflammatory in character. Initially it is confirmed to the gingiva and is termed gingival disease, later supporting structures become involved and the disease receives the name of periodontal disease. The term chronic destructive periodontal disease, which very accurately describes the condition, was used.

Periodontal disease (Synonym not currently used: periodontopathia)	Periodontal disease Other disease of the periodontium	Chronic destructive periodontal disease Gingival disease	Periodontitis Trauma from occlusion Periodontal atrophy

The above classification illustrates the different meanings currently assigned to the term periodontal disease.

The terminal effect of periodontal disease observed in adults has their inception earlier in life. Gingival disease in childhood may progress to jeopardize the periodontium of the adult. The increasing awareness of the prevalence of gingival and periodontal disease in children, coupled with the need for more information regarding the early stages of periodontal disease, have focused attention upon the periodontium in childhood.

Gingivitis, inflammation of the gingiva, is the most common form of gingival disease. Inflammation is almost always present in all form of gingival disease because of the bacterial plaque, which cause inflammation and irritational factors that favour its accumulation and are very often present in the gingival environment. The inflammation caused by dental plaque gives rise to associate degenerative, necrotic and proliferation changes in the gingival tissues.

The role of inflammation in individual cases of gingivitis varies as follows:

i). Inflammation may be the primary and only pathologic change. This is by far the most prevalent type of gingival disease.

ii). Inflammation may be a Secondary feature, super-imposed upon systematically caused gingival disease.

iii). Inflammation may be the precipitating factor responsible for clinical changes in patients with systematic conditions that of themselves do not produce clinically detectable gingival disease. Gingivitis in pregnancy is an example.

The most common type of gingival disease is the simple inflammatory involvement caused by bacterial plaque attached to the tooth surface. This type of gingivitis, sometimes called chronic marginal gingivitis or simple gingivitis, may remain stationary for indefinite periods of time or may proceed to destruction of the supporting structures (Periodontitis).

Dental Morphology

Tooth morphology is defined as the subject which deals with the external and internal structure, morphology, function, eruption and shedding of all the teeth in the mouth. The mouth is called as oral cavity in medical term. Human beings have two jaws in which all the teeth are fixed. The jaws are upper jaw and lower jaw. The term maxilla refers to the upper jaw and the term mandible refers to the lower jaw. At birth there are usually no teeth visible in the mouth, but many teeth in various stages of development are found in the jaws (Kumar, 2007).

Supernumerary Teeth

Supernumerary teeth or hyperdontia are extra teeth beyond the normal number unlike hypodontia or decrease in the number of teeth both representing numerical variations in the teeth. Supernumerary teeth of the present study cab be found in any location in the dental arch but are generally observed outside the dental arch. They are known to cause a considerable amount of dental disturbance by interfering with the growth, development, and eruption and arrangement of the normal teeth. There may be certain supernumerary teeth which remain un-erupted and block the eruption of other

teeth, the presence of which can be highlighted only by X-rays without which it becomes highly difficult to decide which teeth are supernumerary and which represent normal dentition.

The supernumerary teeth are either peg-shaped or have a larger crown. They have often been considered as atavistic in nature indicating an ancestral or primitive pattern. They may be present on one side of the mouth and in line with the other teeth. Sometimes, these are hereditary with a higher frequency occurring in the maxilla. Usually, these are found in the premolar and molar regions in the deciduous as well as permanent dentitions. They occur in all human races in varying proportions. They also have been reported in non-human primates such as gorilla (4.4%), chimpanzee (2.9%), orang-utan (6.8%) and gibbon (0.7%) as revealed by Colyer and Sprawson (1944).

Carabelli's Cusp

The cusp of Carabelli's is an accessory cusp that develops as an elevation or tubercle on the lingual surface of the mesiolingual cusp (protocone) or surface of the maxillary molars particularly the first one. The trait was first detected and described by Von Carabelli in 1842 since when it gained much importance as a 'marker' for differentiation between populations of different ethnic origins. Besides, it is also used in the phylogenetic studies. In the opinion of Lasker (1950) the anomaly of Carabelli appears to be an inherent constitutional variable in man and other primates. Its occurrence has been traced back to Palaeolithic man particularly in Europe.

The trait shows considerable variation in its occurrence, size and location as known from a number of published works of different authors. The highest frequency of

this trait occurs in the deciduous second molar followed by the permanent first, second and the third molars. The trait varies in size from a small furrow or groove or line to large cusp with a triangular tip; the intermediate form between these two extremes are a pit, a y-shaped furrow, a slight protuberance, and a small cusp often found with a furrow. The former two structures namely the furrow and pit are called as negative cusp while the latter two, protuberant and cusp formed structures are described as positive cusps. The trait may occur unilaterally and bilaterally. Regarding the location of the trait, it may be stated that the cusps occurs on the mesial half of the lingual surface of the deciduous second molars and permanent first molar whereas on the permanent second molar the structure is more distally located.

Shovel-Shaped Incisors

The term shovelling, first introduced by Muhlreiter in 1870 according to El-Najjar and Mc Williams (1978), is used to described a condition resulting from a combination of a concave lingual surface and elevated mesial and distal marginal ridges enclosing a central fossa in the upper and lower incisor teeth. It also occurs on the monocuspid canines when their mesial and distal lingual marginal ridges produced the shovelled contour. Hrdlicka (1911) who has done pioneering work in the area of dental anthropology reported pronounced shovelling in the incisor teeth of the American Indians. In the years 1920-21, he found the highest incidence of this trait in the incisors of different Mogoloid groups - Chinese, Japanese, Eskimos and American Indians whereas in Negroes the proportion was lower and among the Caucasians the lowest. These findings of Hrdlicka were later confirmed by the works of a number of scholars,

Nelson (1937-1938); Goldstein (1948); Pedersen (1949); Dahlberg (1945 and 1949) showing that the shovel-shaped teeth are characteristics of the Mongoloid stock. The existence of this trait has been found in the Peking man (*Sinanthropus pekinensis*) by Weidenreich (1937) who suggested genetic continuity of the trait from the fossil human ancestors of China to the modern Mongoloid populations. Lasker (1950) found these teeth in 14% of White Americans studied by him. He noticed no difference in the incidence of the trait between central and lateral incisors but in the latter teeth, the character has been observed to be predominantly more pronounced. In the natives of Eastern Islands of New Guinea, Barksdale (1972) noticed the trait in only 6 percent of the samples. Campbell (1925) held that the character was not a frequent one in the Australian aboriginals.

Diastema

Diastema is a space or gap present between the maxillary central incisors or between the maxillary lateral incisors and canines. The former one is called median diastema which is more frequently observed in the maxilla while the second type, the lateral diastema is occasionally combined with lack of or a reduction in the size of the lateral incisors. The lateral diastema is similar to its counterpart found in anthropoid apes and certain fossil men in which the mandibular canine, being large, needs space or diastema between the maxillary lateral incisors and canine. The diastema may be broad or narrow.

Crowding

Crowding is another non-metric trait which is complex in nature. There is unanimity as to whether this trait which is prominent in modern man, as an inherent constitutional variable, Lasker (1950), but the fact is that the crowding of teeth results due to the inheritance of large teeth from one parent and small jaw from the other, which are determined before birth. This is unlike in the case of spacing which occurs between teeth when the jaw is large and teeth are small. Thus, the existence of crowding as also spacing indicates that the tooth size need not be in complete accord with the jaw size. According to Cadien (1972) "extreme crowding of teeth probably is not an advantageous condition, so selection may be operating to reduce it". Therefore, crowding, one of the many causes for malocclusion, may be considerably influenced by genetic as well as environmental factors.

The dental anomaly which is known for its significance in understanding human evolution is most neglected in population studies in India or outside. The only study known to the writer is that of Boyd (1972) among the natives of Eastern Highlands of New Guinea who have shown crowding to the extent of 34.4% cases in mandible and 26.1% cases in maxilla in sample of 218 dental casts of natives. There were only nine cases with marked crowding in which the arch length was found to be greater than 5 mm. Mandibular crowding has been found to be significantly greater in these natives. Boyd in an attempt to relate crowding to tooth size computed the mean mesiodistal tooth measure from second molar to second molar in each arch for the natives and found a progressive increase in tooth size as crowding becomes more severe. On the whole, the

absolute tooth size was found to be greater in subjects with crowding than in those with spacing.

Cingulum or Lingual Cusp

El-Najjar and McWilliams (1978) following Black and Wheeler, define cingulum as "the lingual cusp known of an anterior tooth. A self or swelling which is found on the tooth just above the cervical line is the site of the development of many supernumerary cusps". According to Segal (1963), "the ridge found on the lingual lobes of the incisors and the canine is termed the 'cervical ridge', or the 'cingulum'. It is more specifically in the cervical portion of the lingual surface. It may be present as a prominence in the cervical one-third of the deeply concave, lingual surface of the upper and lower, central and lateral incisors of the permanent as well as deciduous dentition. In shape, it may be just the highest area at the junction of marginal elevation or it may extend tongue-like into the concavity of the lingual surface. It may be simple or divided by the furrows into two or more smaller cusplets (Sicher, 1965).

This dental tubercle is separate from the Shovel-shaped form of the incisors but the detection of this character becomes difficult when the marginal ridges come in contact with each other. The only work available in the literature is that of Pedersen (1949) among the East Greenland Eskimos for whom no percentage of the incidence of the cusp is given. Later Barksdale (1972) reported the occurrence of lateral incisors with lingual cusps or cingulum in 18% of the casts of the Eastern Highland natives of New Guinea studied. No data are available on pedigree studies at all.

Occlusion

Dental occlusion is the relationship between the masticatory surface of the maxillary and mandibular teeth, when the mouth is closed. Individuals with correct or normal occlusion have their teeth of either jaw arranged in well-formed arches, elliptic maxilla and parabolic mandible, presence of contact between individual teeth and between each tooth of one jaw with two teeth of opposing jaw barring the mandibular central incisors and maxillary wisdom teeth, all forwardly placed mandibular teeth but central incisors, smaller arch than the upper one to facilitate the occlusion of the former inside the latter showing the upper incisors covering the lower incisors and the coincidence between the two jaws in the midline.

The normal or excellent occlusion of the natural dentition described above is not a fixed or static condition due to the changing cultural environment of man in space and time and any deviation or failure from the norms, or when the biting surfaces do not meet correctly, it makes the occlusion defective which is termed as malocclusion to differentiate it from the normal occlusion. The term malocclusion is ill-defined and biased, Corruccini and Whitley (1981) since it does not necessarily cause a functional problem, Moorrees *et al.*, (1971). Therefore, majority of the people prefer to speak of "occlusal variation" rather than using the word malocclusion.

The irregular occlusal variation or the so-called malocclusion is caused by hereditary or environmental factors. Those scientist or orthodontists who emphasize the role of genetics in the causation of malocclusion have not totally ignored the environmental causes. They, however, emphasize such factors as finger or thumb-

sucking, mouth breathing, abnormal muscle patterns, inadequate masticatory function, abnormal swallowing patterns, and premature loss and over retention of milk teeth apart from a number of hereditary factors such as large teeth and small jaws, abnormal skull growth, cleft palate, ill-developed soft tissues like short upper lip and abnormally large tongue, deviation in the eruption times and the pattern of teeth etc. and certain diseases like rheumatoid arthritis and rheumatic fever of childhood affecting jaw growth in the areas of condyles forming part of temporo-mandibular joints; decrease or increase in the number of teeth; diseases and injuries; endocrine dysfunction, forceps delivery and so on.

Chapter II

REVIEW OF LITERATURE

DENTAL ERUPTION

Dental age, like skeletal age and secondary sex character age, is useful for the assessment of biological age, the significance of which has been greatly recognized in the diagnosis and treatment of children with growth disturbances (Tanner, 1962). It can be estimated from data on tooth eruption in such situation where it is highly difficult to estimate chronological age on the basis of historical events (Rami Reddy, 1986). A proper estimation of the dental age can be accomplished only by reference to standards established on the population of which the subject is a member living in the same environmental conditions. If a large sample is studied, possibly from a racial group, one can establish either a trend, a constant, or a distribution within that sample of sufficient reliability to justify its application to that group as a whole so that it could be distinguished from other populations (Rami Reddy, 1986).

Though teeth eruption has been the subject of interest since centuries to scholars from various disciplines, it was not until recently that systematic and extensive studies have been made on it by several workers providing as much dependable results as possible.

Jelliffe and Jelliffe (1973), presented cross-sectional, longitudinal and hospital data on different ethnic groups from different part of the world aimed at evaluating the feasibility of age grouping by dental assessment, and association between nutritional

status and timing of deciduous dental eruption and suggested that severe PCM (Protein Calorie Malnutrition), may lead to delay in teeth eruption.

Data pertaining to tooth eruption in population of India is scanty. The pioneer work in this regard was carried out by Powell (1902) in Bombay. This study was an attempt to define the range of variation rather than to estimate the mean age of eruption of teeth.

Rami Reddy *et al.,* (1985), studied the eruption of deciduous dentition among the Velama of South-eastern Andhra Pradesh and found that the onset of tooth eruption occurred at the same age in both sexes, their completion was found to occur earlier in males than the females, and also found that children belonging to upper and middle income groups were found to have full complement of teeth at the lower ages compared to the lower income group. Singh and Singh (1995) explored the patterns and ages of primary dental eruption of Khatri children of Punjab. They observed that the Khatri boys and girls follow a pattern of eruption which is of universal in character. Their study further shows that the teeth in the upper and lower jaws do not differ in respect of the ages of eruption. The eruption of mandibular incisors is earlier in girls than in boys.

Saran (1985), reported that the first molars erupted in the age group of 4 to 5 years and the time of eruption of the third molar teeth is uncertain among the Christian Oraons of Ranchi district, Bihar. Chhabra *et al.*, (1993), examined the sequence and eruption time of permanent teeth among the Punjabi boys and girls in a comparative perspective. The sequence of eruption is M1, I1, I2, P1, C, P2 and M2 in upper jaw and in lower jaw C (canine) erupted earlier than P1.

Jaswal (1983) carried a study on the age and sequence of permanent tooth emergence among the Khasi children of Shillong, Meghalaya. She observed that, tooth emergence in females was markedly earlier than in males. Limbu (1996) reported a similar trend among the Gallong children of Arunachal Pradesh as reported among the Khasi children by Jaswal.

DENTAL AND ORAL PATHOLOGY

A. Dental Caries: The FDI (International Dental Federation) Commission on Classification and Statistics for Oral Conditions (COSTOC) in its recommendation of the World Health Organization, on the classification of epidemiologic studies of dental caries and definitions of related terms (1975), defined dental caries "as a localized, pathologic process of bacterial origin, that results in the demineralization of the hard tooth structures and progression to cavitations".

Though there is variation in the prevalence patterns of dental caries from time to time, from country to country and from region to region within a country, the fact is that the disease has afflicted all the nations of the world.

Barmes (1981) on the basis of epidemiological studies distinguishes five levels of dental caries prevalence: very low, when the decayed or missing teeth are a few, low, moderate, high; and very high, when the number of carious or missing teeth is quite high. He reports from a recent study made on children age 13-14 years that the levels of dental caries ranges from moderate to very high in a number of developed countries. In certain

highly industrialized countries like Japan, prevalence of dental caries has shown an increasing trend whereas; in the developing countries it is very low level.

In 1932, Goldstein reported presence of very low proportion of caries among the Eskimos. The same author in1948 reported a fairly higher incidence of caries among the Texas Indians. Godivari *et al.,* (1960) studied the incidence of dental caries among school children in Bang Chan, Thailand and observed that the low incidence. One of the reasons for this low incidence of caries was low intake of sugar. Kalvani *et al.,* (1960) studied a group of provincial Thai children and they found that the prevalence of dental caries was less in the rural areas where less refined carbohydrates and more fruits and vegetables and glutinous rice were eaten.

Alvarez *et al.,* (1988) carried out a cross-sectional study on evaluation of dental caries in primary teeth and nutritional status of Peruvian children from low socio-economic conditions and found 49% were found to be chronically malnourished, and nutritional deficits that lead to not only tooth exfoliation but also susceptible to caries attack later in life.

The prevalence of this disease was studied by few people in India. Shourie (1946) has shown a marked rise among the Punjabis of Lahore. Pal (1983) examined the incidence of dental diseases like caries, tooth loss, alveolar abscess, etc. among the Negritos of the Andaman Islands and found that extremely low rate of dental abscess reflects that the Negritos were devoid of any form of periodontal diseases. Very low incidence of caries suggests that the traditional diet of the people was mostly free from

carbohydrate items. Complete absence of the exposure of pulp cavity through dental attrition points towards a softer food habit.

Rami Reddy *et al.,* (1985) studied the prevalence of dental caries among the Balijas of Tirupati town of Andhra Pradesh, aged between 20-40 years and found that 44% of the individuals were found with caries, females (49%) were found to be more prone to this than males (38.5%). Basha *et al* ., (1998) study dental caries and fluorosis among Muslims of low, middle and upper income groups of Kurnool district, Andhra Pradesh. The study reports prevalence of caries is about 38.6% of the overall sample with considerable variation between age, sex, income and habit. The study further reports how caries correlates with fluorosis in rural and urban situation.

Venugopal *et al.,* (1998) examined prevalence of caries among the children of Mumbai between age group 1year and 14 years and found 35.6% had dental caries. Parental income was not to have any bearing on caries prevalence, but parental literacy, particularly maternal literacy was shown to influence caries prevalence in children. The study also shows that prevalence was low in well-nourished and in those taking vegetarian type of diet.

Ghoshmaulik and Devi (1999) studied the relations between dental caries and a few genetic markers and salivary factors, among the Oriya speaking Hindu population living in Bhubaneswar. The study reports nearly 43% of the sibs were affected with caries and concluded that dental caries seem to have biological predisposition. Chronic illness of digestive tract, parasitic infection of intestine, persistent throat infection etc. are likely to produce acidic oral fluid, which may be accentuated by antigenic affinity present in the

saliva. Cultural habits like chewing betel nut or unhygienic method of tooth care; sweet and tobacco consumption etc. are added factors.

Saravanan *et al.,* (2005) conducted studied on children of 5 years of both sexes of school children of Pondicherry urban area randomly selected and found prevalence was 44.4% among the population, being higher in boys and also found higher prevalence of caries in maxillary anterior teeth and mandibular posterior teeth.

B. Periodontal Diseases: Studies on periodontal diseases have conducted in a fair number of populations outside India. King (1940), studied children of Isle of Lewis, age group between 6 and 15 years and observed that 90% of them were affected by periodontal diseases. Greene (1960) found 92% of the school boys in low socio-economic area in Atlanta, Georgia are suffering from periodontal disease. Zimmerman and Baker (1960) studied the prevalence of periodontal disease among the White children from Maryland, Negro children from Texas and White children from Texas and found 35%, 67% and 79% respectively.

Among Indian populations few studies on periodontal diseases have been reported in literature. Marshal-Day (1944), studied among the low economic class boys of the Kangra district in India and observed that the prevalence of periodontal diseases in 81%. Dutta (1965) reported that the prevalence of periodontal diseases among the school going children of Calcutta are found to be 89.80%. Varidana and Reddy, (2007) carried a study on Denagere district of Karnataka and found that gingivitis and periodontal disease are more common in females than in males and as the age advanced gingivitis reduces,

periodontal disease increases steadily and periodontal disease is high in subjects with poor oral hygiene.

Limbu (1990), observed the incidence of periodontal disease among the Gallong of Arunachal Pradesh to be 73.98%.

DENTAL MORPHOLOGY

The dental traits purely based on phenotypic morphologenic classification consist of supernumerary teeth or hyperdontia and hypodontia, carabelli's anomaly, shovel-shaped incisors, diastema, crowding, cingulum and occlusion.

The study of the distribution and inheritance of the morphological characteristics of the teeth and jaws in the living as well as extinct man and non-human primates renders it possible to delineate the nature and extent of interrelationship between them, their origin and evolutionary part from variation. Some of the pioneering studies on these traits particularly among the Mongoloid populations have been made by Hrdlicka (1911), Dahlberg (1963), Pederson (1949), Hellman (1943), Moorrees (1957) and others.

A. Supernumerary teeth or Hyperdontia and Hypodontia: Supernumerary or Hyperdontia are extra teeth beyond the normal number unlike hypodontia or decrease in number of teeth both representing numerical variations in teeth. Published literature shows a very few works on the numerical variations of most of which are limited to tribal population alone. One of the earliest studies made by Campbell (1925) among the Australian Aboriginals and on the skull shows 1.8% of supernumerary teeth. Sinclair *et al.*, (1947) examined the dental conditions among the Papuans of New Guinea and found

2% of them were with supernumerary teeth. Pederson (1949) reported slightly less than 2% of supernumerary teeth in the East Greenland Eskimos, while Pederson (1949) found 2.7% of the South African Bantus possessing these teeth.

In India too studies have been conducted on this anomaly but a few populations only such as on the crania from East India by Pal (1964); among the Vaisyas of Southern Andhra Pradesh by Rami Reddy and Vijay Kumar (1978) and among Muslims of the same region by Rami Reddy *et al.,* (1982b) in whom the proportions of supernumerary teeth noticed are 2%, 0.25% and 2.35% respectively. The work done in India in respect of this trait is limited.

B. Carabelli's Trait: Carabelli's trait gained much importance as a 'marker' for differentiation between populations of different ethnic origins. Several studies conducted on this dental polymorphism in a number of populations outside India revealed that it occurs in a much higher incidence in the Caucasians, Dietz (1944) and Negroes than in Mongoloid and related groups. The highest frequency of the trait ranging from 51% to 90% has been reported in European populations, slightly lower percentage in African populations and in American Indians, and the lowest among the Arctic population (Alvesalo *et al.,* 1975). The different populations of the Mongoloid stock studied are Pecos Indians by Nelson (1983); East Greenland Eskimos by Pederson (1949); Northwest and Labrador Eskimos and Pima and Blackfoot Indians by Dahlberg (1949). In Australian aboriginals Campbell (1925) found 33% of the molar teeth with carabelli's cusp. Pederson (1949) reported 29% of this trait in East Greenland Eskimos of White

admixture, while in isolated areas where the admixture has been the least, the trait was nearly absent.

In India, this trait has been studied by Joshi *et al.*, (1972) among the Hindus of Gujarat (64.6%), by Pal (1978) on the human crania from East India (26.4%), Bhasin *et al.*, (1979) among the Jats of Haryana (61.2%) and by Rami Reddy *et al.*, (1982a and 1982b) among the Pattusalis (26%) and Muslims (15%) of South-eastern Andhra Pradesh.

C. Shovel-shaped Incisors: Hrdlicka (1911) who has done pioneering work in the area of dental anthropology reported pronounced shovelling in the incisor teeth of the American Indians. In the years 1920-21, he found the highest incidence of this trait in the different Mongoloid groups – Chinese, Japanese, Eskimo and American Indians where as in Negroes the proportion was lower and among Caucasians the lowest. These findings of Hrdlicka were later confirmed by the works of a number of scholars, Nelson (1938); Goldstein (1948); Pederson (1949); Dahlberg (1945, 1949) showing that the shovel-shaped teeth are characteristics of the Mongoloid stock. Lasker (1950) found shovel-shaped teeth in 14% among the White Americans. He pointed out that there is no difference in the incidence of the trait between central and lateral incisors but in the latter teeth, the character has been observed to be predominantly more pronounced.

In India, the only studies on this dental trait are those of Ganguly (1960) among the Nicobar Islanders, whose frequency with shovel-shaped incisors comes very close to the proportions found in the people of Indonesia, Micronesia and Polynesia. Pal (1964) studied on the crania from Eastern India and found 48% of this dental trait, Bhasin *et al.*,

(1979) studied among the Jats of Haryana and found 72.2% and Rami Reddy *et al.,* (1982a & 1982b) among the Pattusalis (50%) and Muslims (5.74%) of Southern Andhra Pradesh. Rami Reddy (1985) found shovel-shaped incisors slightly over 30% of males and 25% of females among the people of Gulbarga, Karnataka.

D. Diastema: The diastema though a questionable character; is of intrinsic value in the study of human phylogeny. Boyd (1972) reports the trait of diastema in 62 cases (28.4%) in a sample of dental casts of 218 natives of Eastern Highlands of New Guinea from which he concluded that the absolute tooth size in cases with spacing is relatively smaller than for those individuals with crowding, although their general body size and arch size were also smaller.

In India, Rami Reddy *et al.,* ((1982a & 1982b) carried out a study on the prevalence of diastema among the Pattusalis and Muslims of South-eastern Andhra Pradesh and found out 3.25% and 5% of this dental trait respectively. The results of this study further shows that in both the populations the incidence of the trait is slightly higher in males than in females.

E. Crowding: Crowding is another non-metric trait which is complex in nature. According to Lasker (1950), the crowding of teeth results due to the inheritance of large teeth from one parent and small jaw from the other, which are determined before birth. According to Cadien (1972), extreme crowding of teeth probably is not an advantageous condition, so selection may be operating to reduce it. Therefore, crowding one of the

many causes for it malocclusion may be considerably influenced by genetic as well as environmental factors.

This dental anomaly which is known for its significance in understanding human evolution is most neglected in population studies in India or outside. The study is that of Boyd (1972) among the natives of Eastern Highlands of New Guinea who have shown crowding to the extent of 34.4% cases in mandible and 26.1% cases in maxilla in a sample of 218 dental casts of natives. There were only nine cases with mark crowding in which the arch length was found to be greater than 5cm. Mandibular crowding has been found to be significantly greater in these natives. Boyd in an attempt to relate crowding to tooth size computed the mesio-distal tooth measure from second molar to second molar in each arch for the natives and found a progressive increase in tooth size as crowding becomes more severe.

F. Cingulum: According to Segal (1963) the ridge found on the lingual lobes of the incisor and the canine teeth is termed the 'cervical ridge' or the 'cingulum'. This is a primitive characteristic which helps in highlighting the racial difference between populations of different biological origins.

The only work available in literature is that of Pederson (1949) among the East Greenland Eskimos for whom no percentage of the incidence of the cusp is given. Barksdale (1972) reported the occurrence of lateral incisors with lingual cusps or cingulum in 18% of the casts of the Eastern Highland natives of New Guinea.

In India, the only study conducted in this trait is that of Rami Reddy *et al.*, (1982a & 1982b) among the Pattusalis and Muslims of South-eastern Andhra Pradesh in whom the proportion of the trait has been found to be around 4%, and more frequent in maxillary incisors than the mandibular ones and central than lateral incisors.

G. Occlusion: Dental occlusion is the relationship between the masticatory surface of the maxillary and mandibular teeth, when the mouth is closed. The irregular occlusal variation or the so called malocclusion is caused by hereditary or environmental factors. Persons living in rural areas of developed countries, the prevalence rate of malocclusion have been found to be much lower than that in those in urban areas as revealed by the studies of Goose *et al.*, (1957) in the West Midland country Youths; Lavelle (1973) among Youths and their parents in Central England; Barnard (1956) in the country dweller of Australia; and of Corruccini and Whitley (1981) in the rural Kentucky American community. Corruccini and Whitley (1981) on the basis of a number of works stated that "an important consideration in understanding occlusion variation is the tendency among non-technologic human societies for virtually all individuals to show nearly ideal occlusion. Malocclusion is malady of civilized man". From this statement it is clear that malocclusion results due to one of chewing stress on the modern process foods and the lacks of direction provided to the growing jaws and erupting teeth. A number of studies made on tribal populations have shown a high proportion of normal occlusion than in a situation when these communities came in contact with industrial societies with a high rate of malocclusion. The examples given in this respect are the Australian Aborigines studied by Barrett (1969), C.H.M. Williams (1943) etc.

In India very less studies have been conducted on occlusal variation. Sidhu *et al.*, (1970) based on the cephalometry, experimented on the school going Parsi children and Maharastrians of Bombay and concluded that the different eating habits were the cause of malocclusion. The works on dental occlusion contributed by some physical anthropologist are by Rami Reddy and Vijay Kumar (1978) among the Vaisayas of South Eastern Andhra Pradesh and by Rami Reddy (1985) among the people of Gulbarga, Karnataka. These studies have revealed a very low proportion of malocclusion cases as a result exposure to processed foodstuffs in spite of the existence of contact with the urban and rural areas.

The other studies carried out by Corruccini *et al.*, (1982) was among the 265 Jat youths of Chandigarh (Punjab), both sexes (Males 145, Females 120) aged 12 – 16 years from seven schools representing the high, middle and lower socio-economic groups. It is revealed that the children of the lower socio-economic group mainly rural in origin showed significantly better dental occlusion with broader maxillary arches as their counterparts in developed countries and suggested a number of environmental factors as responsible for malocclusion such as deciduous tooth loss, nutritional heterosis and masticatory function. Sengupta and Das (2002) carried out a study on the tooth occlusion pattern among the Sonowal Kacharis of Dibrugarh district, Assam and found the frequency of overbite highest in males. The Sonowal female characteristically show a prevalence of edge to edge bite.

Though a number of studies have been conducted on many populations outside India, a survey of literature reveals that only a few of these are on Indian population.

Practically no serious attempt has been made so far to study on dentition in the populations of Northeast India. Keeping this in view that people belonging to Mizo of Aizawl town, Mizoram have been chosen for the present study due to the following reasons : 1. The fluorine content is only traced i.e., inadequate in the drinking water of Aizawl Town (PHE Aizawl, 2006), 2. The National Family Health Survey (1998-1999) report shows that among the Mizo, 59.4% males and 22.1% females has the habit of smoking; 60% of males and 60.7% of females are reported to be chewing tobacco and 3. They are also regular chewer of *kuhva* (areca nut and betel leaf with lime).

Therefore, we have undertaken a study on dental anthropology among the Mizo of Aizawl town, Mizoram with the following objectives:

OBJECTIVES OF THE STUDY

1. To assess the eruption pattern of different types of teeth, both deciduous and permanent, their eruption age and order, in both boys and girls.
2. To record the various morphological patterns of teeth.
3. To assess the prevalence of dental pathology and impact of food habits, including chewing of betel nut, tobacco and smoking on dental health.
4. To find out the relationships of eruption pattern, dental pathology and frequency occurrence of various morphological traits with certain demographic and socio-economic variables such as age, sex, income and education.

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 populations 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

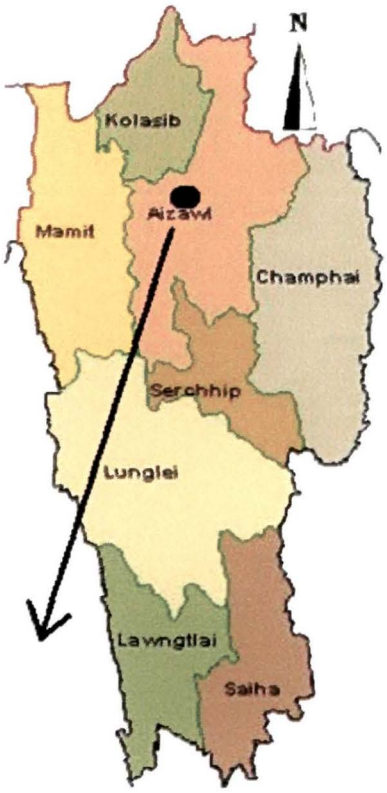
change has taken place; they are now largely dependent on modern medicines. Drinking water is not easily available to the Mizo. They depend on natural resources like rivers, springs, rainwater (Sengupta, 1995).

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 between10°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, observation were made on both the sexes of age group between 3 1/2 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 un-affected 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)

Score	Criteria and Scoring for Field Studies
0	*Negative:* There is neither over inflammation in the investing tissue nor loss of function due to destruction of supporting tissues.
1	*Mild Gingivitis:* There is an overt area of inflammation in the free gingiva but this area does not circumscribe the tooth.
2	*Gingivitis:* Inflammation completely circumscribes the tooth, but there is no apparent break in the epithelial attachment.
6	*Gingivitis with pocket formation:* 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.
8	*Advanced destruction with loss of masticatory function:* The tooth may be loose; may have drifted; may sound dull on percussion with a metallic, instrument; may be depressible in its socket.

$$\text{Periodontal index score per person} = \frac{\text{Sum of individual scores}}{\text{Number of teeth present}}$$

Clinical Condition	Group P1 Scores*	Stage of Disease
Clinically normal supportive tissues	0 to 0.2	Reversible
Simple gingivitis	0.3 to 0.9	
Beginning destructive periodontal disease	0.7 to 1.9	
Established destructive periodontal disease	1.6 to 5.0	Irreversible
Terminal disease	3.8 to 8.0	

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-

Good	0.0 to 1.2
Fair	1.3 to 3.0
Poor	3.1 to 6.0

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-Sis 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^{th} percentile (below Rs. 7500) = Low income group

50^{th} to 75^{th} percentile (Rs. 7500-13300) = Middle income group

Above 75^{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.

Chapter IV

DENTAL ERUPTION

Table 1. Age group-wise distribution of the sample

Age Group (in years)	Age Group (Dec. age)	Male	Female	Total
Below 6 months	Below 0.500	1-40=40	1-42=42	82
1	0.500-1.499	41-98=58	42-110=69	127
2	1.500-2.499	99-160=62	111-173=63	125
3	2.500-3.499	161-214=54	174-232=59	113
4	3.500-4.499	215-278=64	233-289=57	121
5	4.500-5.499	279-324=46	290-328=39	85
6	5.500-6.499	325-361=37	329-353=25	62
7	6.500-7.499	362-400=39	354-400=47	86
8	7.500-8.499	401-454=54	401-440=40	94
9	8.500-9.499	455-497=43	441-485=45	87
10	9.500-10.499	498-530=33	486-521=36	69
11	10.500-11.499	531-579=49	522-566=45	94
12	11.500-12.499	580-621=42	567-617=51	93
13	12.500-13.499	622-656=35	618-656=39	74
14	13.500-14.499	657-701=45	657-709=53	98
15	14.500-15.499	702-745=44	710-747=38	82
16	15.500-16.499	746-804=59	748-814=67	126
17	16.500-17.499	805-851=47	815-870=56	103
18	17.500-18.499	852-908=57	871-937=67	124
19	18.500-19.499	909-974=66	938-992=55	121
20	19.500-20.499	975-1043=69	993-1057=65	134
21	20.500-21.499	1044-1105=62	1058-1131=74	136
22	21.500-22.499	1106-1147=42	1132-1206=75	117
23	22.500-23.499	1148-1210=63	1207-1275=69	132
24	23.500-24.499	1211-1255=45	1276-1343=68	113
25	24.500-25.499	1256-1300=45	1344-1413=70	115
26-30	25.500-30.499	1301-1517=217	1414-1694=281	498
31-35	30.500-35.499	1518-1714=197	1695-1899=205	402
36-40	35.500-40.499	1715-1856=142	1900-2078=179	321
41-45	40.500-45.499	1857-1973=117	2079-2234=156	273
46-50	45.500-50.499	1974-2090=117	2235-2368=134	251
51-55	50.500-55.499	2091-2169=79	2369-2480=112	191
56-60	55.500-60.499	2170-2267=98	2481-2572=92	190
61-65	60.500-65.499	2268-2318=51	2573-2640=68	119
66-70	65.500-70.499	2319-2348=30	2641-2672=32	62
70+	70.500+	2349-2409=61	2673-2741=69	130
Total		2409	2742	5151

Table 1 shows age group-wise distribution of the sample. The total sample is comprised of 2409 males and 2742 females belong to the Mizo tribe, and the entire sample has been divided into 36 age groups.

Table 2. Age-group wise distribution of the sample (for deciduous teeth)

Age Group (in months)	Age Group (Decimal age)	Male	Female	Total
Below 6 months	Below 0.500	1-40=40	1-42=42	82
7-12	0.500-0.999	41-70=30	43-77=35	65
13-18	1.000-1.499	71-98=28	78-111=34	62
19-24	1.500-1.999	99-133=35	112-144=33	68
25-30	2.000-2.499	134-160=27	145-174=30	57
31-36	2.500-2.999	161-194=34	175-201=27	61
37-42	3.000-3.499	195-214=20	176-207=32	52
Total		214	233	447

Table 2 shows the age group-wise distribution of the sample (for deciduous teeth eruption). In this table, those who belong to below 3 years and 6 months are sub-divided into smaller age groups i.e. six months age groups. The total sample comprises of 214 boys and 233 girls, and has been divided into 7 age groups.

Table 3. Number and percentage of erupted deciduous teeth among the Mizo boys (left mandible)

Age Group (in months)	i_1	i_2	c_0	m_1	m_2
Below 6	5 (12.50)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)
7 – 12	17 (56.67)	3 (10.00)	0 (0.00)	0 (0.00)	0 (0.00)
13 – 18	28 (100.00)	21 (75.00)	12 (42.86)	16 (57.14)	0 (0.00)
19 – 24	35 (100.00)	35 (100.00)	29 (82.86)	35 (100.00)	12 (34.29)
25 – 30	27 (100.00)	27 (100.00)	27 (100.00)	27 (100.00)	24 (88.89)
31 – 36	34 (100.00)	34 (100.00)	34 (100.00)	34 (100.00)	31 (91.18)
37 – 42	20 (100.00)	20 (100.00)	20 (100.00)	20 (100.00)	20 (100.00)

Figures in parentheses represent percentage

The number and percentage of deciduous teeth in the left mandible of the Mizo boys of Aizawl town is shown in Table 3. In the age group below 6 months only 5(12.50%) central incisors have erupted. At 7-12 months age, 17(56.67%) and 3(10.00%) central incisors and lateral incisors have erupted respectively. By the age 13 - 18 months 28(100.00%) central incisors have completed their eruption and all the remaining teeth excepting the second molars were also found erupted. The lateral incisor and first molar have completed erupting between 19 months and 24 months. All the teeth, except the second molar 24(88.89%) have completed erupting by 25- 30 months. By 37 - 42 months of age, all the teeth have completed eruption in the lower jaw.

Table 4. Number and percentage of erupted deciduous teeth among the Mizo boys (right mandible)

Age Group (in months)	i_1	i_2	c_0	m_1	m_2
Below 6	3 (7.50)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)
7 – 12	18 (60.00)	3 (10.00)	0 (0.00)	0 (0.00)	0 (0.00)
13 – 18	28 (100.00)	21 (75.00)	12 (42.86)	16 (57.14)	0 (0.00)
19 – 24	35 (100.00)	35 (100.00)	29 (82.86)	35 (100.00)	12 (34.29)
25 – 30	27 (100.00)	27 (100.00)	27 (100.00)	27 (100.00)	24 (88.89)
31 – 36	34 (100.00)	34 (100.00)	34 (100.00)	34 (100.00)	31 (91.18)
37 – 42	20 (100.00)	20 (100.00)	20 (100.00)	20 (100.00)	20 (100.00)

Figures in parentheses represent percentage

Table 4 shows the number and percentage of deciduous teeth among the Mizo boys. There are only 3(7.50%) central incisor found to have erupted before 6 months of age. By 13- 18 months of age, all the teeth except the second molar have completed their eruption. At the age group of 25- 30 months all the deciduous teeth excepting the second molar 24(88.89%) were found erupted. Finally, at 37- 42 months age, all the deciduous teeth have completed their eruption in the right lower jaw.

Table 5. Number and percentage of erupted deciduous teeth among the Mizo boys (left maxilla)

Age Group (in months)	i^1	i^2	c^0	m^1	m^2
Below 6	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)
7 – 12	11 (36.67)	5 (16.67)	0 (0.00)	0 (0.00)	0 (0.00)
13 – 18	26 (92.86)	23 (82.14)	12 (42.86)	14 (50.00)	0 (0.00)
19 – 24	35 (100.00)	35 (100.00)	24 (68.57)	35 (100.00)	10 (28.57)
25 – 30	27 (100.00)	27 (100.00)	27 (100.00)	27 (100.00)	24 (88.89)
31 – 36	34 (100.00)	34 (100.00)	34 (100.00)	34 (100.00)	31 (91.18)
37 – 42	20 (100.00)	20 (100.00)	20 (100.00)	20 (100.00)	20 (100.00)

Figures in parentheses represent percentage

The numbers and percentage of deciduous teeth among the Mizo boys (left maxilla) is shown in Table 5. Below 6 months of age, not a single tooth was found erupted. By 7-12 months there found, 11(36.67%) and 5(16.67%) central incisors and lateral incisors respectively. By 13-18 months, the central incisors have almost completed eruption (92.86%) and all the teeth except second molar are erupted. At 19-24 months, the central incisor, lateral incisor and first molar have completed erupting while there are 24(68.57%) canines and 10(28.57%) second molars were also seen. Finally, by 37-42 months, all the deciduous teeth in the left maxilla of the boys have completed eruption.

Table 6. Number and percentage of erupted deciduous teeth among the Mizo boys (right maxilla)

Age Group (in months)	i^1	i^2	c^0	m^1	m^2
Below 6	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)
7 – 12	11 (36.67)	5 (16.67)	0 (0.00)	0 (0.00)	0 (0.00)
13 – 18	26 (92.86)	23 (82.14)	12 (42.86)	15 (53.57)	0 (0.00)
19 – 24	35 (100.00)	35 (100.00)	24 (68.57)	35 (100.00)	10 (28.57)
25 – 30	27 (100.00)	27 (100.00)	27 (100.00)	27 (100.00)	24 (88.89)
31 – 36	34 (100.00)	34 (100.00)	34 (100.00)	34 (100.00)	31 (91.18)
37 – 42	20 (100.00)	20 (100.00)	20 (100.00)	20 (100.00)	20 (100.00)

Figures in parentheses represent percentage

Table 6 shows that not a single tooth in the right maxilla of the Mizo boys are erupted before 6 months of age. At 7-12 months age, only 11(36.67%) central incisors and 5(16.67%) lateral incisor are observed in the right maxilla. By 19-24 months, all the teeth except the canines (68.57%) and second molars (28.57%) have completed their eruption. However, by 37-42 months of age, all the deciduous teeth in the right maxilla of the Mizo boys complete their eruption.

Table 7. Number and percentage of erupted deciduous teeth among the Mizo boys - sides pooled (mandibular)

Age Group (in months)	i_1	i_2	c_0	m_1	m_2
Below 6	8 (10.00)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)
7 – 12	35 (58.33)	6 (10.00)	0 (0.00)	0 (0.00)	0 (0.00)
13 – 18	56 (100.00)	42 (75.00)	24 (42.86)	32 (57.14)	0 (0.00)
19 – 24	70 (100.00)	70 (100.00)	58 (82.86)	70 (100.00)	24 (34.29)
25 – 30	54 (100.00)	54 (100.00)	54 (100.00)	54 (100.00)	48 (88.89)
31 – 36	68 (100.00)	68 (100.00)	68 (100.00)	68 (100.00)	62 (91.18)
37 – 42	40 (100.00)	40 (100.00)	40 (100.00)	40 (100.00)	40 (100.00)

Figures in parentheses represent percentage

Table 7 presents the number and percentage of deciduous teeth in the mandible of the Mizo boys. Up to 7-12 months of age except the medial incisor, no other teeth are found erupted. In the age group, 13-18 months, medial incisors have completed eruption, while the remaining deciduous teeth were found emerging. By 19-24 months, most of the teeth completed erupting except the canine (82.86%) and the second molar (34.29%).At 31-36 months age, all the teeth complete emerging except the second molar (91.18%) and finally, by 37-42 months, all the teeth complete their emergence.

Table 8. Number and percentage of erupted deciduous teeth among the Mizo boys – sides-pooled (maxillary)

Age Group (in months)	i^1	i^2	c^0	m^1	m^2
Below 6	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)
7 – 12	22 (36.67)	10 (16.67)	0 (0.00)	0 (0.00)	0 (0.00)
13 – 18	52 (92.86)	46 (82.14)	24 (42.86)	29 (51.79)	0 (0.00)
19 – 24	70 (100.00)	70 (100.00)	48 (68.57)	70 (100.00)	20 (28.57)
25 – 30	54 (100.00)	54 (100.00)	54 (100.00)	54 (100.00)	48 (88.89)
31 – 36	68 (100.00)	68 (100.00)	68 (100.00)	68 (100.00)	62 (91.18)
37 – 42	40 (100.00)	40 (100.00)	40 (100.00)	40 (100.00)	40 (100.00)

Figures in parentheses represent percentage

Table 8 shows the number and percentage of deciduous teeth in the maxilla of the Mizo boys, where no eruption of tooth have taken place before 6 months age. The age 7-12 months shows, 22(36.67%) central incisors and 10(16.67%) lateral incisors. At 13-18 months of age, all the teeth except the first molar are erupted. By 19-24 months of age, central incisor, lateral incisor, and first molar have completed eruption, while, 48(68.57%) canines and 20(28.57%) second molars have also appeared. Canines have completed eruption at 25-30 months and by 37-42 months of age all the maxillary teeth among the Mizo boys have completed eruption.

Table 9. Number and percentage of erupted deciduous teeth among the Mizo boys – all teeth combined (mandibular)

Age Group (in months)	Number of teeth	Percentage
Below 6	8	2.00
7 – 12	41	13.67
13 – 18	154	55.00
19 – 24	292	83.43
25 – 30	264	97.78
31 – 36	334	98.24
37 – 42	200	100.00

Table 9 shows the number and percentage of deciduous teeth among the Mizo boys of Aizawl town, when all the mandibular deciduous teeth are combined. It is observed that at the age below 6 months, only 8(2.00%) teeth found erupted. As the age group increases, the numbers and percentage of erupted teeth are also increases. By the age of 37-42 months all the teeth have completed their eruption

Table 10. Number and percentage of erupted deciduous teeth among the Mizo boys – all teeth combined (maxillary)

Age Group (in months)	Number of teeth	Percentage
Below 6	0	0.00
7 – 12	32	10.67
13 – 18	151	53.93
19 – 24	278	79.43
25 – 30	264	97.78
31 – 36	334	98.24
37 – 42	200	100.00

Eruption of all maxillary teeth combined among the Mizo boys are shown in Table10. Below 6 months of age not a single tooth is found erupted in the maxilla. By the age of 13-18 months, more than 50% of teeth have erupted. As the age increases, the number and percentage of erupted teeth are also found increased. By 37-42 months, all the maxillary deciduous teeth have completed their eruption.

Table 11. Number and percentage of erupted deciduous teeth among the Mizo boys (Quadrant-wise)

Age Group (in months)	Left mandible		Right mandible		Left maxilla		Right maxilla	
	No.of teeth	%	No.of teeth	%	No.of teeth	%	No.of teeth	%
Below 6	5	2.50	3	1.50	0	0.00	0	0.00
7 – 12	20	13.33	21	14.00	16	10.67	16	10.67
13 – 18	77	55.00	77	55.00	75	53.37	76	54.29
19 – 24	146	83.43	146	83.43	139	79.43	139	79.43
25 – 30	132	97.78	132	97.78	132	97.78	132	97.78
31 – 36	167	98.24	167	98.24	167	98.24	167	98.24
37 – 42	100	100.00	100	100.00	100	100.00	100	100.00

Table11 shows the number and percentage of quadrant-wise erupted deciduous teeth among the Mizo boys. Below 6 months of age, there are 5(2.50%) and 3(1.50%) teeth found erupted in the left and right lower jaws respectively, whereas not a single tooth found erupted in the upper jaw. The above table further shows that till the age of 24 months, the number and percentage of erupted deciduous teeth are more in the mandible than in the maxilla. At the age group of 25-30 months and 31-36 months, the number and percentage of erupted teeth in both the upper and lower jaws are same. By 37-42 months age, all the teeth in both the jaws have completed their eruption among the Mizo boys.

Table 12. Number and percentage of erupted deciduous teeth, all teeth combined among the Mizo boys (both mandible and maxilla combined)

Age group(in months)	No. of teeth	Percentage
Below 6	8	1.00
7 – 12	73	12.17
13 – 18	305	54.46
19 – 24	570	81.43
25 – 30	528	97.78
31 – 36	668	98.24
37 – 42	400	100.00

Table 12 shows that the number and percentage of deciduous teeth, when all the teeth of both the jaws are combined. Below 6 months, only 8(1%) of teeth are found erupted. As the age increases the number and percentage of erupted teeth also increases. By the age group of 13-18 months, 305(54.46%) of teeth were erupted. The above table shows that eruption of all the deciduous teeth completed by 37-42 months age group among the Mizo boys of Aizawl town.

Table 13. Number and percentage of erupted deciduous teeth among the Mizo girls (left mandible)

Age Group (in months)	i_1	i_2	c_0	m_1	m_2
Below 6	2 (15.38)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)
7 – 12	18 (51.43)	5 (14.29)	0 (0.00)	0 (0.00)	0 (0.00)
13 – 18	32 (94.12)	16 (47.06)	2 (5.88)	9 (26.47)	0 (0.00)
19 – 24	33 (100.00)	31 (93.93)	18 (54.55)	28 (84.85)	3 (9.09)
25 – 30	30 (100.00)	30 (100.00)	23 (76.67)	28 (93.33)	7 (23.33)
31 – 36	27 (100.00)	27 (100.00)	27 (100.00)	27 (100.00)	18 (66.67)
37 – 42	32 (100.00)	32 (100.00)	32 (100.00)	32 (100.00)	32 (100.00)

Figures in parentheses represent percentage

The number and percentage of deciduous teeth (left mandible) among the Mizo girls is shown in Table13. Below 6 months of age, only 2(15.38%) central incisors are found erupted. 5(14.29%) lateral incisors were recorded at the age group of 7-12 months. By 19-24 months, the central incisor completed their eruption and at the same age group all the other teeth are also found erupted. The lateral incisor has completed eruption at the age of 25-30 months, and the canine and first molar by the age of 31-36 months. The above table shows that all the teeth have completed their eruption by the age of 37-42 months.

Table 14. Number and percentage of erupted deciduous teeth among the Mizo girls (right mandible)

Age Group (in months)	i_1	i_2	c_0	m_1	m_2
Below 6	2 (15.38)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)
7 – 12	18 (51.43)	8 (22.86)	0 (0.00)	0 (0.00)	0 (0.00)
13 – 18	32 (94.12)	16 (47.06)	2 (5.88)	9 (26.47)	0 (0.00)
19 – 24	33 (100.00)	31 (93.93)	19 (57.58)	28 (84.85)	4 (12.12)
25 – 30	30 (100.00)	30 (100.00)	24 (80.00)	28 (93.33)	7 (23.33)
31 – 36	27 (100.00)	27 (100.00)	27 (100.00)	27 (100.00)	18 (66.67)
37 – 42	32 (100.00)	32 (100.00)	32 (100.00)	32 (100.00)	32 (100.00)

Figures in parentheses represent percentage

It is revealed from Table 14 that before 6 months of age, no other teeth than the medial deciduous incisor (15.38%) are emerged in the right mandible among the Mizo girls of Aizawl town. At 7-12 months age, both the medial (51.43%) and lateral deciduous incisors (22.86%) are found erupted. By 13-18 months, all the teeth except the second molars have emerged. The above table shows that by 19-24 months age, the medial incisor completes erupting and all other teeth are still emerging. Both the incisors complete erupting by 25-30 months. At the age of 31-36 months, except the second molar (66.67%), all other teeth complete erupting. Finally, by 37-42 months of age, like other quadrants, in the right mandible also all the teeth completes eruption.

Table 15. Number and percentage of erupted deciduous teeth among the Mizo girls (left maxilla)

Age Group (in months)	i^1	i^2	c^0	m^1	m^2
Below 6	2 (15.38)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)
7 – 12	11 (31.43)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)
13 – 18	30 (88.24)	25 (73.53)	4 (11.76)	11 (32.35)	0 (0.00)
19 – 24	33 (100.00)	30 (90.90)	19 (57.58)	28 (84.85)	3 (9.09)
25 – 30	30 (100.00)	30 (100.00)	23 (76.67)	28 (93.33)	7 (23.33)
31 – 36	27 (100.00)	27 (100.00)	27 (100.00)	27 (100.00)	15 (55.56)
37 – 42	32 (100.00)	32 (100.00)	32 (100.00)	32 (100.00)	32 (100.00)

Figures in parentheses represent percentage

Table 15 shows that till the age of 12 months, only the central incisor seen erupting in the left maxilla. At the age of 13-18 months, 30(88.24%) central incisors, 25(73.53%) lateral incisors, 4(11.76%) canines and 11(32.35%) first molars have erupted. The central incisors have completed their eruption at 19-24 months of age, where, only 3(9.09%) second molars were seen in the dental arcade. The number and percentage of erupted teeth increase as the age groups increase. It is observed that the eruption of all the deciduous teeth completes their eruption by 37-42 months of age.

Table 16. Number and percentage of erupted deciduous teeth among the Mizo girls (right maxilla)

Age Group (in months)	i^1	i^2	c^0	m^1	m^2
Below 6	2 (15.38)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)
7 – 12	11 (31.43)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)
13 – 18	31 (91.18)	24 (70.59)	6 (17.65)	11 (32.35)	0 (0.00)
19 – 24	33 (100.00)	30 (90.90)	19 (54.55)	28 (84.85)	3 (9.09)
25 – 30	30 (100.00)	30 (100.00)	23 (76.67)	28 (93.33)	7 (23.33)
31 – 36	27 (100.00)	27 (100.00)	27 (100.00)	27 (100.00)	15 (55.56)
37 – 42	32 (100.00)	32 (100.00)	32 (100.00)	32 (100.00)	32 (100.00)

Figures in parentheses represent percentage

Table 16 shows the number and percentage of deciduous teeth (right maxilla) among the Mizo girls of Aizawl town. It shows that the first tooth to erupt is the medial incisor (15.38%) in both the age groups i.e. below 6 months and 7-12 months. In the next higher age group i.e. 13-18 months all the teeth have started emerging except the second molar. In the age group 19-24 months, the medial incisor completes erupting. In the next higher age group i.e. 25-30 months, both the incisors complete their eruption. In the age group 31-36 months, almost all the deciduous teeth complete eruption except the second molar and by 37-42 months all the deciduous teeth complete their emergence.

Table 17. Number and percentage of erupted deciduous teeth among the Mizo girls – sides-pooled (mandible)

Age Group (in months)	i_1	i_2	c_0	m_1	m_2
Below 6	4 (4.76)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)
7 – 12	36 (51.43)	13 (18.57)	0 (0.00)	0 (0.00)	0 (0.00)
13 – 18	64 (94.12)	32 (47.06)	4 (5.88)	18 (26.47)	0 (0.00)
19 – 24	66 (100.00)	62 (93.94)	37 (56.06)	56 (84.85)	7 (10.61)
25 – 30	60 (100.00)	60 (100.00)	47 (78.33)	56 (93.33)	14 (23.33)
31 – 36	54 (100.00)	54 (100.00)	54 (100.00)	54 (100.00)	36 (66.67)
37 – 42	64 (100.00)	64 (100.00)	64 (100.00)	64 (100.00)	64 (100.00)

Figures in parentheses represent percentage

The number and percentage of deciduous teeth, sides-pooled (mandible) among the Mizo girls is shown in Table 17. Below 6 months of age, only 4(4.76%) central incisors are present in the mandible. 13(18.57%) lateral incisors are erupted at the age of 7-12 months. By 19-24 months age, the central incisors have completed their eruption and all the other teeth have started erupting. The above table also shows that the lateral incisors have completed erupting by 25-30 months of age, whereas the canine and first molar at 31-36 months. By 37-42 months of age all the deciduous teeth have completed erupting.

Table 18. Number and percentage of erupted deciduous teeth among the Mizo girls – sides-pooled (maxillary)

Age Group (in months)	i^1	i^2	c^0	m^1	m^2
Below 6	4 (4.76)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)
7 – 12	22 (31.43)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)
13 – 18	61 (89.71)	49 (70.06)	10 (14.71)	22 (32.35)	0 (0.00)
19 – 24	66 (100.00)	60 (90.91)	37 (56.06)	56 (84.85)	6 (9.09)
25 – 30	60 (100.00)	60 (100.00)	46 (76.67)	56 (93.33)	14 (23.33)
31 – 36	54 (100.00)	54 (100.00)	54 (100.00)	54 (100.00)	30 (55.56)
37 – 42	64 (100.00)	64 (100.00)	64 (100.00)	64 (100.00)	64 (100.00)

Figures in parentheses represent percentage

Table 18 shows the number and percentage of maxillary deciduous teeth among the Mizo girls when both the sides are pooled together. Only 4(4.79%) central incisors were found erupted at the age of below 6 months. There are 61(89.71%) central incisors, 49(70.06%) lateral incisors, 10(14.71%) canines and 22(32.35%) first molars found erupted at 13-18 months age group. By 19-24 months, the central incisor completes eruption and 6(9.09%) second molars are also seen. The lateral incisor has also completed erupting at 25-30 months age. By 31-36 months, canine and first molar have completed eruption. Eruption of all the teeth is completed by 37-42 months age.

Table 19. Number and percentage of erupted deciduous teeth among the Mizo girls – all teeth combined (mandibular)

Age Group (in months)	Number of teeth	Percentage
Below 6	0	0.00
7 – 12	32	10.67
13 – 18	151	53.93
19 – 24	278	79.43
25 – 30	264	97.78
31 – 36	334	98.24
37 – 42	320	100.00

Table 19 shows the number and percentage of deciduous teeth among the Mizo girls when all mandibular teeth are combined. Below 6 months of age, only 4(0.95%) teeth are observed in the lower jaw. The number and percentage of teeth increase as the age- group increases. By 37-42 months, all the mandibular teeth have completed eruption.

Table 20. Number and percentage of erupted deciduous teeth among the Mizo girls – all teeth combined (maxilla)

Age Group (in months)	Number of teeth	Percentage
Below 6	4	0.95
7 – 12	22	6.29
13 – 18	142	41.76
19 – 24	233	70.61
25 – 30	236	78.67
31 – 36	246	91.11
37 – 42	320	100.00

Table 20 presents the number and percentage of maxillary deciduous teeth among the Mizo girls when all teeth are combined. Below 6 months of age, only 4(0.95%) teeth were erupted in the maxilla. At 31-36 months age, more than 90% of teeth are erupted, and by 37-42 months all the maxillary deciduous teeth have completed eruption in the girls.

Table 21. Number and percentage of erupted deciduous teeth among the Mizo girls (Quadrant-wise)

Age Group (in months)	Left mandible		Right mandible		Left maxilla		Right maxilla	
	No.of teeth	%	No.of teeth	%	No.of teeth	%	No.of teeth	%
Below 6	2	0.95	2	0.95	2	0.95	2	0.95
7 – 12	23	13.14	26	14.86	11	6.29	11	6.29
13 – 18	59	34.71	59	34.71	70	41.18	72	42.35
19 – 24	113	68.48	115	69.70	113	68.48	112	67.88
25 – 30	118	78.67	119	79.33	118	78.67	118	78.67
31 – 36	126	93.33	126	93.33	123	91.11	123	91.11
37 – 42	160	100.00	160	100.00	160	100.00	160	100.00

Quadrant-wise, the number and percentage of erupted deciduous teeth among the Mizo girls is shown in Table 21. There are 2(0.95%) teeth each in all the quadrants below 6 months of age. The number and percentage of erupted teeth are more in the lower jaw than in the upper jaw excepting the 13-18 months age group. By 37-42 months, eruption is completed for the entire quadrants.

Table 22. Number and percentage of erupted deciduous teeth, all teeth combined among the Mizo girls (both mandible and maxilla)

Age group(in months)	No. of teeth	Percentage
Below 6	8	0.95
7 – 12	71	10.14
13 – 18	260	38.24
19 – 24	453	68.84
25 – 30	473	78.83
31 – 36	498	92.22
37 – 42	640	100.00

Table 22 shows the number and percentage of deciduous teeth when all teeth are combined in both the mandible and maxilla among the Mizo girls. Below 6 months of age, only 8(0.95%) teeth are found erupted in both the jaws. Eruption of all the deciduous teeth is completed by 37-42 months age among the girl subjects of the present population.

Table 23. Number and percentage of erupted deciduous teeth among the Mizo boys and girls (both maxillary and mandibular)

Age (in months)	Maxillary				Mandibular			
	Boys		Girls		Boys		Girls	
	No. of teeth	%	No. of teeth	%	No. of teeth	%	No. of teeth	%
Below 6	0	0.00	4	0.95	8	2.00	4	0.95
7 – 12	32	10.67	22	6.29	41	13.67	49	14.00
13 – 18	151	53.93	142	41.76	154	55.00	118	34.71
19 – 24	278	79.43	233	70.61	292	83.43	234	70.91
25 – 30	264	97.78	236	78.67	264	97.78	237	79.00
31 – 36	334	98.24	246	91.11	334	98.24	252	93.33
37 – 42	200	100.00	320	100.00	200	100.00	320	100.00

Table 23 shows the number and percentage of deciduous teeth in both the jaws and sex among the study population. The above table reveals that in general, the deciduous teeth erupt earlier among the boys than that of the girls. The percentages of erupted teeth increase as the age group increases. By 37-42 months, all the deciduous teeth have completed eruption in the present population.

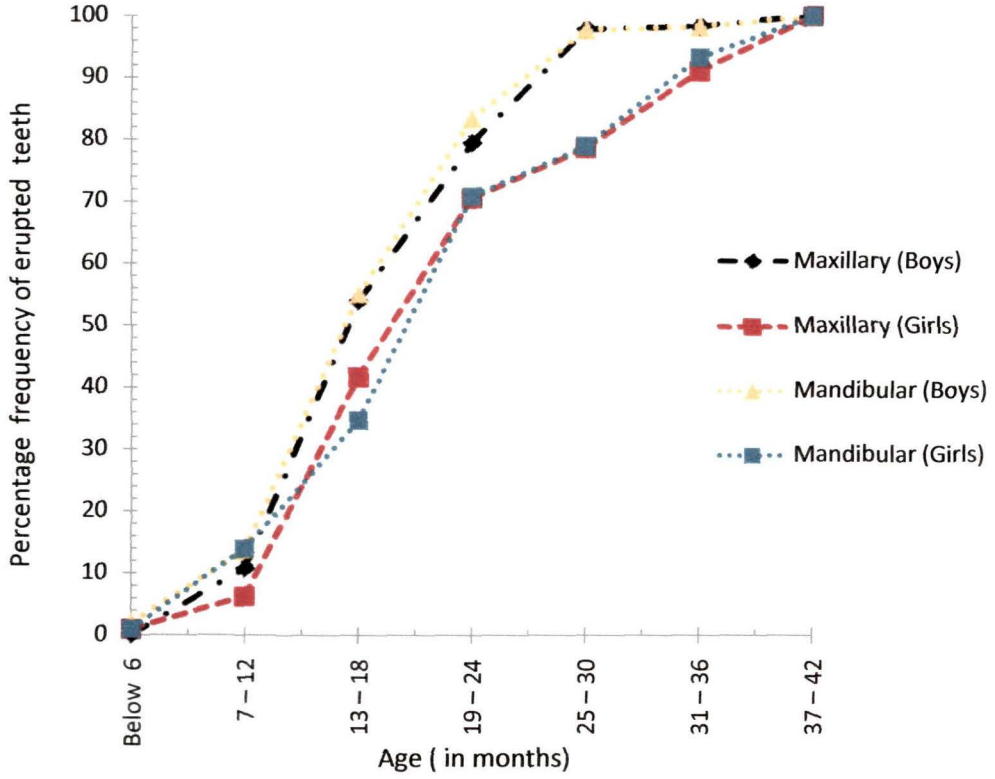


Figure 1.Percentage frequency of erupted deciduous teeth among the Mizo boys and girls.

Table 24. Number and percentage of erupted permanent teeth among the Mizo females (left mandible)

Age group (in years)	I_1	I_2	C_0	P_1	P_2	M_1	M_2	M_3
5	2(4.88)	1(2.44)	0(0.00)	0(0.00)	0(0.00)	3(7.32)	0(0.00)	0(0.00)
6	9(36.00)	2(8.00)	0(0.00)	0(0.00)	0(0.00)	12(48.00)	0(0.00)	0(0.00)
7	40(81.63)	21(42.86)	0(0.00)	0(0.00)	0(0.00)	38(77.55)	0(0.00)	0(0.00)
8	37(94.87)	29(74.36)	0(0.00)	2(5.13)	0(0.00)	40(100.00)	0(0.00)	0(0.00)
9	45(100.00)	41(91.11)	2(4.44)	9(20.00)	0(0.00)	45(100.00)	0(0.00)	0(0.00)
10	36(100.00)	36(100.00)	7(19.44)	11(30.56)	2(5.56)	36(100.00)	0(0.00)	0(0.00)
11	45(100.00)	45(100.00)	26(57.78)	30(66.67)	21(46.67)	45(100.00)	9(20.00)	0(0.00)
12	51(100.00)	51(100.00)	43(84.31)	48(94.12)	41(80.39)	51(100.00)	26(50.98)	0(0.00)
13	39(100.00)	39(100.00)	37(94.87)	39(100.00)	32(82.05)	39(100.00)	33(84.62)	0(0.00)
14	53(100.00)	53(100.00)	53(100.00)	53(100.00)	53(100.00)	53(100.00)	51(96.22)	2(3.77)
15	38(100.00)	38(100.00)	38(100.00)	38(100.00)	38(100.00)	38(100.00)	38(100.00)	2(5.26)
16	67(100.00)	67(100.00)	67(100.00)	67(100.00)	67(100.00)	67(100.00)	67(100.00)	5(7.46)
17	56(100.00)	56(100.00)	56(100.00)	56(100.00)	56(100.00)	56(100.00)	56(100.00)	5(8.93)
18	67(100.00)	67(100.00)	67(100.00)	67(100.00)	67(100.00)	67(100.00)	67(100.00)	12(17.91)
19	55(100.00)	55(100.00)	55(100.00)	55(100.00)	55(100.00)	55(100.00)	55(100.00)	11(20.00)
20	65(100.00)	65(100.00)	65(100.00)	65(100.00)	65(100.00)	65(100.00)	65(100.00)	19(29.23)
21	74(100.00)	74(100.00)	74(100.00)	74(100.00)	74(100.00)	74(100.00)	74(100.00)	26(35.13)
22	75(100.00)	75(100.00)	75(100.00)	75(100.00)	75(100.00)	75(100.00)	75(100.00)	34(45.33)
23	69(100.00)	69(100.00)	69(100.00)	69(100.00)	69(100.00)	69(100.00)	69(100.00)	33(47.83)
24	68(100.00)	68(100.00)	68(100.00)	68(100.00)	68(100.00)	68(100.00)	68(100.00)	47(69.11)
25	70(100.00)	70(100.00)	70(100.00)	70(100.00)	70(100.00)	70(100.00)	70(100.00)	50(71.43)

Figures in parentheses represent percentage

Table 24 presents the number and percentage of permanent teeth among in the left mandible of the Mizo females. At 5 years of age, 2(4.88%) central incisors, 1(2.44%) lateral incisor and 3(7.32%) first molars are observed. At the age of 8 years, the first molar has completed eruption and 2(5.13%) first premolars are also found erupted at this age. At 9 years, the central incisor completes eruption. By 10 years, the lateral incisor also completes eruption and all the teeth, except the third molars are present in the dental arcade. The first premolar has completed eruption at 13 years of age. Canine and second premolar has also completed eruption at 14 years. By 15 years of age, all the teeth excepting the third molar have completed their eruption. At 25 years of age, 71.43% of the third molars are found erupted.

Table 25. Number and percentage of erupted permanent teeth among the Mizo females (right mandible)

Age group (in years)	I_1	I_2	C_0	P_1	P_2	M_1	M_2	M_3
5	2(4.88)	1(2.44)	0(0.00)	0(0.00)	0(0.00)	3(7.32)	0(0.00)	0(0.00)
6	7(28.00)	2(8.00)	0(0.00)	0(0.00)	0(0.00)	10(40.00)	0(0.00)	0(0.00)
7	38(77.55)	26(53.06)	0(0.00)	0(0.00)	0(0.00)	40(81.63)	0(0.00)	0(0.00)
8	37(94.87)	27(69.23)	0(0.00)	2(5.13)	0(0.00)	40(100.00)	0(0.00)	0(0.00)
9	45(100.00)	41(91.11)	0(0.00)	4(8.89)	2(4.44)	45(100.00)	0(0.00)	0(0.00)
10	36(100.00)	36(100.00)	2(5.56)	7(19.44)	4(11.11)	36(100.00)	0(0.00)	0(0.00)
11	45(100.00)	45(100.00)	28(62.22)	32(71.11)	22(48.89)	45(100.00)	17(37.78)	0(0.00)
12	51(100.00)	51(100.00)	43(84.31)	48(94.12)	39(76.47)	51(100.00)	26(50.98)	0(0.00)
13	39(100.00)	39(100.00)	38(97.44)	39(100.00)	37(94.87)	39(100.00)	33(84.62)	0(0.00)
14	53(100.00)	53(100.00)	53(100.00)	53(100.00)	53(100.00)	53(100.00)	50(94.34)	2(3.77)
15	38(100.00)	38(100.00)	38(100.00)	38(100.00)	38(100.00)	38(100.00)	38(100.00)	4(10.52)
16	67(100.00)	67(100.00)	67(100.00)	67(100.00)	67(100.00)	67(100.00)	67(100.00)	5(7.46)
17	56(100.00)	56(100.00)	56(100.00)	56(100.00)	56(100.00)	56(100.00)	56(100.00)	5(8.93)
18	67(100.00)	67(100.00)	67(100.00)	67(100.00)	67(100.00)	67(100.00)	67(100.00)	10(14.93)
19	55(100.00)	55(100.00)	55(100.00)	55(100.00)	55(100.00)	55(100.00)	55(100.00)	11(20.00)
20	65(100.00)	65(100.00)	65(100.00)	65(100.00)	65(100.00)	65(100.00)	65(100.00)	17(26.15)
21	74(100.00)	74(100.00)	74(100.00)	74(100.00)	74(100.00)	74(100.00)	74(100.00)	29(39.19)
22	75(100.00)	75(100.00)	75(100.00)	75(100.00)	75(100.00)	75(100.00)	75(100.00)	34(45.33)
23	69(100.00)	69(100.00)	69(100.00)	69(100.00)	69(100.00)	69(100.00)	69(100.00)	36(52.17)
24	68(100.00)	68(100.00)	68(100.00)	68(100.00)	68(100.00)	68(100.00)	68(100.00)	41(60.29)
25	70(100.00)	70(100.00)	70(100.00)	70(100.00)	70(100.00)	70(100.00)	70(100.00)	48(68.57)

Figures in parentheses represent percentage

Table 25 shows the number and percentage of permanent teeth in the right mandible of the Mizo females. At 5 years age, 2(4.88%) central incisors, 1(2.44%) lateral incisor and 3(7.32%) first molars are seen in the right mandible. At 8 years, first molar completes eruption and 2(5.13%) first premolars present. 2(4.44%) second premolars are present at 9 years of age. By 9 years, central incisor completes eruption. The lateral incisor also completes eruption at 10 years of age. The first premolar completes eruption by13 year's age. At 14 years, canine and second premolar also completes eruption and 2(3.77%) third molars are also9 present. By 15 years, all the teeth excepting the third molars complete. At 23 years of age, more than 50% of the third molars are present in the right quadrant of the lower jaw.

Table 26. Number and percentage of erupted permanent teeth among the Mizo females (left maxilla)

Age group (in years)	I^1	I^2	C^0	P^1	P^2	M^1	M^2	M^3
5	2(4.88)	1(2.44)	0(0.00)	0(0.00)	0(0.00)	3(7.32)	0(0.00)	0(0.00)
6	2(8.00)	2(8.00)	0(0.00)	0(0.00)	0(0.00)	11(44.00)	0(0.00)	0(0.00)
7	32(65.31)	7(14.29)	0(0.00)	0(0.00)	0(0.00)	38(77.55)	0(0.00)	0(0.00)
8	31(79.49)	23(58.97)	0(0.00)	0(0.00)	0(0.00)	37(94.87)	0(0.00)	0(0.00)
9	45(100.00)	41(91.11)	2(4.44)	0(0.00)	0(0.00)	45(100.00)	0(0.00)	0(0.00)
10	36(100.00)	36(100.00)	0(0.00)	2(5.56)	0(0.00)	36(100.00)	0(0.00)	0(0.00)
11	45(100.00)	45(100.00)	24(53.33)	30(66.67)	15(33.33)	45(100.00)	4(8.89)	0(0.00)
12	51(100.00)	51(100.00)	37(72.55)	45(88.23)	34(66.67)	51(100.00)	20(39.22)	0(0.00)
13	39(100.00)	39(100.00)	36(92.31)	39(100.00)	35(89.74)	39(100.00)	22(56.41)	0(0.00)
14	53(100.00)	53(100.00)	53(100.00)	53(100.00)	53(100.00)	53(100.00)	48(90.57)	2(3.77)
15	38(100.00)	38(100.00)	38(100.00)	38(100.00)	38(100.00)	38(100.00)	38(100.00)	2(5.26)
16	67(100.00)	67(100.00)	67(100.00)	67(100.00)	67(100.00)	67(100.00)	67(100.00)	5(7.46)
17	56(100.00)	56(100.00)	56(100.00)	56(100.00)	56(100.00)	56(100.00)	56(100.00)	5(8.93)
18	67(100.00)	67(100.00)	67(100.00)	67(100.00)	67(100.00)	67(100.00)	67(100.00)	10(14.93)
19	55(100.00)	55(100.00)	55(100.00)	55(100.00)	55(100.00)	55(100.00)	55(100.00)	13(23.64)
20	65(100.00)	65(100.00)	65(100.00)	65(100.00)	65(100.00)	65(100.00)	65(100.00)	17(26.15)
21	74(100.00)	74(100.00)	74(100.00)	74(100.00)	74(100.00)	74(100.00)	74(100.00)	19(25.68)
22	75(100.00)	75(100.00)	75(100.00)	75(100.00)	75(100.00)	75(100.00)	75(100.00)	27(36.00)
23	69(100.00)	69(100.00)	69(100.00)	69(100.00)	69(100.00)	69(100.00)	69(100.00)	29(42.03)
24	68(100.00)	68(100.00)	68(100.00)	68(100.00)	68(100.00)	68(100.00)	68(100.00)	35(51.47)
25	70(100.00)	70(100.00)	70(100.00)	70(100.00)	70(100.00)	70(100.00)	70(100.00)	42(60.00)

Figures in parentheses represent percentage

Table 26 shows the number and percentage of permanent teeth in the left maxilla of the Mizo females. At 5 years, 2(4.88%) central incisors, 1(2.44%) lateral incisor and 3(7.32%) first molars are present in the right mandible. By 9 years, central incisor and first molar have completed eruption and only 2(4.44%) canines are present. At 10 years, lateral incisor has completed eruption and 2(5.56%) first premolars are also appeared. By 11 years of age, 4(8.89%) second molars are found erupted. At 13 years of age the first premolar has completed eruption. Canine and second premolar have completed eruption at 14 years of age and by 15 years of age, all the permanent left maxillary teeth complete eruption . 2(5.26%) third molars erupt at 15years age. By 24 years, more than 50% of the third molars are present in the left maxilla.

Table 27. Number and percentage of erupted permanent teeth among the Mizo females (right maxilla)

Age group (in years)	I^1	I^2	C^0	P^1	P^2	M^1	M^2	M^3
5	2(4.88)	1(2.44)	0(0.00)	0(0.00)	0(0.00)	3(7.32)	0(0.00)	0(0.00)
6	2(8.00)	2(8.00)	0(0.00)	0(0.00)	0(0.00)	10(40.00)	0(0.00)	0(0.00)
7	26(53.06)	14(28.57)	0(0.00)	0(0.00)	0(0.00)	40(81.63)	0(0.00)	0(0.00)
8	31(79.49)	23(58.97)	2(5.13)	0(0.00)	0(0.00)	37(94.87)	0(0.00)	0(0.00)
9	45(100.00)	41(91.11)	0(0.00)	2(4.44)	0(0.00)	45(100.00)	0(0.00)	0(0.00)
10	36(100.00)	36(100.00)	0(0.00)	2(5.56)	0(0.00)	36(100.00)	0(0.00)	0(0.00)
11	45(100.00)	45(100.00)	24(53.33)	30(66.67)	15(33.33)	45(100.00)	4(8.89)	0(0.00)
12	51(100.00)	51(100.00)	39(76.47)	45(88.24)	36(70.59)	51(100.00)	20(39.22)	0(0.00)
13	39(100.00)	39(100.00)	37(94.87)	39(100.00)	36(92.31)	39(100.00)	22(56.41)	0(0.00)
14	53(100.00)	53(100.00)	53(100.00)	53(100.00)	53(100.00)	53(100.00)	48(90.57)	2(3.77)
15	38(100.00)	38(100.00)	38(100.00)	38(100.00)	38(100.00)	38(100.00)	38(100.00)	2(5.26)
16	67(100.00)	67(100.00)	67(100.00)	67(100.00)	67(100.00)	67(100.00)	67(100.00)	6(8.96)
17	56(100.00)	56(100.00)	56(100.00)	56(100.00)	56(100.00)	56(100.00)	56(100.00)	6(10.71)
18	67(100.00)	67(100.00)	67(100.00)	67(100.00)	67(100.00)	67(100.00)	67(100.00)	10(14.93)
19	55(100.00)	55(100.00)	55(100.00)	55(100.00)	55(100.00)	55(100.00)	55(100.00)	13(23.64)
20	65(100.00)	65(100.00)	65(100.00)	65(100.00)	65(100.00)	65(100.00)	65(100.00)	15(23.08)
21	74(100.00)	74(100.00)	74(100.00)	74(100.00)	74(100.00)	74(100.00)	74(100.00)	19(25.68)
22	75(100.00)	75(100.00)	75(100.00)	75(100.00)	75(100.00)	75(100.00)	75(100.00)	29(38.67)
23	69(100.00)	69(100.00)	69(100.00)	69(100.00)	69(100.00)	69(100.00)	69(100.00)	29(42.03)
24	68(100.00)	68(100.00)	68(100.00)	68(100.00)	68(100.00)	68(100.00)	68(100.00)	35(51.47)
25	70(100.00)	70(100.00)	70(100.00)	70(100.00)	70(100.00)	70(100.00)	70(100.00)	42(60.00)

Figures in parentheses represent percentage

Table 27 presents the number and percentage of permanent teeth in the right maxilla of the Mizo females. At 5 years, 2(4.88%) central incisors, 1(2.44%) lateral incisor and 3(7.32%) first molars are present. 2(5.13%) canines were present at the age of 8 years. By 9 years of age, the central incisor and the first molar have completed eruption and 2(4.44%) first premolars were also present. At 10 years the lateral incisor completes eruption and 24(53.33%), 30(66.67%), 15(33.33%) and 4(8.89%), canines, first premolars, second premolars and second molars are found erupted respectively. By 13 years of age, first premolar also completes eruption. 2(3.77%) third molars are also present at the age of 14 years. By 15 years of age, all the teeth have completed eruption except the third molars which again completes more than 50% of eruption by 24 years of age.

Table 28. Number and percentage of erupted permanent teeth among the Mizo females– sides-pooled (mandible)

Age group (in years)	I_1	I_2	C_0	P_1	P_2	M_1	M_2	M_3
5	4(4.88)	2(2.44)	0(0.00)	0(0.00)	0(0.00)	6(7.32)	0(0.00)	0(0.00)
6	16(32.00)	4(8.00)	0(0.00)	0(0.00)	0(0.00)	22(44.00)	0(0.00)	0(0.00)
7	78(79.59)	47(47.96)	0(0.00)	0(0.00)	0(0.00)	78(79.59)	0(0.00)	0(0.00)
8	74(94.87)	56(71.79)	0(0.00)	4(5.13)	0(0.00)	80(100.00)	0(0.00)	0(0.00)
9	90(100.00)	82(91.11)	2(2.22)	13(14.44)	2(2.22)	90(100.00)	0(0.00)	0(0.00)
10	72(100.00)	72(100.00)	9(12.50)	18(25.00)	6(8.33)	72(100.00)	0(0.00)	0(0.00)
11	90(100.00)	90(100.00)	54(60.00)	62(68.89)	50(55.56)	90(100.00)	26(28.89)	0(0.00)
12	102(100.00)	102(100.00)	86(84.31)	96(94.12)	80(78.43)	102(100.00)	52(50.98)	0(0.00)
13	78(100.00)	78(100.00)	75(96.15)	79(100.00)	69(88.46)	78(100.00)	66(84.62)	0(0.00)
14	106(100.00)	106(100.00)	106(100.00)	106(100.00)	106(100.00)	106(100.00)	101(95.28)	4(3.77)
15	76(100.00)	76(100.00)	76(100.00)	76(100.00)	76(100.00)	76(100.00)	76(100.00)	6(7.89)
16	134(100.00)	134(100.00)	134(100.00)	134(100.00)	134(100.00)	134(100.00)	134(100.00)	10(7.46)
17	112(100.00)	112(100.00)	112(100.00)	112(100.00)	112(100.00)	112(100.00)	112(100.00)	10(8.92)
18	134(100.00)	134(100.00)	134(100.00)	134(100.00)	134(100.00)	134(100.00)	134(100.00)	22(16.42)
19	110(100.00)	110(100.00)	110(100.00)	110(100.00)	110(100.00)	110(100.00)	110(100.00)	22(20.00)
20	130(100.00)	130(100.00)	130(100.00)	130(100.00)	130(100.00)	130(100.00)	130(100.00)	36(27.69)
21	148(100.00)	148(100.00)	148(100.00)	148(100.00)	148(100.00)	148(100.00)	148(100.00)	55(37.16)
22	150(100.00)	150(100.00)	150(100.00)	150(100.00)	150(100.00)	150(100.00)	150(100.00)	68(45.33)
23	138(100.00)	138(100.00)	138(100.00)	138(100.00)	138(100.00)	138(100.00)	138(100.00)	69(50.00)
24	136(100.00)	136(100.00)	136(100.00)	136(100.00)	136(100.00)	136(100.00)	136(100.00)	88(64.71)
25	140(100.00)	140(100.00)	140(100.00)	140(100.00)	140(100.00)	140(100.00)	140(100.00)	98(70.00)

Figures in parentheses represent percentage

Table 28 shows that the number and percentage of mandibular permanent teeth in the Mizo females when both the sides pooled. At the age of 5 years, 4(4.88%) central incisors, 2(2.44%) lateral incisors and 6(7.32%) first molars found erupted. 4(5.13%) first premolars are found erupted at the age of 8 years. The first molar has completed eruption at the age of 8 years. By the age of 9 years, central incisor has completed eruption and 2(2.22%) canines are found present. At 10 years of age, the lateral incisor has completed eruption. By 11 years of age, 54(60.00%) canines, 62(68.89%) first premolars, 50(55.56%) second premolars and 26(28.89%) second molars are present. Premolars have completed eruption by 13 years of age and by 14 years; all the permanent teeth in the mandible of the study population have completed excepting the third molar. By 23 years, 69(50.00%) third molar are present in the lower jaw of the subjects.

Table 29. Number and percentage of erupted permanent teeth among the Mizo females– sides-pooled (maxillary)

Age group (in years)	I^1	I^2	C^0	P^1	P^2	M^1	M^2	M^3
5	4(4.88)	2(2.44)	0(0.00)	0(0.00)	0(0.00)	6(7.32)	0(0.00)	0(0.00)
6	4(8.00)	4(8.00)	0(0.00)	0(0.00)	0(0.00)	22(44.00)	0(0.00)	0(0.00)
7	58(58.18)	21(21.43)	0(0.00)	0(0.00)	0(0.00)	78(79.59)	0(0.00)	0(0.00)
8	62(79.49)	46(58.97)	2(2.56)	0(0.00)	0(0.00)	64(82.05)	0(0.00)	0(0.00)
9	90(100.00)	82(91.11)	2(2.22)	2(2.22)	0(0.00)	90(100.00)	0(0.00)	0(0.00)
10	72(100.00)	65(90.28)	0(0.00)	4(5.56)	0(0.00)	72(100.00)	0(0.00)	0(0.00)
11	90(100.00)	90(100.00)	48(53.33)	60(66.67)	30(33.33)	90(100.00)	8(8.89)	0(0.00)
12	102(100.00)	102(100.00)	60(58.82)	70(68.63)	50(49.02)	102(100.00)	40(39.22)	0(0.00)
13	78(100.00)	78(100.00)	62(79.49)	64(82.05)	56(71.79)	78(100.00)	44(56.41)	0(0.00)
14	106(100.00)	106(100.00)	98(92.45)	104(98.11)	97(91.51)	106(100.00)	96(90.57)	4(3.77)
15	76(100.00)	76(100.00)	76(100.00)	76(100.00)	76(100.00)	76(100.00)	76(100.00)	4(5.26)
16	134(100.00)	134(100.00)	134(100.00)	134(100.00)	134(100.00)	134(100.00)	134(100.00)	11(8.21)
17	112(100.00)	112(100.00)	112(100.00)	112(100.00)	112(100.00)	112(100.00)	112(100.00)	11(9.82)
18	134(100.00)	134(100.00)	134(100.00)	134(100.00)	134(100.00)	134(100.00)	134(100.00)	20(14.93)
19	110(100.00)	110(100.00)	110(100.00)	110(100.00)	110(100.00)	110(100.00)	110(100.00)	26(23.64)
20	130(100.00)	130(100.00)	130(100.00)	130(100.00)	130(100.00)	130(100.00)	130(100.00)	32(24.62)
21	148(100.00)	148(100.00)	148(100.00)	148(100.00)	148(100.00)	148(100.00)	148(100.00)	38(25.68)
22	150(100.00)	150(100.00)	150(100.00)	150(100.00)	150(100.00)	150(100.00)	150(100.00)	56(37.33)
23	138(100.00)	138(100.00)	138(100.00)	138(100.00)	138(100.00)	138(100.00)	138(100.00)	58(42.03)
24	136(100.00)	136(100.00)	136(100.00)	136(100.00)	136(100.00)	136(100.00)	136(100.00)	70(51.47)
25	140(100.00)	140(100.00)	140(100.00)	140(100.00)	140(100.00)	140(100.00)	140(100.00)	84(60.00)

Figures in parentheses represent percentage

The number and percentage of permanent maxillary teeth among the Mizo females (sides pooled) are shown in Table 29. At 5 years of age, there are 4(4.88%) central incisors, 2(2.44%) lateral incisors and 6(7.32%) first molars found erupted. 2(2.56%) canines are found erupted at the age of 8 years. By 9 years of age, central incisors and first molars complete eruption, whereas, 2(2.22%) canines and first premolars each are also present. By 10 years of age, lateral incisor completes eruption. At 11 years age, 8(8.89%) second molars are present. The first premolar has completed eruption at 13 years. By 14 years, canine and second premolar has completed eruption, and at this age, 4(3.77%) third molars also seen erupted. By 15 years, all the teeth excepting the third molar have completed eruption. At 24 years of age, 70(51.47%) third molars also found erupted.

Table 30. Number and percentage of erupted permanent teeth among the Mizo females, all teeth combined (mandible)

Age group (in years)	Number of teeth (excluding M3)	Percentage
5	12	2.09
6	42	12.00
7	203	29.59
8	214	38.21
9	279	44.29
10	249	49.40
11	462	73.33
12	620	86.83
13	523	95.79
14	737	99.33
15	532	100.00

Table 30 shows the number and percentage of permanent mandibular teeth among the Mizo females when all teeth combined. The above table reveals that at the age of 5 years, only 12(2.09%) teeth are found erupted in the mandible. By 10 years of age, nearly half of the teeth are present. By the age of 15 years, all the teeth (excluding third molar) have completed eruption.

Table 31. Number and percentage of erupted permanent teeth among the Mizo females, all teeth combined (maxillary)

Age group (in years)	Number of teeth	Percentage
5	12	2.09
6	29	8.29
7	157	22.89
8	174	31.87
9	266	42.22
10	220	43.65
11	416	66.03
12	582	81.51
13	500	91.58
14	732	98.65
15	532	100.00

Table 31 shows the number and percentage of permanent maxillary teeth among the Mizo females, when all the teeth are combined. It is observed from the above table that the permanent teeth start erupting by 5 years of age, represented by 12(2.09%) teeth. By 6 years and 7 years, 29(8.29%) and 157(22.29%) of teeth were present respectively. By 11 years of age, more than 416(66.03%) teeth complete erupting. Finally, by 15 years of age all the maxillary teeth excepting the third molars complete their eruption among the Mizo girls.

Table 32. Number and percentage of erupted permanent teeth among the Mizo females – quadrant- wise (excluding M_3)

Age group (in years)	Left mandible		Right mandible		Left maxilla		Right maxilla	
	No.of teeth	%	No.of teeth	%	No.of teeth	%	No.of teeth	%
5	6	2.20	6	2.20	6	2.20	6	2.20
6	23	13.14	19	10.86	15	8.57	14	8.00
7	99	30.09	104	31.61	77	23.40	80	24.32
8	108	38.57	106	37.86	91	32.50	93	33.21
9	142	46.10	137	43.49	133	42.22	133	42.22
10	128	48.12	121	48.02	110	43.65	110	43.65
11	221	73.42	234	74.29	208	66.03	208	66.03
12	311	87.11	309	86.55	289	80.95	293	82.07
13	258	92.14	264	96.70	249	91.21	251	91.94
14	369	99.46	368	99.19	366	98.65	366	98.65
15	266	100.00	266	100.00	266	100.00	266	100.00

Table 32 shows the number and percentage of permanent teeth of both the jaws excepting the third molars among the Mizo females (quadrant wise). At the age of 5 years, the number and percentage of erupted teeth are same i.e. 6(2.20%) in the entire quadrant. The above table also shows that in all the ages, the number and percentage of erupted teeth are higher in the mandible than that of the maxilla in all the age groups i.e. from 6 years to 14 years of age. However, the beginning of eruption and completion of eruption of all the teeth excepting the third molar is same in all the quadrant of both the jaws.

Table 33. Number and percentage of erupted permanent teeth among the Mizo males (left mandible)

Age group (in years)	I_1	I_2	C_0	P_1	P_2	M_1	M_2	M_3
5	2(4.35)	0(0.00)	0(0.00)	0(0.00)	0(0.00)	0(0.00)	0(0.00)	0(0.00)
6	7(18.92)	5(13.51)	0(0.00)	3(8.11)	0(0.00)	7(18.92)	0(0.00)	0(0.00)
7	30(81.08)	6(16.22)	0(0.00)	0(0.00)	0(0.00)	33(89.19)	0(0.00)	0(0.00)
8	51(94.44)	36(66.67)	0(0.00)	7(12.96)	0(0.00)	51(94.44)	0(0.00)	0(0.00)
9	43(100.00)	40(93.02)	3(6.98)	6(13.95)	3(6.98)	43(100.00)	0(0.00)	0(0.00)
10	33(100.00)	33(100.00)	12(36.36)	14(42.42)	3(9.09)	33(100.00)	0(0.00)	0(0.00)
11	49(100.00)	49(100.00)	19(38.78)	28(57.69)	11(22.45)	49(100.00)	5(10.20)	0(0.00)
12	42(100.00)	42(100.00)	27(64.29)	35(83.33)	25(59.52)	42(100.00)	19(45.24)	0(0.00)
13	35(100.00)	35(100.00)	33(94.29)	35(100.00)	29(82.86)	35(100.00)	32(91.43)	0(0.00)
14	45(100.00)	45(100.00)	45(100.00)	45(100.00)	45(100.00)	45(100.00)	42(93.33)	0(0.00)
15	44(100.00)	44(100.00)	44(100.00)	44(100.00)	44(100.00)	44(100.00)	44(100.00)	2(4.55)
16	59(100.00)	59(100.00)	59(100.00)	59(100.00)	59(100.00)	59(100.00)	59(100.00)	4(6.78)
17	47(100.00)	47(100.00)	47(100.00)	47(100.00)	47(100.00)	47(100.00)	47(100.00)	8(17.02)
18	57(100.00)	57(100.00)	57(100.00)	57(100.00)	57(100.00)	57(100.00)	57(100.00)	13(22.81)
19	66(100.00)	66(100.00)	66(100.00)	66(100.00)	66(100.00)	66(100.00)	66(100.00)	14(21.21)
20	69(100.00)	69(100.00)	69(100.00)	69(100.00)	69(100.00)	69(100.00)	69(100.00)	17(24.64)
21	62(100.00)	62(100.00)	62(100.00)	62(100.00)	62(100.00)	62(100.00)	62(100.00)	19(30.65)
22	42(100.00)	42(100.00)	42(100.00)	42(100.00)	42(100.00)	42(100.00)	42(100.00)	14(33.33)
23	63(100.00)	63(100.00)	63(100.00)	63(100.00)	63(100.00)	63(100.00)	63(100.00)	27(42.86)
24	45(100.00)	45(100.00)	45(100.00)	45(100.00)	45(100.00)	45(100.00)	45(100.00)	25(55.56)
25	45(100.00)	45(100.00)	45(100.00)	45(100.00)	45(100.00)	45(100.00)	45(100.00)	33(73.33)

Figures in parentheses represent percentage

Table 33 shows the numbers and percentages of permanent teeth present among the Mizo males (left mandible). At the age of 5 years, only 2(4.35%) central incisors are present. At 6 years age, 7(18.92%) central incisors, 5(13.51%) lateral incisors, 3(8.11%) first premolars and 7(18.92%) first molars were found erupted. At 9 years of age, medial incisors and first molars completed their eruption. At this age not a single second molar has erupted. The lateral incisor has completed eruption by the age of 10 years. At 11 years, 5(10.20%) second molars are found erupted. At 13 years, excepting canine, second premolar and second molar, all other teeth have completed eruption. By 14 years, 42(93.33%) second molars are found erupted. By the age of 15 years, all the permanent teeth except the third molars complete eruption. At this age, 2(4.55%) of third molars are also seen erupted. By 24 years of age, more than 50% of third molars are present in the lower jaws of the Mizo males.

Table 34. Number and percentage of erupted permanent teeth among the Mizo males (right mandible)

Age Group (in years)	I_1	I_2	C_0	P_1	P_2	M_1	M_2	M_3
5	2(4.35)	0(0.00)	0(0.00)	0(0.00)	0(0.00)	2(4.35)	0(0.00)	0(0.00)
6	7(18.92)	5(13.51)	0(0.00)	3(8.11)	0(0.00)	7(18.92)	0(0.00)	0(0.00)
7	30(81.08)	8(21.62)	0(0.00)	0(0.00)	0(0.00)	33(89.19)	0(0.00)	0(0.00)
8	51(94.44)	36(66.67)	5(9.26)	5(9.26)	0(0.00)	49(90.74)	0(0.00)	0(0.00)
9	43(100.00)	40(93.02)	6(13.95)	9(20.93)	3(6.98)	43(100.00)	0(0.00)	0(0.00)
10	33(100.00)	33(100.00)	12(36.36)	12(36.36)	6(18.18)	33(100.00)	0(0.00)	0(0.00)
11	49(100.00)	49(100.00)	21(42.86)	28(57.69)	15(30.16)	49(100.00)	5(10.20)	0(0.00)
12	42(100.00)	42(100.00)	27(64.29)	35(83.33)	25(59.52)	42(100.00)	8(19.05)	0(0.00)
13	35(100.00)	35(100.00)	33(94.29)	35(100.00)	28(80.00)	35(100.00)	27(77.14)	0(0.00)
14	45(100.00)	45(100.00)	45(100.00)	45(100.00)	45(100.00)	45(100.00)	45(100.00)	0(0.00)
15	44(100.00)	44(100.00)	44(100.00)	44(100.00)	44(100.00)	44(100.00)	44(100.00)	2(4.55)
16	59(100.00)	59(100.00)	59(100.00)	59(100.00)	59(100.00)	59(100.00)	59(100.00)	6(10.17)
17	47(100.00)	47(100.00)	47(100.00)	47(100.00)	47(100.00)	47(100.00)	47(100.00)	8(17.02)
18	57(100.00)	57(100.00)	57(100.00)	57(100.00)	57(100.00)	57(100.00)	57(100.00)	12(21.05)
19	66(100.00)	66(100.00)	66(100.00)	66(100.00)	66(100.00)	66(100.00)	66(100.00)	16(24.24)
20	69(100.00)	69(100.00)	69(100.00)	69(100.00)	69(100.00)	69(100.00)	69(100.00)	17(24.64)
21	62(100.00)	62(100.00)	62(100.00)	62(100.00)	62(100.00)	62(100.00)	62(100.00)	14(22.58)
22	42(100.00)	42(100.00)	42(100.00)	42(100.00)	42(100.00)	42(100.00)	42(100.00)	14(33.33)
23	63(100.00)	63(100.00)	63(100.00)	63(100.00)	63(100.00)	63(100.00)	63(100.00)	30(47.62)
24	45(100.00)	45(100.00)	45(100.00)	45(100.00)	45(100.00)	45(100.00)	45(100.00)	25(55.56)
25	45(100.00)	45(100.00)	45(100.00)	45(100.00)	45(100.00)	45(100.00)	45(100.00)	31(68.89)

Figures in parentheses represent percentage

Table34 reveals that the permanent teeth first erupt at 5 years of age which is represented by the medial incisors and the first molars with 2(4.35%) and 2(4.35%) numbers respectively. In the 6 years of age, except the canine, second premolar, second molar and third molars, all the other teeth started erupting. At 9 years, medial incisor and first molar complete their eruption. By 14 years, all the permanent teeth completed eruption except the third molar, which starts erupting at 15 years. By 24 years of age, more than 50% of the third molars are found erupted.

Table 35. Number and percentage of erupted permanent teeth among the Mizo males (left maxilla)

Age Group (in years)	I^1	I^2	C^0	P^1	P^2	M^1	M^2	M^3
5	0(0.00)	0(0.00)	0(0.00)	0(0.00)	0(0.00)	0(0.00)	0(0.00)	0(0.00)
6	7(18.92)	0(0.00)	0(0.00)	0(0.00)	0(0.00)	7(18.92)	0(0.00)	0(0.00)
7	22(59.46)	6(16.22)	0(0.00)	0(0.00)	0(0.00)	33(89.19)	0(0.00)	0(0.00)
8	51(94.44)	26(48.15)	0(0.00)	5(9.26)	0(0.00)	54(100.00)	0(0.00)	0(0.00)
9	43(100.00)	42(97.67)	0(0.00)	3(6.98)	0(0.00)	43(100.00)	0(0.00)	0(0.00)
10	33(100.00)	33(100.00)	6(18.18)	8(24.24)	4(12.12)	33(100.00)	0(0.00)	0(0.00)
11	49(100.00)	49(100.00)	21(42.86)	28(57.69)	15(30.16)	49(100.00)	5(10.20)	0(0.00)
12	42(100.00)	42(100.00)	19(45.24)	31(73.81)	19(45.24)	42(100.00)	13(30.95)	0(0.00)
13	35(100.00)	35(100.00)	29(82.86)	35(100.00)	28(80.00)	35(100.00)	30(85.71)	0(0.00)
14	45(100.00)	45(100.00)	45(100.00))	45(100.00)	45(100.00)	45(100.00)	40(88.89)	0(0.00)
15	44(100.00)	44(100.00)	44(100.00)	44(100.00)	44(100.00)	44(100.00)	44(100.00)	2(4.55)
16	59(100.00)	59(100.00)	59(100.00)	59(100.00)	59(100.00)	59(100.00)	59(100.00)	4(6.78)
17	47(100.00)	47(100.00)	47(100.00)	47(100.00)	47(100.00)	47(100.00)	47(100.00)	8(17.02)
18	57(100.00)	57(100.00)	57(100.00)	57(100.00)	57(100.00)	57(100.00)	57(100.00)	10(17.54)
19	66(100.00)	66(100.00)	66(100.00)	66(100.00)	66(100.00)	66(100.00)	66(100.00)	14(21.21)
20	69(100.00)	69(100.00)	69(100.00)	69(100.00)	69(100.00)	69(100.00)	69(100.00)	17(24.64)
21	62(100.00)	62(100.00)	62(100.00)	62(100.00)	62(100.00)	62(100.00)	62(100.00)	19(30.65)
22	42(100.00)	42(100.00)	42(100.00)	42(100.00)	42(100.00)	42(100.00)	42(100.00)	15(35.71)
23	63(100.00)	63(100.00)	63(100.00)	63(100.00)	63(100.00)	63(100.00)	63(100.00)	26(41.27)
24	45(100.00)	45(100.00)	45(100.00)	45(100.00)	45(100.00)	45(100.00)	45(100.00)	28(62.22)
25	45(100.00)	45(100.00)	45(100.00)	45(100.00)	45(100.00)	45(100.00)	45(100.00)	31(68.89)

Figures in parentheses represent percentage

Table 35 shows the number and percentage of erupted permanent teeth among the Mizo males (left maxilla). At the age of 5 years, not a single tooth found erupted in the left maxilla. At 6 years, 7(18.92%) each central incisors and first molars are found erupted and at the age of 7 years the lateral incisor is also found erupted. By 8 years of age , 5(9.26%) first premolars are found erupted. The above table also shows that the first molar, central incisor and lateral incisor have completed their eruption by 8 years, 9 years and 10 years respectively. 6(18.18%) canines and 4(12.12%) second premolars are present at 10 years of age. The first premolar completes erupting at 13 years, while canine and second premolar completed by 14 years. The second molar completed eruption by 15 years, whereas, only 2(4.55%) third molars are found present at that age. By the age of 25 years 68.89% of the third molars are found present in the left maxilla of the Mizo males.

Table 36. Number and percentage of erupted permanent teeth among the Mizo males (right maxilla)

Age Group (in years)	I^1	I^2	C^0	P^1	P^2	M^1	M^2	M^3
5	0(0.00)	0(0.00)	0(0.00)	0(0.00)	0(0.00)	0(0.00)	0(0.00)	0(0.00)
6	5(13.51)	0(0.00)	0(0.00)	3(8.11)	0(0.00)	7(18.92)	0(0.00)	0(0.00)
7	22(59.46)	6(16.22)	0(0.00)	0(0.00)	0(0.00)	30(81.08)	0(0.00)	0(0.00)
8	49(90.74)	24(44.44)	2(3.70)	5(9.26)	0(0.00)	54(100.00)	0(0.00)	0(0.00)
9	43(100.00)	42(97.67)	0(0.00)	3(6.98)	0(0.00)	43(100.00)	0(0.00)	0(0.00)
10	33(100.00)	33(100.00)	4(12.12)	12(36.36)	3(9.09)	33(100.00)	0(0.00)	0(0.00)
11	49(100.00)	49(100.00)	12(24.49)	19(38.78)	15(30.16)	49(100.00)	2(4.08)	0(0.00)
12	42(100.00)	42(100.00)	19(45.24)	29(69.05)	15(37.71)	42(100.00)	11(26.19)	0(0.00)
13	35(100.00)	35(100.00)	29(82.86)	35(100.00)	28(80.00)	35(100.00)	30(85.71)	0(0.00)
14	45(100.00)	45(100.00)	45(100.00)	45(100.00)	45(100.00)	45(100.00)	39(86.67)	0(0.00)
15	44(100.00)	44(100.00)	44(100.00)	44(100.00)	44(100.00)	44(100.00)	44(100.00)	2(4.55)
16	59(100.00)	59(100.00)	59(100.00)	59(100.00)	59(100.00)	59(100.00)	59(100.00)	4(6.78)
17	47(100.00)	47(100.00)	47(100.00)	47(100.00)	47(100.00)	47(100.00)	47(100.00)	6(12.77)
18	57(100.00)	57(100.00)	57(100.00)	57(100.00)	57(100.00)	57(100.00)	57(100.00)	12(21.05)
19	66(100.00)	66(100.00)	66(100.00)	66(100.00)	66(100.00)	66(100.00)	66(100.00)	14(21.21)
20	69(100.00)	69(100.00)	69(100.00)	69(100.00)	69(100.00)	69(100.00)	69(100.00)	19(27.54)
21	62(100.00)	62(100.00)	62(100.00)	62(100.00)	62(100.00)	62(100.00)	62(100.00)	19(30.65)
22	42(100.00)	42(100.00)	42(100.00)	42(100.00)	42(100.00)	42(100.00)	42(100.00)	15(35.71)
23	63(100.00)	63(100.00)	63(100.00)	63(100.00)	63(100.00)	63(100.00)	63(100.00)	30(47.62)
24	45(100.00)	45(100.00)	45(100.00)	45(100.00)	45(100.00)	45(100.00)	45(100.00)	28(62.22)
25	45(100.00)	45(100.00)	45(100.00)	45(100.00)	45(100.00)	45(100.00)	45(100.00)	31(68.89)

Figures in parentheses represent percentage

Table 36 presents the number and percentage of permanent teeth among the Mizo males (right maxilla). At the age of 5 years not a single permanent tooth found present in the right maxilla. At 6 years, 5(13.51%) central incisors, 3(8.11%) first premolars and 7(18.92%) first molars are erupted. 6(16.22%) lateral incisors are erupted at 7 years of age, while 2(3.70%) canines were found erupted at 8 years. The first molar and the central incisor complete eruption by 8 years and 9 years of age respectively. By 10 years of age, the lateral incisor also completes eruption. By 11 years, 2(4.08%) second molars are found emerged. The above table further shows that; the first premolar, canine, second premolar and second molar have completed their eruption by 13 years, 14 years and 15 years respectively. At 15 years, 2(4.55%) first permanent third molars were recorded emerged and by the age of 25 years 68.89% of the third molars completed eruption.

Table 37. Number and percentage of erupted permanent teeth among the Mizo males – sides-pooled (mandible)

Age Group (in years)	I_1	I_2	C_0	P_1	P_2	M_1	M_2	M_3
5	4(4.35)	0(0.00)	0(0.00)	0(0.00)	0(0.00)	2(2.27)	0(0.00)	0(0.00)
6	14(18.92)	10(13.51)	0(0.00)	3(4.05)	0(0.00)	14(18.92)	0(0.00)	0(0.00)
7	60(81.08)	14(18.92)	0(0.00)	0(0.00)	0(0.00)	66(89.19)	0(0.00)	0(0.00)
8	102(94.44)	72(66.67)	5(4.63)	12(11.11)	0(0.00)	100(92.59)	0(0.00)	0(0.00)
9	86(100.00)	80(93.02)	9(10.47)	15(17.44)	6(6.98)	86(100.00)	0(0.00)	0(0.00)
10	66(100.00)	66(100.00)	24(36.36)	26(39.39)	9(13.64)	66(100.00)	0(0.00)	0(0.00)
11	98(100.00)	98(100.00)	30(30.61)	56(57.14)	26(26.33)	98(100.00)	10(10.20)	0(0.00)
12	84(100.00)	84(100.00)	54(64.28)	70(83.33)	50(59.52)	84(100.00)	27(32.14)	0(0.00)
13	70(100.00)	70(100.00)	66(94.29)	70(100.00)	57(81.43)	70(100.00)	59(84.29)	0(0.00)
14	90(100.00)	90(100.00)	90(100.00)	90(100.00)	90(100.00)	90(100.00)	87(96.67)	0(0.00)
15	88(100.00)	88(100.00)	88(100.00)	88(100.00)	88(100.00)	88(100.00)	88(100.00)	4(4.55)
16	118(100.00)	118(100.00)	118(100.00)	118(100.00)	118(100.00)	118(100.00)	118(100.00)	10(8.47)
17	94(100.00)	94(100.00)	94(100.00)	94(100.00)	94(100.00)	94(100.00)	94(100.00)	16(17.02)
18	114(100.00)	114(100.00)	114(100.00)	114(100.00)	114(100.00)	114(100.00)	114(100.00)	25(21.93)
19	132(100.00)	132(100.00)	132(100.00)	132(100.00)	132(100.00)	132(100.00)	132(100.00)	30(22.73)
20	138(100.00)	138(100.00)	138(100.00)	138(100.00)	138(100.00)	138(100.00)	138(100.00)	34(24.64)
21	124(100.00)	124(100.00)	124(100.00)	124(100.00)	124(100.00)	124(100.00)	124(100.00)	33(26.61)
22	84(100.00)	84(100.00)	84(100.00)	84(100.00)	84(100.00)	84(100.00)	84(100.00)	28(33.33)
23	126(100.00)	126(100.00)	126(100.00)	126(100.00)	126(100.00)	126(100.00)	126(100.00)	57(45.24)
24	90(100.00)	90(100.00)	90(100.00)	90(100.00)	90(100.00)	90(100.00)	90(100.00)	50(55.56)
25	90(100.00)	90(100.00)	90(100.00)	90(100.00)	90(100.00)	90(100.00)	90(100.00)	64(71.11)

Figures in parentheses represent percentage

The number and percentage of erupted permanent teeth among the Mizo males – side-pooled (mandible) are shown in Table 37. At 5 years of age, 4(4.35%) central incisors and 2(2.27%) first molars have erupted. At 6 years, 10(13.51%) lateral incisors and 3(4.05%) first premolars are also present. There are 5(4.63%) canines in mandible at 8 year of age. By 9 years, central incisor and first molar complete their eruption. At this age, 6(6.98%) second premolars are also observed erupted. Lateral incisor completes eruption by 10 years. At 11 years, 10(10.20%) second molars are also found erupted. First premolar; canine and second premolar and, second molar completed eruption by the age of 13 years, 14 years and 15 yeas respectively. At 15 years, the third molar starts erupting represented by 4(4-55%) teeth. By 25 years of age, 64(71.11%) mandibular third molars are found erupted.

Table 38. Number and percentage of erupted permanent teeth among the Mizo males – sides-pooled (maxilla)

Age Group (in years)	I^1	I^2	C^0	P^1	P^2	M^1	M^2	M^3
5	0(0.00)	0(0.00)	0(0.00)	0(0.00)	0(0.00)	0(0.00)	0(0.00)	0(0.00)
6	12(16.22)	0(0.00)	0(0.00)	3(4.05)	0(0.00)	14(18.92)	0(0.00)	0(0.00)
7	44(59.46)	12(15.38)	0(0.00)	0(0.00)	0(0.00)	63(85.14)	0(0.00)	0(0.00)
8	100(92.59)	50(46.29)	2(1.85)	10(9.26)	0(0.00)	108(100.00)	0(0.00)	0(0.00)
9	86(100.00)	84(97.68)	0(0.00)	6(6.98)	0(0.00)	86(100.00)	0(0.00)	0(0.00)
10	66(100.00)	66(100.00)	10(15.15)	20(30.30)	7(10.60)	66(100.00)	0(0.00)	0(0.00)
11	98(100.00)	98(100.00)	33(33.67)	47(47.96)	21(21.43)	98(100.00)	10(10.20)	0(0.00)
12	84(100.00)	84(100.00)	38(45.23)	60(71.43)	34(40.47)	84(100.00)	24(28.57)	0(0.00)
13	70(100.00)	70(100.00)	58(82.86)	70(100.00)	56(80.00)	70(100.00)	60(85.71)	0(0.00)
14	90(100.00)	90(100.00)	90(100.00)	90(100.00)	90(100.00)	90(100.00)	79(87.78)	0(0.00)
15	88(100.00)	88(100.00)	88(100.00)	88(100.00)	88(100.00)	88(100.00)	88(100.00)	4(4.55)
16	118(100.00)	118(100.00)	118(100.00)	118(100.00)	118(100.00)	118(100.00)	118(100.00)	8(6.78)
17	94(100.00)	94(100.00)	94(100.00)	94(100.00)	94(100.00)	94(100.00)	94(100.00)	14(14.89)
18	114(100.00)	114(100.00)	114(100.00)	114(100.00)	114(100.00)	114(100.00)	114(100.00)	22(19.30)
19	132(100.00)	132(100.00)	132(100.00)	132(100.00)	132(100.00)	132(100.00)	132(100.00)	28(21.21)
20	138(100.00)	138(100.00)	138(100.00)	138(100.00)	138(100.00)	138(100.00)	138(100.00)	36(26.09)
21	124(100.00)	124(100.00)	124(100.00)	124(100.00)	124(100.00)	124(100.00)	124(100.00)	38(30.65)
22	84(100.00)	84(100.00)	84(100.00)	84(100.00)	84(100.00)	84(100.00)	84(100.00)	30(35.71)
23	126(100.00)	126(100.00)	126(100.00)	126(100.00)	126(100.00)	126(100.00)	126(100.00)	56(44.44)
24	90(100.00)	90(100.00)	90(100.00)	90(100.00)	90(100.00)	90(100.00)	90(100.00)	56(62.22)
25	90(100.00)	90(100.00)	90(100.00)	90(100.00)	90(100.00)	90(100.00)	90(100.00)	62(68.89)

Figures in parentheses represent percentage

Table 38 shows the number and percentage of maxillary permanent teeth in the Mizo males when sides are pooled. At 6 years of age, 12(16.22%) central incisors, 3(4.05%) first premolars and 14(18.92%) first molars are found to have erupted. 12(15.38%) lateral incisors have erupted by 7 years of age. By 8 years, there appeared only 2(1.85%) canines while the first molars complete their eruption. The lateral incisor has completed eruption by 10 years, and 7(10.60%) second premolar also found erupted at the same age. The first premolar, canine and second premolar completed their eruption by 13 years, of 14 years and 15 years respectively. At 15 years age, 4(4.55%) third molars also appear in the maxilla. However, by 25 years of age, 68.89% third molar have erupted in the upper jaws of the male subjects.

Table 39. Number and percentage of erupted permanent teeth, all teeth combined among the Mizo male (mandible)

Age group (in years)	Number of teeth	Percentage
5	6	0.93
6	41	7.92
7	140	25.64
8	291	38.49
9	282	46.84
10	257	55.63
11	426	62.10
12	453	77.04
13	462	94.29
14	627	99.52
15	616	100.00

Table 39 shows the number and percentage of erupted permanent mandibular teeth among the Mizo males when all teeth are combined. At 5 years of age, only 6(0.93%) teeth were found erupted in the lower jaw. At 10 years, more than 50% of teeth are already erupted and by 15 years, all the mandibular teeth (excluding the third molar) have completed eruption.

Table 40. Number and percentage of erupted permanent teeth, all teeth combined among the Mizo male (maxilla)

Age group (in years)	Number of teeth	Percentage
5	0	0.00
6	29	5.60
7	119	21.79
8	268	35.44
9	262	43.52
10	235	50.87
11	402	58.60
12	408	69.39
13	454	92.56
14	619	98.25
15	616	100.00

The number and percentage of maxillary permanent teeth among the Mizo males, when all teeth combined is shown in Table 40. At 5 years of age, not a single tooth is found erupted. By 6 years, 29(5.60%) teeth have erupted in the maxilla. By 10 years of age, more than 50% of teeth are observed. By 15 years of age, all the teeth excluding third molars have completed their eruption in the lower jaw.

Table 41. Number and percentage of erupted permanent teeth among the Mizo males - quadrant wise (excluding M_3)

Age group (in years)	Left mandible		Right mandible		Left maxilla		Right maxilla	
	No.of teeth	%	No.of teeth	%	No.of teeth	%	No.of teeth	%
5	2	0.62	4	1.24	0	0.00	0	0.00
6	22	8.49	19	7.34	14	5.41	15	5.79
7	69	25.27	71	26.01	61	22.34	58	21.25
8	145	38.36	146	38.62	136	35.98	134	35.45
9	138	45.85	144	47.84	131	43.52	131	43.52
10	128	55.41	129	55.84	117	50.65	118	51.08
11	210	61.22	216	62.97	216	62.97	186	54.23
12	232	80.84	221	77.01	208	70.75	200	68.03
13	234	95.51	228	93.06	227	92.65	227	92.65
14	312	99.05	315	100.00	310	98.41	295	93.65
15	308	100.00	308	100.00	308	100.00	308	100.00

Table 41 shows the number and percentage of erupted permanent teeth excluding the third molars in the Mizo males (quadrant-wise). At 5 years of age, there are 2(0.62%) and 4(1.24%) teeth found erupted in the left and right mandible respectively, but not a single tooth found erupted in the maxilla. The above table also reveals that in all the age groups, the number and percentage of erupted teeth are higher in the mandible compared to the maxilla excepting at the age of 11 years of age, where, the number and percentage of teeth present are found to be equal in both the upper and the lower jaws. The above table further shows that eruption (excluding the third molar) in the right mandible is completed by 14 years, while in the remaining quadrants they are completed by 15 years of age.

Table 42. Number and percentage of erupted permanent teeth among the Mizo males and females – all teeth combined (excluding M_3)

Age group (in years)	Males		Females	
	Number of teeth	Percentage	Number of teeth	Percentage
5	6	0.46	24	2.20
6	70	6.76	71	10.14
7	259	23.72	360	27.36
8	561	37.10	398	35.54
9	544	45.18	545	44.24
10	492	53.25	469	44.08
11	828	60.35	871	72.34
12	861	75.00	1202	84.17
13	916	93.47	1022	91.25
14	1232	97.78	1469	98.99
15	1232	100.00	1064	100.00

Table 42 shows the number and percentage of erupted permanent teeth (excepting the third molar) among the Mizo males and females when all the teeth are combined. The above tables shows that the percentage of erupted permanent teeth are higher among the females in all the ages excepting the age groups of 8 years, 9 years, 10 years and 13 years, which reveals that the eruption of permanent teeth in general takes place earlier in the girls than that of their male counterparts. However, the eruption age of the first tooth and completion of all the teeth excepting the third molar is same i.e. 5 years and 15 years respectively.

Table 43. Median Age (±S.D) of eruption of permanent teeth in males – jaw and quadrant

JAW	Quadrant	I_1	I_2	C_0	P_1	P_2	M_1	M_2	M_3
Mandible	Left	6.2	7.1	10.7	10.1	11.4	6.1	11.8	22.5
	(±S.D)	(0.15)	(0.15)	(0.35)	(0.25)	(0.15)	(0.15)	(0.15)	(0.60)
	Right	6.2	7.1	10.6	10.1	11.3	6.2	12.2	22.6
	(±S.D)	(0.15)	(0.15)	(0.25)	(0.25)	(0.20)	(0.20)	(0.15)	(0.40)
Maxilla	Left	6.6	7.8	11.0	10.5	11.6	6.3	12.1	22.4
	(±S.D)	(0.10)	(0.15)	(0.25)	(0.25)	(0.30)	(0.10)	(0.15)	(0.50)
	Right	6.6	7.9	11.4	10.6	11.5	6.3	12.2	22.2
	(±S.D)	(0.15)	(0.15)	(0.25)	(0.25)	(0.15)	(0.15)	(0.15)	(0.45)

Table 43 shows the median age of eruption of permanent teeth by jaws and quadrants in the Mizo males. The first tooth to erupt is the first molar 6.1(±0.15) of the left mandible followed by medial incisors 6.2(±0.15) of the lower jaw of both the quadrants. Comparison of the similar type of teeth of both the jaws shows that all the teeth erupt earlier in the mandible than their maxillary counterparts. The last tooth to erupt is the third molar of right mandible.

Table 44. Median Age (±S.D) of eruption of permanent teeth in females – jaw and quadrant

JAW	Quadrant	I_1	I_2	C_0	P_1	P_2	M_1	M_2	M_3
Mandible	Left	6.0	6.9	10.6	10.1	10.9	5.9	11.7	21.9
	(±S.D)	(0.15)	(0.20)	(0.20)	(0.25)	(0.15)	(0.15)	(0.15)	(0.45)
	Right	6.1	6.8	10.7	10.3	10.8	5.9	11.4	21.1
	(±S.D)	(0.15)	(0.20)	(0.10)	(0.15)	(0.20)	(0.15)	(0.20)	(0.80)
Maxilla	Left	6.6	7.6	10.3	10.6	11.2	5.9	12.2	22.7
	(±S.D)	(0.15)	(0.15)	(0.30)	(0.15)	(0.15)	(0.15)	(0.25)	(0.60)
	Right	6.8	7.4	10.3	10.6	11.1	6.0	12.2	22.6
	(±S.D)	(0.10)	(0.20)	(0.25)	(0.10)	(0.15)	(0.15)	(0.25)	(0.50)

Table 44 shows the median age of eruption of permanent teeth by jaws and quadrant in females. The first teeth to erupt is the mandibular first molar and the maxillary left first molar at 5.9(±0.15) years each, followed by the mandibular left medial incisor 6.0(±0.15). The side-wise comparison of the jaws shows that only the first molars erupt at the same time in the lower jaw, whereas, in maxilla the canines, first premolars and second molars emerge at the same time.

Table 45. Median Age (±S.D) eruption of permanent teeth by jaw and sex – Left Quadrant

JAW	Sex	I_1	I_2	C_0	P_1	P_2	M_1	M_2	M_3
Mandible	Male	6.2	7.1	10.7	10.1	11.4	6.1	11.8	22.5
	(±S.D)	(0.15)	(0.15)	(0.35)	(0.25)	(0.15)	(0.15)	(0.15)	(0.60)
	Female	6.0	6.9	10.6	10.1	10.9	5.9	11.7	21.9
	(±S.D)	(0.15)	(0.20)	(0.20)	(0.25)	(0.15)	(0.15)	(0.15)	(0.45)
JAW	Sex	I^1	I^2	C^0	P^1	P^2	M^1	M^2	M^3
Maxilla	Male	6.6	7.8	11.0	10.5	11.6	6.3	12.1	22.4
	(±S.D)	(0.10)	(0.15)	(0.25)	(0.25)	(0.30)	(0.10)	(0.15)	(0.50)
	Female	6.6	7.6	10.3	10.6	11.2	5.9	12.2	22.7
	(±S.D)	(0.15)	(0.15)	(0.30)	(0.15)	(0.15)	(0.15)	(0.25)	(0.60)

Table 46. Median Age (±S.D) eruption of permanent teeth by jaw and sex – Right Quadrant

JAW	Sex	I_1	I_2	C_0	P_1	P_2	M_1	M_2	M_3
Mandible	Male	6.2	7.1	10.6	10.1	11.3	6.2	12.2	22.6
	(±S.D)	(0.15)	(0.15)	(0.25)	(0.25)	(0.20)	(0.20)	(0.15)	(0.40)
	Female	6.1	6.8	10.7	10.3	10.8	5.9	11.4	21.1
	(±S.D)	(0.15)	(0.20)	(0.10)	(0.15)	(0.20)	(0.15)	(0.20)	(0.80)
JAW	Sex	I^1	I^2	C^0	P^1	P^2	M^1	M^2	M^3
Maxilla	Male	6.6	7.9	11.4	10.6	11.5	6.3	12.2	22.2
	(±S.D)	(0.15)	(0.15)	(0.25)	(0.25)	(0.15)	(0.15)	(0.15)	(0.45)
	Female	6.8	7.4	10.3	10.6	11.1	6.0	12.2	22.6
	(±S.D)	(0.10)	(0.20)	(0.25)	(0.10)	(0.15)	(0.15)	(0.25)	(0.50)

Table 45 and 46 present the median age (±SD) of tooth emergence with their standard deviations by sex and jaw of left and right quadrant respectively. The side-wise comparison of Tables 45 and 46 shows that the central incisor, lateral incisor and first premolar in the lower jaw of male emerge at same time. The emergence time of the canine and second premolar of the right mandible of male is earlier than that of the left mandible, while the molars of the left mandible have emerged earlier than the right of the males.

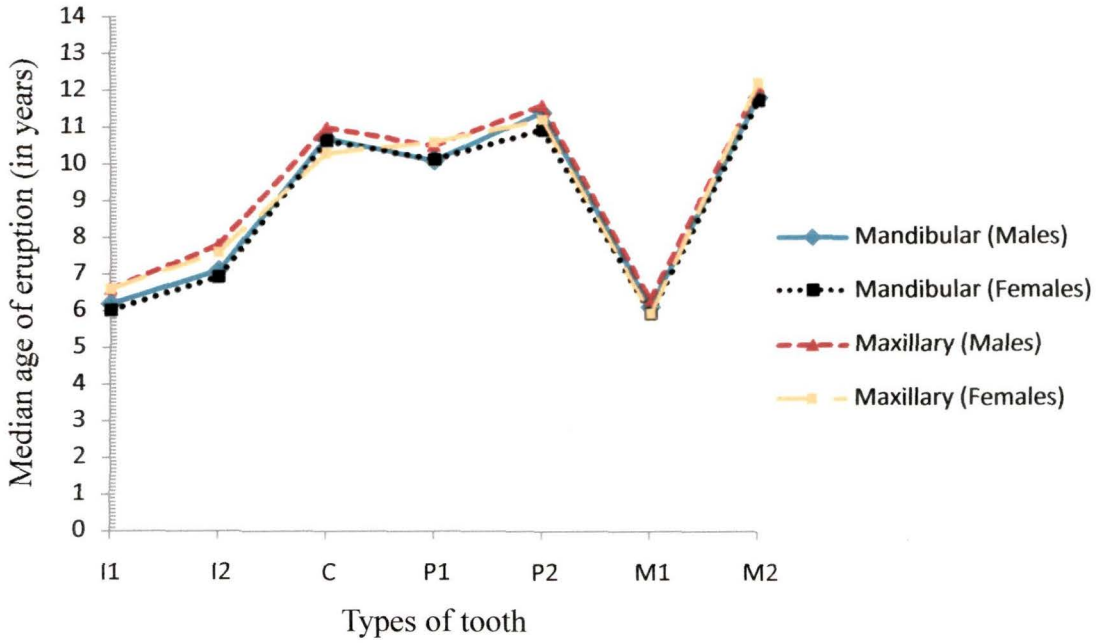


Figure2. Median age eruption of permanent teeth by sex and jaw (left quadrant)

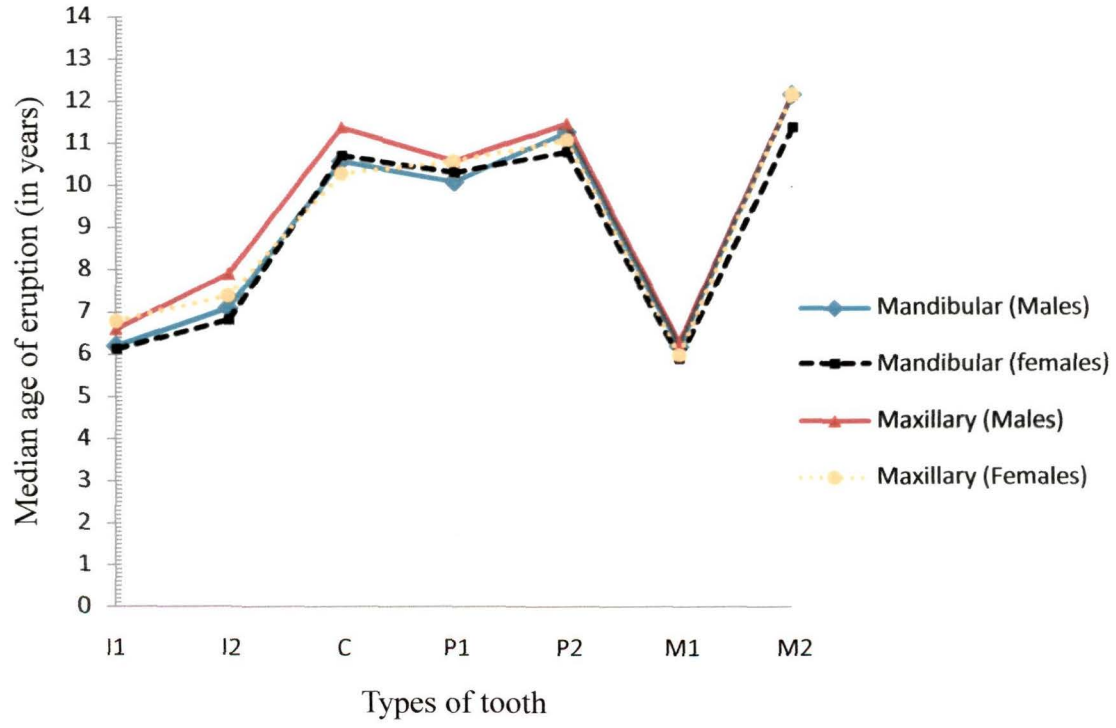


Figure3. Median age eruption of permanent teeth by sex and jaw (right quadrant)

Table 47. Median Age (±S.D) of eruption of permanent teeth by jaw and sex– Sides-pooled

JAW	Sex	I_1	I_2	C_0	P_1	P_2	M_1	M_2	M_3
Mandible	Male	6.2	7.5	10.6	10.2	11.3	6.1	12.1	22.6
	(±S.D)	(0.15)	(0.10)	(0.30)	(0.25)	(0.20)	(0.15)	(0.15)	(0.50)
	Female	6.1	6.9	10.7	10.3	10.8	5.9	11.6	21.8
	(±S.D)	(0.15)	(0.20)	(0.20)	(0.20)	(0.15)	(0.15)	(0.15)	(0.45)
JAW	Sex	I^1	I^2	C^0	P^1	P^2	M^1	M^2	M^3
Maxilla	Male	6.6	7.8	11.5	10.6	11.6	6.3	12.1	22.2
	(±S.D)	(0.15)	(0.15)	(0.35)	(0.25)	(0.25)	(0.10)	(0.10)	(0.45)
	Female	6.7	7.5	10.7	10.6	11.4	5.9	12.2	22.6
	(±S.D)	(0.15)	(0.20)	(0.35)	(0.15)	(0.25)	(0.15)	(0.20)	(0.70)

Table 47 shows the median age of eruption of permanent teeth by jaw and sexes. In both the jaws and sexes, the first tooth to erupt is the first molar of both the jaws in females which is erupted at median age of 5.9(±0.15); followed by mandibular first molar in male and the mandibular central incisor in female 6.1(±0.15). The above table also shows that the lateral incisors (7.5 median ages) of the lower jaw of male and upper jaw of female have erupted at the same time. First premolars have erupted earlier than the canines in both the jaws and sexes.

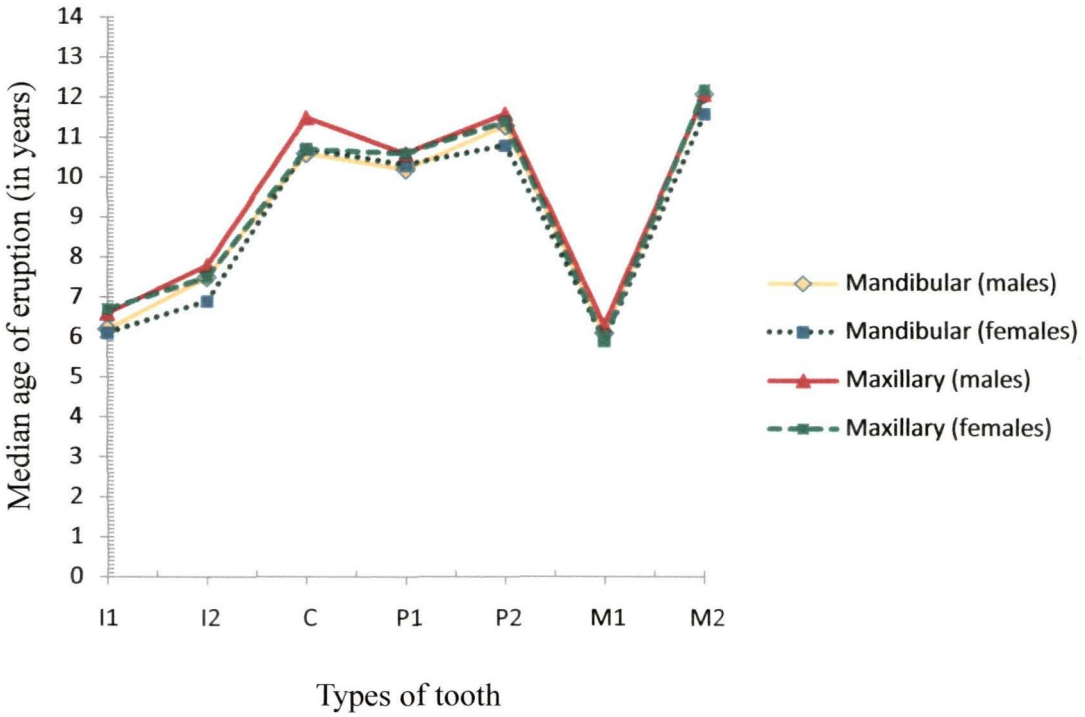


Figure4.Median age of eruption of permanent teeth by jaw and sex (both quadrants combined)

Order of Eruption:

The orders of tooth eruption on both the jaws are as follows:

Left Mandible:

1. Male: $M_1>I_1>I_2>P_1>C_0>P_2>M_2>M_3$
2. Female: $M_1>I_1>I_2>P_1>C_0>P_2>M_2>M_3$

Right Mandible:

1. Male: $I_1>M_1>I_2>P_1>C_0>P_2>M_2>M_3$
2. Female: $M_1>I_1>I_2>P_1>C_0>P_2>M_2>M_3$

Left Maxilla:

1. Male: $M^1>I^1>I^2>P^1>C^0>P^2>M^2>M^3$
2. Female: $M^1>I^1>I^2>C^0>P^1>P^2>M^2>M^3$

Right Maxilla:

1. Male: $M^1>I^1>I^2>P^1>C^0>P^2>M^2>M^3$
2. Female: $M^1>I^1>I^2>C^0>P^1>P^2>M^2>M^3$

Sides pooled:

Mandible:

1. Male: $M_1>I_1>I_2>P_1>C_0>P_2>M_2>M_3$
2. Female: $M_1>I_1>I_2>P_1>C_0>P_2>M_2>M_3$

Maxilla:

1. Male: $M^1>I^1>I^2>P^1>C^0>P^2>M^2>M^3$
2. Female: $M^1>I^1>I^2>P^1>C^0>P^2>M^2>M^3$

In both the jaws and sexes, the first tooth to erupt is the first molar, followed by the medial incisor and the last tooth to erupt is the third molar. The sequence of eruption is as follows: first molar, medial incisor, lateral incisor, first premolar, canine, second premolar, second molar and the third molar.

Both Jaws combined:

Male: $M_1>I_1>M^1>I^1>I_2>I^2>P_1>P^1>C_0>P_2>C^0=P^2>M^2>M^2>M_3>M^3$

Female: $M_1=M^1>I_1>I^1>I_2>I^2>P_1>P^1>C_0>C^0>P_2>P^2>M_2>M^2>M_3>M^3$

When both the jaws are combined then the first tooth to emerge is the mandibular first molar in both the sexes. In female the first molars of both the jaws are erupted at the same time, which is followed by medial incisor of the mandible. In males the mandibular first molar erupts earlier, which is followed by the mandibular medial incisor. Considering the entire teeth; the mandibular teeth show earlier eruption time than their maxillary counterparts. In both the sexes, the mandibular canine erupts after the maxillary first premolar. After the mandibular canine, the mandibular second premolar and maxillary canine erupt in males and females respectively. In males, the canine and second premolar of maxilla is erupted at the same time.

Chapter V

DENTAL AND ORAL PATHOLOGY

Chapter V deals with the dental caries, periodontal diseases and oral hygiene among the Mizo of Aizawl town, Mizoram according to certain socio-economic factors.

Table 48 shows the number and percentage frequencies of caries affected persons by age and sex. Mild and moderate forms of caries affected teeth were first recorded at the age of 2 years in of both the sexes, while severe form of caries is first observed at 4 years and 3 years old males and females respectively. The above table shows that the caries affected individuals are highest in the age group of 26-30 years followed by 31-35 years and then 36-40 years in both the sexes. The present trend shows that the caries affected persons increase up to 31-35 years of age, thereafter it decreases gradually as the age increases, in respect of mild, moderate and severe forms of caries. Table 5.1 also reveals that excepting the mild form of caries, in all other forms, the frequency of male are higher than their female counterparts.

Table 48. Caries affected individuals by age and sex

Age (in yrs)	Mild		Moderate		Severe	
	Male	Female	Male	Female	Male	Female
Below 1	0(0.00)	0(0.00)	0(0.00)	0(0.00)	0(0.00)	0(0.00)
1	0(0.00)	0(0.00)	0(0.00)	0(0.00)	0(0.00)	0(0.00)
2	6(9.68)	7(11.11)	3(4.84)	2(3.17)	0(0.00)	0(0.00)
3	7(12.96)	4(6.78)	4(7.07)	1(1.69)	0(0.00)	1(1.69)
4	11(17.19)	12(21.05)	3(4.69)	2(3.51)	2(3.13)	1(1.75)
5	9(19.57)	10(25.64)	4(8.70)	2(5.13)	3(6.52)	1(2.56)
6	7(18.92)	6(24.00)	4(10.81)	3(12.00)	3(8.11)	2(8.00)
7	7(17.95)	5(10.64)	7(17.95)	3(6.38)	3(7.69)	3(6.38)
8	6(11.11)	4(10.00)	3(5.56)	3(7.50)	2(3.70)	2(5.00)
9	8(18.60)	6(13.33)	4(9.30)	4(8.89)	2(4.65)	2(4.44)
10	6(18.18)	7(19.44)	3(9.09)	4(11.11)	4(12.12)	3(8.33)
11	9(18.37)	8(17.78)	3(6.12)	2(4.44)	1(2.04)	1(2.22)
12	6(14.29)	6(11.76)	2(4.76)	3(5.88)	2(4.76)	1(1.96)
13	7(20.00)	6(15.38)	4(11.43)	4(10.26)	3(8.57)	3(7.69)
14	6(13.33)	7(13.21)	4(8.89)	3(5.66)	1(2.22)	1(1.89)
15	5(11.36)	4(10.53)	3(6.82)	3(7.89)	2(4.55)	2(5.26)
16	8(13.56)	6(8.96)	4(6.79)	5(7.46)	3(5.08)	2(2.98)
17	7(14.89)	8(14.29)	6(12.77)	7(12.50)	5(10.64)	4(7.14)
18	9(15.79)	10(14.93)	6(10.53)	5(7.46)	4(7.02)	4(5.97)
19	11(16.67)	8(14.55)	5(7.58)	5(9.09)	4(6.06)	3(5.45)
20	13(18.84)	11(16.92)	6(6.70)	7(10.77)	4(5.80)	3(4.62)
21	11(17.74)	14(18.92)	6(9.68)	9(12.16)	5(8.06)	6(8.11)
22	8(19.05)	16(21.33)	5(11.90)	9(12.00)	3(7.14)	7(9.33)
23	12(19.05)	14(20.29)	7(11.11)	6(8.70)	5(7.94)	5(7.25)
24	8(17.78)	13(19.12)	4(8.89)	5(7.35)	3(6.67)	3(4.41)
25	9(20.00)	13(18.57)	6(13.33)	6(8.57)	3(6.67)	2(2.86)
26-30	47(21.66)	54(19.22)	39(17.97)	47(16.73)	21(9.68)	31(11.03)
31-35	34(17.26)	29(14.15)	26(13.20)	23(11.22)	19(9.64)	22(10.73)
36-40	27(19.01)	31(17.32)	28(19.72)	33(18.44)	15(10.56)	17(9.50)
41.45	19(16.24)	21(13.46)	14(11.97)	17(10.90)	14(11.97)	18(11.54)
46-50	12(10.26)	14(10.47)	13(11.11)	16(11.94)	11(9.40)	15(11.19)
51-55	8(10.13)	11(9.82)	6(7.59)	12(10.71)	6(7.59)	10(8.93)
56-60	5(5.10)	5(5.43)	7(7.14)	6(6.52)	9(9.18)	8(8.70)
61-65	3(5.88)	5(7.35)	4(7.84)	7(10.29)	7(13.73)	9(13.24)
66-70	3(10.00)	3(9.38)	2(6.67)	3(9.38)	4(13.33)	3(9.38)
71+	8(13.11)	8(11.59)	11(18.03)	15(21.74)	13(21.31)	17(24.64)

Figures in parentheses represent percentage

Table 49. Prevalence of caries in deciduous teeth by age and sex

Age (in months and years)	Mild		Moderate		Severe	
	Male	Female	Male	Female	Male	Female
Below 6 mnts	0(0.00)	0(0.00)	0(0.00)	0(0.00)	0(0.00)	0(0.00)
7-12 mnts	0(0.00)	0(0.00)	0(0.00)	0(0.00)	0(0.00)	0(0.00)
13-18 mnts	2(7.14)	3(8.82)	1(3.57)	1(2.94)	0(0.00)	0(0.00)
19-24 mnts	4(11.43)	4(12.12)	2(5.71)	1(3.03)	0(0.00)	0(0.00)
25-30 mnts	3(11.11)	3(10.00)	2(7.40)	2(6.67)	0(0.00)	0(0.00)
31-36 mnts	4(11.76)	3(11.11)	2(5.88)	2(7.41)	0(0.00)	0(0.00)
37-42 mnts	3(15.00)	4(12.50)	1(5.00)	1(3.13)	1(5.00)	0(0.00)
43-48 mnts	5(15.63)	3(10.00)	2(6.25)	1(3.33)	0(0.00)	1(3.33)
49-54 mnts	11(34.38)	12(44.44)	3(9.38)	2(7.41)	2(6.25)	1(3.70)
5 yrs	13(28.26)	10(25.64)	4(8.70)	2(5.13)	3(6.52)	1(2.56)
6 yrs	7(18.92)	6(24.00)	4(10.81)	3(12.00)	3(8.11)	2(8.00)
7 yrs	7(17.95)	5(10.64)	7(17.95)	3(6.38)	3(7.69)	3(6.38)
8 yrs	5(8.77)	3(7.50)	3(5.26)	3(7.50)	2(3.51)	2(5.00)
9 yrs	7(16.28)	5(11.11)	3(6.98)	3(6.67)	2(4.65)	2(4.44)
10 yrs	4(12.12)	5(13.89)	3(9.09)	3(8.33)	3(9.09)	2(5.56)
11 yrs	6(12.24)	5(11.11)	2(4.08)	2(4.44)	1(2.04)	1(2.22)
12 yrs	4(9.52)	4(7.84)	2(4.76)	3(5.88)	2(4.76)	1(1.96)
13 yrs	3(8.57)	4(10.26)	2(5.71)	3(7.69)	0(0.00)	1(2.56)
14 yrs	0(0.00)	0(0.00)	0(0.00)	0(0.00)	0(0.00)	0(0.00)

Figures in parentheses represent percentage

The prevalence of caries in deciduous teeth by age and sex is presented in Table 49. Mild and moderate forms of caries are recorded earliest at the age group of 13-18 months in both the sexes. The highest percentage of mild form of caries is observed at 49-54 months age group in both the sexes, while for the moderate form, it is 7 years and 6 years in boys and girls respectively. Severe form of caries is recorded highest at the age group of 10 years (9.09%) and 6 years (8.00%) in boys and girls respectively.

Table 50. Prevalence of caries in permanent teeth by age and sex

Age (in years)	Mild		Moderate		Severe	
	Male	Female	Male	Female	Male	Female
6	0(0.00)	0(0.00)	0(0.00)	0(0.00)	0(0.00)	0(0.00)
7	0(0.00)	0(0.00)	0(0.00)	0(0.00)	0(0.00)	0(0.00)
8	0(0.00)	0(0.00)	0(0.00)	0(0.00)	0(0.00)	0(0.00)
9	1(2.33)	1(2.22)	1(2.33)	1(2.22)	0(0.00)	0(0.00)
10	2(6.06)	2(5.56)	0(0.00)	1(2.78)	1(3.03)	1(2.78)
11	3(6.12)	3(6.67)	1(2.04)	0(0.00)	0(0.00)	0(0.00)
12	2(4.76)	2(3.92)	0(0.00)	0(0.00)	0(0.00)	0(0.00)
13	3(8.57)	2(5.13)	2(5.71)	1(2.56)	3(8.57)	2(5.13)
14	6(13.33)	7(13.21)	4(8.89)	3(5.66)	1(2.22)	1(1.89)
15	5(11.36)	4(10.53)	3(6.82)	3(7.89)	2(4.55)	2(5.26)
16	8(13.56)	6(8.96)	4(6.78)	5(7.46)	3(5.08)	2(2.98)
17	7(14.89)	8(14.29)	6(12.77)	7(12.50)	5(10.64)	4(7.14)
18	9(15.79)	10(14.93)	6(10.53)	5(7.46)	4(7.02)	4(5.97)
19	11(16.67)	8(14.55)	5(7.58)	5(9.09)	4(6.04)	3(5.45)
20	13(18.84)	11(16.92)	6(8.70)	7(10.77)	4(5.80)	3(4.62)
21	11(17.74)	14(18.92)	6(9.68)	9(12.16)	5(8.06)	6(8.11)
22	8(19.05)	1621.33)	5(11.90)	9(12.00)	3(7.14)	7(9.33)
23	12(19.05)	14(20.29)	7(11.11)	6(8.70)	5(7.94)	5(7.25)
24	8(17.78)	13(19.12)	4(8.89)	5(7.35)	3(6.67)	3(4.41)
25	9(20.00)	13(18.57)	6(13.33)	6(8.57)	3(6.67)	2(2.86)

Figures in parentheses represent percentage

Table 50 presents the number and percentage of caries affected permanent teeth by age and sex. Caries affected permanent teeth din not present in the age group between 6years and 8 years. By 9 years of age, mild and moderate forms of caries were detected in both the sexes. In males, the highest percentage of mild and moderate forms of caries was found in 25 years of age, while for the severe form is at 17 years. In females, the highest percentage of mild form of caries is recorded at the age of 23 years; the moderate form is at 17 years and the severe form at 22 years. The above table also shows that the percentage of the mild and moderate form of

caries is high in the higher age groups. However, the severe form does not show any particular pattern in the present study population.

Table 51. Position and age-wise distribution of caries affected permanent teeth in male.

Age (in years)	Anterior teeth	Percentage	Posterior teeth	Percentage
6	0	0.00	0	0.00
7	0	0.00	0	0.00
8	0	0.00	0	0.00
9	0	0.00	2	4.65
10	2	6.06	3	9.09
11	2	4.08	4	8.16
12	2	4.76	4	9.52
13	2	5.71	5	14.29
14	4	8.89	8	17.78
15	4	9.09	8	18.18
16	5	8.47	12	20.34
17	5	10.64	11	23.40
18	6	10.53	14	24.56
19	8	12.12	17	25.76
20	11	15.94	18	26.09
21	9	14.52	17	27.42
22	8	19.05	12	28.57
23	12	19.05	22	34.92
24	8	17.78	15	33.33
25	9	20.00	18	40.00
26-30	47	21.66	94	43.32
31-35	44	22.34	86	43.65
36-40	33	23.24	62	43.66
41-45	24	20.51	52	44.44
46-50	27	23.08	55	47.01
51-55	19	24.05	32	40.51
56-60	24	24.49	41	41.84
61-65	13	25.49	22	43.14
66-70	8	26.67	13	43.33
70+	17	27.87	31	50.82

Table 51 reveals that the frequency of caries affected teeth increases with the increase of age group. Caries affected teeth is recorded earliest (4.65%) in the

posterior teeth in the 9 years age- group, whereas, in the anterior teeth, it is at 10 years of age (6.06%). In all the ages, the frequency of caries affected teeth is almost double in the posterior teeth than that of the anterior teeth. By 70 years of age and above, more than 50% of the posterior teeth are affected by caries, while only 27.87% belong to that of the anterior teeth.

Table 52. Position and age-wise distribution of caries affected permanent teeth in female.

Age (in years)	Anterior teeth	Percentage	Posterior teeth	Percentage
6	0	0.00	0	0.00
7	0	0.00	0	0.00
8	0	0.00	0	0.00
9	0	0.00	2	4.44
10	1	2.78	3	8.33
11	0	0.00	3	6.67
12	2	3.92	4	7.84
13	2	5.13	9	12.82
14	3	5.66	11	13.21
15	2	5.26	9	15.79
16	4	5.97	13	19.40
17	5	8.93	19	21.43
18	8	11.94	19	22.39
19	8	14.55	16	25.45
20	11	16.92	21	29.23
21	14	18.92	29	31.08
22	16	21.33	32	36.00
23	14	20.29	25	36.23
24	13	19.12	21	35.29
25	13	18.57	21	37.14
26-30	54	19.22	132	40.93
31-35	42	20.49	74	43.41
36-40	37	20.67	81	45.25
41-45	36	23.08	56	46.15
46-50	31	23.13	45	44.03
51-55	27	24.11	33	46.43
56-60	25	27.17	19	45.65
61-65	19	27.94	21	48.53
66-70	9	28.13	9	53.13
70+	21	30.43	40	57.97

Table 52 shows the position and age-wise distribution of caries affected permanent teeth in female. Caries affected teeth are recorded earliest (4.44%) in the posterior teeth at the age of 9 years, whereas in the anterior teeth (2.78%) it is recorded first at 10 years of age. The above table also shows that like males, in females also the prevalence of carious teeth are almost double in the posterior teeth compared to that of the anterior teeth. In both the sexes, the incidence of caries affected teeth increases with the increase of age group. By 70 years and above, the percentage frequency of the caries affected teeth are recorded to be 30.43% and 57.97% in the anterior and posterior teeth respectively.

Table 53. Prevalence of caries according to literacy

Literacy	Male			Female			Total		
	Present	Absent	Total	Present	Absent	Total	Present	Absent	Total
Illiterate	5	2	7	9	3	12	14	5	19
%	71.43	28.57	0.290	75.00	25.00	0.44	73.68	26.32	0.37
Literate	792	1610	2402	871	1859	2730	1677	3455	5132
%	32.97	67.03	99.71	31.90	68.10	99.56	32.68	67.32	99.63
Total	797	1612	2409	880	1862	2742	1691	3460	5151
%	33.08	69.92	100.00	32.09	67.91	100.00	32.83	67.17	100.00

Bisexual variation, $\chi^2 = 0.79$, df = 1, $p > 0.05$, Insignificant.

According to literacy in male, $\chi^2 = 4.64$, df = 1, $p < 0.05$, Significant.

According to literacy in female, $\chi^2 = 10.18$, df = 1, $p < 0.05$, Significant.

Table 53 shows the prevalence of caries in both the males and females according to literacy. The percentage of the occurrence of caries is observed to be higher among illiterates compared to their literate counterparts in both the sexes. The above table also shows that the prevalence of caries is more in females than that of the males, while among the literates it shows reverse result. The variations according to literacy in respect of both the sexes are statistically significant; however, the bisexual variation is not significant.

Table 54. Prevalence of caries according to income level

		Low income group		Middle income group		High income group		Total
		Male	Female	Male	Female	Male	Female	
Unaffected	No	507	562	705	811	400	489	3474
	%	61.53	59.28	72.23	71.33	65.68	74.43	67.44
Affected	No	317	386	271	326	209	168	1677
	%	38.47	40.72	27.77	28.67	34.32	25.57	32.56
Grand total		824	948	976	1137	609	657	5151
Percentage		15.99	18.4	18.95	22.07	11.82	12.75	100.00

Bisexual variation, $\chi^2 = 7.29$, df = 2, $p < 0.05$, Significant.

According to income level in male, $\chi^2 = 27.21$, df = 2, $p < 0.05$, Significant.

According to income level in female, $\chi^2 = 51.29$, df = 2, $p < 0.05$, Significant.

Prevalence of dental caries according to sex-wise and the income is given in the Table 54. The above table shows that the prevalence of caries is higher in the females in both the low and middle income groups compared that of the males, whereas, the same shows the reverse result in the high income group. The bisexual variation of the prevalence of caries according to the income level is statistically significant. However, the difference of the same, in respect of income among the males ($\chi^2 = 27.21$, df = 2, $p < 0.05$) and females ($\chi^2 = 51.29$, df = 2, $p < 0.05$) are found to be highly significant.

Table 55. Prevalence of caries among the betel nut and leaf with lime (*kuhva*) chewers and non-chewers

Sex		*Kuhva* chewer		With caries		Non-chewer		With caries	
		No.	%	No.	%	No.	%	No.	%
Male	2409	892	37.03	104	11.66	1517	62.97	693	45.68
Female	2742	783	28.56	102	13.03	1959	71.44	778	39.71
Total	5151	1573	30.54	206	4.00	3578	69.46	1471	28.56

Bisexual variation among chewers, $\chi^2 = 0.57$, df = 1, $p > 0.05$, Insignificant.
Chewer and non-chewer in male, $\chi^2 = 160.78$, df = 1, $p < 0.05$, Significant.
Chewer and non-chewer in female, $\chi^2 = 103.85$, df = 1, $p < 0.05$, Significant.

Table 55 shows the prevalence of caries among the chewers and non-chewers of betel nut and leaf with lime (*kuhva*). The above shows that the prevalence of caries among the *kuhva* chewer is very less compared to that of the non-chewers in both the sexes. Among the males, the incidence of caries is found to be approximately four times higher than that of the non-chewers, where in the females; it is approximately three times higher. Difference between both the sexes in respect of the *kuhva* chewers and non-chewers are found significant, while no significant difference was seen in respect of bisexual variation.

Table 56. Prevalence of caries among the smokers and non-smokers

Sex	No	Smokers		With caries		Non-smokers		With caries	
		No	%	No	%	No	%	No	%
Male	2409	754	31.30	114	15.12	1655	68.70	217	13.11
Female	2742	456	16.63	76	16.67	2286	83.37	241	10.54
Total	5151	1049	20.36	190	18.11	4102	79.64	458	11.17

Bisexual variation among smokers $\chi^2 = 0.37$, df = 1, $p > 0.05$, Insignificant.

Bisexual variation among non-smokers $\chi^2 = 4.88$, df = 1, $p < 0.05$, Significant.

Prevalence of caries among the smokers and non-smokers is given in Table 56. In males, the prevalence of caries is higher (915.12%) among the smokers compared to that of the non-smokers (13.11%). In females also the prevalence of caries is observed higher (16.67%) among the smokers compared to that of the non-smokers (10.54%). When both the sexes are combined, the percentage of smokers with caries (18.11%) found higher than that of the non-smokers (11.17%). However, the bisexual variations except among the non-smokers are found statistically insignificant. The above table reveals that smoking increases the incidence of caries.

Table 57. Prevalence of caries among the tobacco chewers and non-chewers

Sex	No. of subject	Tobacco chewers		With caries		Non-chewers		With caries	
		No	%	No	%	No	%	No	%
Male	2409	683	28.35	178	26.06	1726	71.65	368	21.32
Female	2742	948	34.57	253	26.69	1794	65.43	471	26.25
Total	5151	1631	31.66	431	26.43	3520	68.34	839	23.84

Bisexual variation among chewers, $\chi^2 = 0.05$, df = 1, $p > 0.05$, Insignificant.

Bisexual variation among non-chewers, $\chi^2 = 7.27$, df = 1, $p < 0.05$, Significant.

Tobacco chewer *vs*. Non-chewer males, $\chi^2 = 3.89$, df = 1, $p < 0.05$, Significant.

Tobacco chewer *vs*. Non-chewer females, $\chi^2 = 0.04$, df = 1, $p > 0.05$, Insignificant.

Prevalence of caries among the tobacco chewers and non-chewers is given in Table 57. Percentage of caries is found higher among the tobacco chewers in both the sexes than that of the non-chewers, when observed separately as well as when both the sexes combined. The difference between the tobacco chewers and non-chewers in respect of the prevalence of the caries is found to be statically significant among the males only. In respect of this trait, bisexual variation does not show significant difference.

Table 58. Periodontal Index Score in both the deciduous and permanent teeth (mixed dentition) by age and sex

Age (in months and years)	0		0.0-0.2		0.3-0.9		0.7-0.9		1.6-5.0		3.8-8.0	
	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female
Below 6 mnts	41(100.00)	42(100.00)	0(0.00)	0(0.00)	0(0.00)	0(0.00)	0(0.00)	0(0.00)	0(0.00)	0(0.00)	0(0.00)	0(0.00)
7-12 mnts	30(100.00)	35(100.00)	0(0.00)	0(0.00)	0(0.00)	0(0.00)	0(0.00)	0(0.00)	0(0.00)	0(0.00)	0(0.00)	0(0.00)
13-18 mnts	28(100.00)	34(100.00)	0(0.00)	0(0.00)	0(0.00)	0(0.00)	0(0.00)	0(0.00)	0(0.00)	0(0.00)	0(0.00)	0(0.00)
19-24 mnts	35(100.00)	33(100.00)	0(0.00)	0(0.00)	0(0.00)	0(0.00)	0(0.00)	0(0.00)	0(0.00)	0(0.00)	0(0.00)	0(0.00)
25-30 mnts	27(100.00)	30(100.00)	0(0.00)	0(0.00)	0(0.00)	0(0.00)	0(0.00)	0(0.00)	0(0.00)	0(0.00)	0(0.00)	0(0.00)
31-36 mnts	34(100.00)	27(100.00)	0(0.00)	0(0.00)	0(0.00)	0(0.00)	0(0.00)	0(0.00)	0(0.00)	0(0.00)	0(0.00)	0(0.00)
37-42 mnts	20(100.00)	32(100.00)	0(0.00)	0(0.00)	0(0.00)	0(0.00)	0(0.00)	0(0.00)	0(0.00)	0(0.00)	0(0.00)	0(0.00)
43-48 mnts	32(100.00)	30(100.00)	0(0.00)	0(0.00)	0(0.00)	0(0.00)	0(0.00)	0(0.00)	0(0.00)	0(0.00)	0(0.00)	0(0.00)
49-54 mnts	32(100.00)	27(100.00)	0(0.00)	0(0.00)	0(0.00)	0(0.00)	0(0.00)	0(0.00)	0(0.00)	0(0.00)	0(0.00)	0(0.00)
5 yrs	44(95.65)	37(94.87)	2(4.35)	2(5.13)	0(0.00)	0(0.00)	0(0.00)	0(0.00)	0(0.00)	0(0.00)	0(0.00)	0(0.00)
6 yrs	35(94.59)	23(92.00)	2(5.41)	2(8.00)	0(0.00)	0(0.00)	0(0.00)	0(0.00)	0(0.00)	0(0.00)	0(0.00)	0(0.00)
7 yrs	37(94.87)	44(93.33)	2(5.13)	3(6.38)	0(0.00)	0(0.00)	0(0.00)	0(0.00)	0(0.00)	0(0.00)	0(0.00)	0(0.00)
8 yrs	51(94.44)	37(92.50)	2(3.70)	2(5.00)	1(1.85)	1(2.50)	0(0.00)	0(0.00)	0(0.00)	0(0.00)	0(0.00)	0(0.00)
9 yrs	40(93.02)	42(93.33)	2(4.65)	2(4.44)	1(2.33)	1(2.22)	0(0.00)	0(0.00)	0(0.00)	0(0.00)	0(0.00)	0(0.00)
10 yrs	30(90.91)	33(91.67)	2(6.06)	2(5.56)	1(3.03)	1(2.78)	0(0.00)	0(0.00)	0(0.00)	0(0.00)	0(0.00)	0(0.00)
11 yrs	44(89.80)	41(91.11)	3(6.12)	3(6.67)	1(2.04)	1(2.22)	1(2.04)	0(0.00)	0(0.00)	0(0.00)	0(0.00)	0(0.00)
12 yrs	37(88.10)	46(90.20)	3(7.14)	3(5.88)	1(2.38)	1(1.96)	1(2.38)	1(1.96)	0(0.00)	0(0.00)	0(0.00)	0(0.00)
13 yrs	32(91.43)	38(97.44)	2(5.71)	1(2.56)	1(2.85)	0(0.00)	0(0.00)	0(0.00)	0(0.00)	0(0.00)	0(0.00)	0(0.00)
14 yrs	42(93.33)	52(98.11)	2(4.44)	2(3.77)	1(2.22)	1(1.89)	0(0.00)	0(0.00)	0(0.00)	0(0.00)	0(0.00)	0(0.00)

Figures in parenthesis represent percentage

Table 58 shows the periodontal index scores in both the deciduous and permanent teeth (mixed dentition) by age and sex. Till 4 years of age, no periodontal disease was found in the present population. Periodontal index score (0.0-0.2) was first observed at 5 years of age in males (4.35%) and in females (5.13%). Between 8 years and 14 years, except at 13 years in female; there is only one individual each in both the sexes with 0.3-0.9 score. There are only three individuals (both sexes combined) under the score of 0.7-0.9. The above table further shows that in the entire population, not a single child was found who was having periodontal index score of 1.6-5.0 and above.

Table59. Periodontal Index Score in permanent teeth by age and sex

Age (in years)	0		0.0-0.2		0.3-0.9		0.7-0.9		1.6-5.0		3.8-8.0	
	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female
6	37(100.00)	25(100.00)	0(0.00)	0(0.00)	0(0.00)	0(0.00)	0(0.00)	0(0.00)	0(0.00)	0(0.00)	0(0.00)	0(0.00)
7	39(100.00)	47(100.00)	0(0.00)	0(0.00)	0(0.00)	0(0.00)	0(0.00)	0(0.00)	0(0.00)	0(0.00)	0(0.00)	0(0.00)
8	50(92.59)	38(95.00)	2(3.70)	1(2.50)	1(2.33)	1(2.50)	0(0.00)	0(0.00)	1(1.85)	0(0.00)	0(0.00)	0(0.00)
9	39(90.70)	42(93.33)	2(4.65)	2(4.44)	0(0.00)	1(2.22)	0(0.00)	0(0.00)	1(2.33)	0(0.00)	0(0.00)	0(0.00)
10	30(90.91)	33(91.67)	2(6.06)	1(2.78)	1(2.04)	1(2.78)	0(0.00)	1(2.78)	1(3.03)	0(0.00)	0(0.00)	0(0.00)
11	44(89.80)	41(91.11)	2(4.08)	2(4.44)	1(2.38)	2(4.44)	1(2.04)	0(0.00)	0(0.00)	0(0.00)	0(0.00)	0(0.00)
12	37(88.10)	46(90.20)	3((7.14)	2(3.92)	1(2.86)	2(3.92)	0(0.00)	1(1.96)	1(2.38)	0(0.00)	0(0.00)	0(0.00)
13	30(85.71)	35(89.74)	3(8.57)	1(2.56)	2(4.44)	1(2.56)	1(2.86)	1(2.56)	0(0.00)	1(2.56)	0(0.00)	0(0.00)
14	39(86.67)	46(86.79)	2(4.44)	2(3.77)	2(4.55)	2(3.77)	1(2.22)	2(3.77)	1(2.22)	1(1.89)	0(0.00)	0(0.00)
15	39(88.64)	33(86.84)	2(4.55)	2(5.26)	1(1.69)	1(2.63)	1(2.27)	1(2.63)	0(0.00)	1(2.63)	0(0.00)	0(0.00)
16	53(89.83)	59(88.06)	3(5.08)	3(4.48)	1(2.13)	2(2.99)	1(1.69)	2(2.99)	1(1.69)	1(1.49)	0(0.00)	0(0.00)
17	42(89.36)	50(89.29)	2(4.25)	2(3.57)	1(1.75)	1(1.79)	1(2.13)	2(3.57)	1(2.13)	1(1.79)	0(0.00)	0(0.00)
18	53(92.98)	61(91.04)	2(3.51)	3(4.48)	2(3.03)	2(2.99)	0(0.00)	1(1.49)	1(1.75)	0(0.00)	0(0.00)	0(0.00)
19	60(90.91)	50(90.91)	3(4.55)	2(3.64)	2(2.90)	1(1.82)	1(1.52)	1(1.82)	0(0.00)	1(1.82)	0(0.00)	0(0.00)
20	62(89.86)	59(90.77)	3(4.35)	2(3.08)	1(1.61)	2(3.08)	2(2.90)	1(1.54)	0(0.00)	1(1.54)	0(0.00)	0(0.00)
21	57(91.94)	67(90.54)	2(3.23)	3(4.05)	2(4.76)	2(2.70)	1(1.61)	1(1.35)	1(1.61)	1(1.35)	0(0.00)	0(0.00)
22	38(9048)	68(90.67)	1(2.38)	2(2.67)	2(3.17)	2(2.67)	0(0.00)	2(2.67)	1(2.38)	1(1.33)	0(0.00)	0(0.00)
23	57(90.48)	62(89.86)	2(3.17)	3(4.35)	1(2.22)	2(2.90)	1(1.59)	1(1.45)	1(1.59)	1(1.45)	0(0.00)	0(0.00)
24	41(91.11)	61(89.71)	1(2.22)	3(4.41)	1(2.22)	1(1.47)	1(2.22)	2(2.94)	1(2.22)	1(1.47)	0(0.00)	0(0.00)
25	39(86.67)	61(87.14)	2(4.44)	4(5.71)	9(4.15)	2(2.86)	2(2.22)	1(1.43)	1(2.22)	1(1.43)	1(2.22)	1(1.43)
26-30	176(81.11)	228(81.14)	12(5.53)	16(5.69)	12(6.09)	12(4.27)	8(3.69)	10(3.56)	5(2.30)	8(2.85)	7(3.23)	7(2.49)
31-35	155(78.68)	161(78.54)	14(7.11)	19(9.27)	11(7.75)	9(4.39)	9(4.57)	7(3.41)	3(1.52)	5(2.44)	4(2.03)	4(1.95)
36-40	109(76.76)	137(76.54)	11(7.75)	17(9.50)	10(8.55)	14(7.82)	7(4.93)	9(5.03)	1(0.70)	9(5.03)	3(2.11)	4(2.23)
41-45	84(71.79)	114(73.08)	10(8.55)	18(11.54)	12(10.26)	11(7.05)	7(5.98)	8(5.13)	4(3.42)	3(1.92)	2(1.71)	2(1.28)
46-50	76(64.96)	89(66.61)	11(9.40)	20(14.93)	13(16.56)	10(7.46)	6(5.13)	7(5.22)	5(4.27)	3(2.24)	7(5.98)	5(3.73)
51-55	47(59.49)	69(61.61)	9(11.39)	19(16.96)	17(17.35)	9(8.04)	5(6.33)	7(6.25)	3(3.80)	5(4.46)	2(2.53)	3(2.68)
56-60	51(52.04)	48(52.17)	12(12.24)	18(19.57)	10(19.61)	8(8.70)	7(7.14)	6(6.52)	5(5.10)	5(5.43)	6(6.12)	7(7.61)
61-65	25(49.02)	35(51.47)	7(13.73)	14(20.59)	7(23.33)	6(8.82)	4(7.84)	5(7.35)	3(5.88)	4(5.88)	2(3.92)	4(5.88)
66-70	14(46.67)	15(46.88)	4(13.33)	7(21.88)	15(24.59)	3(9.38)	2(6.67)	3(9.38)	2(6.67)	2(6.25)	1(3.33)	2(6.25)
70+	26(42.62)	31(44.93)	9(14.75)	16(23.19)	15(24.59)	8(11.59)	5(8.20)	7(10.14)	4(6.56)	4(5.80)	2(3.28)	3(4.35)

Table 59 shows the number and percentage of periodontal index score in the permanent teeth by age and sex. Up to 7 years old children, no periodontal index score is recorded in the permanent teeth. This table also shows that the percentage of periodontal index score increases as the age increases. There are two individuals in the age group of 8 years, who are under the score of 0.0 to 0.2 each. There are two individuals each under the score of 0.3 to 0.9 and 1.6 to 5.0 respectively. The highest score (i.e. 3.8 to 8.0) is first recorded at the age of 25 years, in both the sexes. The highest percentage of the score of 3.8 to 8.0 is observed at the later age group i.e., 56-60 years in both males and females.

Table 60. Age group-wise distribution of Gingivitis

Age (in years)	Male		Female	
	Number	Percentage	Number	Percentage
0-5	95	29.32	91	27.66
6-10	43	20.87	38	19.69
11-15	25	11.63	23	10.18
16-20	23	7.72	26	8.39
21-25	31	12.06	42	11.80
26-30	29	13.36	41	14.59
31-35	33	16.75	35	17.07
36-40	27	19.01	33	18.45
41-45	21	17.95	36	23.08
46-50	24	20.51	29	21.64
51-55	17	21.52	27	24.11
56-60	23	23.47	21	22.83
61-65	14	27.45	19	27.94
66-70	9	30.00	9	28.13
71+	19	31.15	21	30.43

Age group-wise distribution of gingivitis is shown in Table 60, which shows that the prevalence of gingivitis decreases from the age group of 0-5 years to 16-20 years in both the sexes, thereafter, it gradually increases with the increase of age. The highest percentage of gingivitis is recorded at 71+ years of age in both the males and females subjects.

Table 61. Prevalence of OHI- (DI-S) by age and sex

Age (in years)	Good (0.3-0.6)				Fair (0.7-1.8)				Poor (1.9-3.0)			
	Male		Female		Male		Female		Male		Female	
	No	%	No	%	No	%	No	%	No	%	No	%
0-5	32	9.88	39	11.8	29	8.95	27	8.21	25	7.72	20	6.08
6-10	14	6.80	13	6.74	13	6.31	11	5.70	9	4.37	8	4.15
11-15	9	4.19	9	3.98	6	2.79	6	2.65	1	0.47	2	0.88
16-20	6	2.01	6	1.94	4	1.34	3	0.97	0	0.00	0	0.00
21-25	7	2.72	7	1.97	5	1.95	4	1.12	0	0.00	0	0.00
26-30	5	2.30	6	2.14	3	1.38	5	1.78	0	0.00	0	0.00
31-35	6	3.05	5	2.44	5	2.54	4	1.95	2	1.02	1	0.49
36-40	5	3.52	5	2.79	4	2.82	5	2.79	2	1.41	2	1.12
41-45	4	3.42	6	3.85	5	4.27	4	2.56	1	0.85	2	1.28
46-50	5	4.27	5	3.73	5	4.27	3	2.24	2	1.71	1	0.75
51-55	4	5.06	5	4.46	4	5.06	4	3.57	0	0.00	1	0.89
56-60	5	5.10	4	4.35	3	3.06	2	2.17	2	2.04	3	3.26
61-65	3	5.88	4	5.88	2	3.92	3	4.41	3	5.88	3	4.41
66-70	2	6.67	2	6.25	1	3.33	1	3.12	2	6.67	2	6.25
71+	4	6.56	4	5.80	3	4.92	3	4.35	5	8.20	5	7.25
Total	111	4.61	120	4.38	92	3.82	85	3.10	54	2.24	50	1.82

Table 61 shows the prevalence of Oral Hygiene Index (OHI), Debris Index Simplified - (DI-S) by age and sex among the Mizo of Aizawl town. All the three types of scores are found to be highest in the age group 0-5 years. The percentages of the individuals with OHI-(DI-S) score have initially decreased with the increase of age and thereafter, it tends to increase again. In general, the percentages of the females are lower than the males in all the OHI (DI-S) scores.

Table 62. Prevalence of OHI- (CI-S) by age and sex

Age (in years)	Good (0.3-0.6)				Fair (0.7-1.8)				Poor (1.9-3.0)			
	Male		Female		Male		Female		Male		Female	
	No	%	No	%	No	%	No	%	No	%	No	%
0-5	5	1.54	7	2.13	2	0.62	3	0.91	0	0.00	0	0.00
6-10	7	3.40	4	2.07	4	1.94	5	2.59	5	2.43	3	1.55
11-15	10	4.65	11	4.87	7	3.26	7	3.10	3	1.39	3	1.33
16-20	12	4.03	15	4.84	6	2.01	9	2.90	3	1.01	1	0.32
21-25	14	5.45	18	5.06	6	2.33	11	3.09	1	0.39	5	1.40
26-30	12	5.53	13	4.63	3	1.38	8	2.85	4	1.84	5	1.78
31-35	11	5.58	9	4.39	3	1.52	6	2.93	5	2.54	7	3.41
36-40	8	5.63	7	3.91	4	2.82	6	3.35	5	3.52	6	3.35
41-45	7	5.98	7	4.49	5	4.27	5	3.21	4	3.42	3	1.92
46-50	9	7.69	7	5.22	6	5.13	6	4.48	5	4.27	4	2.99
51-55	6	7.59	5	4.46	5	6.33	3	2.68	7	8.86	4	3.57
56-60	7	7.14	4	4.35	3	3.06	3	3.26	5	5.10	5	5.43
61-65	3	5.88	4	5.88	2	3.92	2	2.94	3	5.88	4	5.88
66-70	2	6.67	2	6.25	1	3.33	1	3.13	2	6.67	3	9.38
71+	3	4.92	4	5.80	2	3.28	3	4.35	5	8.20	6	8.70
Total	116	4.82	117	4.27	59	2.45	78	2.84	57	2.37	59	2.15

Table 62 shows the prevalence of Oral Hygiene Index (OHI), Calculus Index Simplified (CI-S) by age and sex among the Mizo of Aizawl town. Here, not a single individual is found with Poor OHI (CI-S) score (1.9-3.0) up to 0-5 year age group. The above table also shows that the prevalence of all the three scores increase with the increase of the age. In general the prevalence of Good and Fair are slightly higher in males than the females; however, it is reverse in case of the Poor score.

Table 63. Prevalence of (OHI- S) by age and sex

Age (in years)	Good (0.0-1.2)				Fair (1.3-3.0)				Poor (3.1-6.0)			
	Male		Female		Male		Female		Male		Female	
	No	%	No	%	No	%	No	%	No	%	No	%
0-5	215	66.36	218	66.26	67	20.68	65	19.76	42	12.96	46	13.98
6-10	137	66.50	131	67.88	48	23.30	41	21.24	21	10.19	21	10.88
11-15	159	73.95	169	74.78	35	16.28	35	15.49	21	9.77	22	9.73
16-20	238	79.87	243	78.39	34	11.41	41	13.23	26	8.72	26	8.39
21-25	209	81.32	287	80.62	26	10.12	35	9.83	22	8.56	34	9.55
26-30	174	80.18	224	79.72	23	10.60	29	10.32	20	9.22	28	9.96
31-35	143	72.59	157	76.59	28	14.21	25	12.20	26	13.20	23	11.22
36-40	97	68.31	134	74.86	23	16.20	24	13.41	22	15.49	21	11.73
41-45	78	66.67	109	69.87	21	17.95	23	14.74	18	15.38	24	15.38
46-50	74	63.25	87	64.93	25	21.37	22	16.42	18	15.38	25	18.66
51-55	43	54.43	71	63.39	19	24.05	20	17.86	17	21.52	21	18.75
56-60	58	59.18	52	56.52	23	23.47	18	19.57	17	17.35	22	23.91
61-65	26	50.98	32	47.06	14	27.45	17	25.00	11	21.57	19	27.94
66-70	14	46.67	15	46.88	9	30.00	9	28.13	7	23.33	8	25.00
71+	25	40.98	29	42.03	21	34.43	21	30.43	15	24.59	19	27.54
Total	1690	70.15	1958	71.41	416	17.27	425	15.50	303	12.58	359	13.09

The percentage of OHI-S score by age and sex is shown in Table 63 which shows that the highest percentage of individuals belonging to all the three different scores is found in the age group, 70+ years. The percentages of individuals in the score Good decrease as the age group increases; whereas, in respect of the scores, Fair and Poor, it is the result is reverse. The percentage of the Good and Poor scores are higher among the females compared to that of the males, whereas, the Fair score is found in higher percentage among the males.

Table 64. Chewing of betel nut and leaf with lime (*kuhva*) and prevalence of periodontal diseases

Sex	*Kuhva* Chewers		With periodontal diseases		Non-chewers		With periodontal diseases	
	No	%	No	%	No	%	No	%
Male	892	37.03	281	31.50	1517	62.97	747	49.24
Female	783	28.56	257	32.82	1959	71.44	791	40.38
Total	1573	30.54	538	34.20	3578	69.46	1538	42.98

Bisexual variation among the chewer, $\chi^2 = 0.17$, df = 1, $p > 0.05$, Insignificant.

Bisexual variation among the non-chewer, $\chi^2 = 10.45$, df = 1, $p < 0.05$, Significant.

Chewer vs. Non-chewer male, $\chi^2 = 30.1$, df = 1, $p < 0.05$, Significant.

Chewer vs. Non-chewer female, $\chi^2 = 6.19$, df = 1, $p < 0.05$, Significant.

Table 64 shows the number and percentage of periodontal disease in respect of the *kuhva* chewers and non-chewers. Among the *kuhva* chewers the percentage of individuals with periodontal disease is slightly higher in the females than in males, whereas in case of non-chewers it is found to be reverse. The above table also shows that the prevalence of periodontal diseases is low among the *kuhva* chewers compared to that of the non-chewers. The difference between the k*uhva* chewers and non-chewers are statistically significant in both the sexes in respect of the prevalence of the periodontal disease, which reveals that there is inverse association between the chewing of *kuhva* and the periodontal disease.

Table 65. Smoking and prevalence of periodontal diseases

Sex	Smokers		With periodontal diseases		Non-smokers		With periodontal diseases	
	No	%	No	%	No	%	No	%
Male	754	31.30	397	52.65	1655	68.70	671	40.54
Female	456	16.63	293	64.25	2286	83.37	749	32.76
Total	1049	20.36	690	65.78	4102	79.64	1410	34.37

Bisexual variation among smokers, $\chi^2 = 4.19$, df = 1, $p < 0.05$, Significant.
Bisexual variation among non-smokers, $\chi^2 = 11.75$ df = 1, $p < 0.05$ Significant.
Smoker vs. non-smoker males, $\chi^2 = 11.52$, df = 1, $p < 0.05$, Significant.
Smoker vs. non-smoker females, $\chi^2 = 62.79$, df = 1, $p < 0.05$, Significant.

The prevalence of periodontal disease among smokers and non-smokers is given in Table 65 which shows that the percentage of periodontal disease is higher among the smokers compared to that of the non-smokers. The variations between the smokers and non-smokers as well as sex-wise are statistically significant.

Table 66. Chewing tobacco and prevalence of periodontal diseases

Sex	Chewers		With periodontal diseases		Non-chewers		With periodontal diseases	
	No	%	No	%	No	%	No	%
Male	683	28.35	432	63.25	1726	71.65	729	42.24
Female	948	34.57	573	60.44	1794	65.43	741	41.30
Total	1631	31.66	1005	61.62	3520	68.34	1470	41.76

Bisexual variation among chewer, $\chi^2 = 0.76$, df = 1, $p > 0.05$, Insignificant.
Bisexual variation among non- chewer, $\chi^2 = 0.13$, df = 1, $p > 0.05$, Insignificant.
Chewer vs. non- chewer male, $\chi^2 = 28.62$, df = 1, $p < 0.05$, Significant.
Chewer vs. non- chewer female, $\chi^2 = 30.93$, df = 1, $p < 0.05$, Significant.

Chewing tobacco and prevalence of periodontal disease is given in Table 66 which shows that its prevalence is higher in males than the females, irrespective of the tobacco chewers and non-chewers. The above table further shows that the percentage of tobacco chewers are higher in females, however, the percentage of individuals with periodontal disease is more in males. When both the sexes are combined, the percentage of individuals with periodontal disease is found higher (61.62%) among those subjects who are the tobacco chewers compared to the non-chewers (41.76%). The difference between the tobacco chewers and the non-chewers are statistically significant in respect of the prevalence of periodontal disease.

Table 67. Prevalence of OHI (CI-S) according to family size

		Small family (less than 5 members)		Medium family (5-6 members)		Large family (more than 6 members)		Total
		Male	Female	Male	Female	Male	Female	
Unaffected	Number	609	709	1072	1231	496	548	4665
	Percentage	90.49	90.78	90.16	91.59	90.68	88.82	90.56
Affected	Number	64	72	117	113	51	69	486
	Percentage	9.51	9.22	9.84	8.41	9.32	11.18	9.44
Grand total	Number	673	781	1189	1344	547	617	5151
	Percentage	27.94	28.48	49.36	49.02	22.71	22.50	100.00

Affected and unaffected in male, $\chi^2 = 0.12$, df = 2, $p > 0.05$, Insignificant.
Affected and unaffected in female, $\chi^2 = 3.88$, df = 2, $p > 0.05$, Insignificant.
Affected and unaffected in small family, $\chi^2 = 0.04$, df = 1, $p > 0.05$, Insignificant.
Affected and unaffected in medium family, $\chi^2 = 0.90$, df = 1, $p > 0.05$ Insignificant.
Affected and unaffected in large family, $\chi^2 = 1.09$, df = 1, $p < 0.05$, Insignificant.

Prevalence of OHI (CI-S) according to family size is presented in Table 67. Among the males, the occurrence of OHI (CI-S) observed to be highest in the medium family size (9.84%) followed by small family size (9.51%). However, no significant differences were observed in respect of the family size. Among the females, the highest percentage of prevalence of OHI (CI-S) is observed in the large family size (11.18%) followed by the small family size (9.22). Lowest prevalence of the OHI (CI-S) was observed in the large family size in respect of the males (9.32%) and medium size (8.41%) in respect of the females. However, the difference between the affected and unaffected in respect of OHI (CI-S) according to family size is found statistically insignificant.

Table 68. Prevalence of OHI (DI-S) according to family size

		Small family (less than 5 members)		Medium family (5-6 members)		Large family (more than 6 members)		Total
		Male	Female	Male	Female	Male	Female	
Unaffected	Number	604	700	1068	1205	480	550	4607
	Percentage	89.75	89.63	89.82	89.66	87.75	91.41	89.44
Affected	Number	69	81	121	139	67	67	544
	Percentage	10.25	10.37	10.18	10.34	12.25	10.86	10.56
Grand total	Number	673	781	1189	1344	547	617	5151
	Percentage	27.94	28.48	49.36	49.02	22.71	22.50	100.00

Affected and unaffected in male, $\chi^2 = 1.85$, df = 2, $p > 0.05$, Insignificant.
Affected and unaffected in female, $\chi^2 = 0.13$, df = 2, $p > 0.05$, Insignificant.
Affected and unaffected in small family, $\chi^2 = 0.005$, df = 1, $p > 0.05$, Insignificant.
Affected and unaffected in medium family, $\chi^2 = 0.02$, df = 1, $p > 0.05$, Insignificant.
Affected and unaffected in large family, $\chi^2 = 0.55$, df = 1, $p > 0.05$, Insignificant.

Table 68 shows the prevalence of Oral Hygiene Index (Debris Index-Simplified) OHI (DI-S) according to family size. The percentage of affected males is highest in the large family size (12.25%). Small and medium sized families do not show many differences. Among the females, the highest prevalence of OHI (DI-S) is recorded in the large family size (10.86%) followed by the small family size (10.37%). However, no significant differences were observed in the prevalence of OHI (DI-S) in respect of the family size. Prevalence of OHI (DI-S) is statistically insignificant according to the family size and sex.

Table 69. Prevalence of OHI (S) according to family size

		Small family (less than 5 members)		Medium family (5-6 members)		Large family (more than 6 members)		Total
		Male	Female	Male	Female	Male	Female	
Unaffected	Number	530	639	963	1101	427	493	4153
	Percentage	78.75	81.92	80.99	81.82	78.06	79.90	80.63
Affected	Number	143	142	226	243	120	124	998
	Percentage	21.25	18.18	19.01	18.08	21.94	20.10	19.37
Grand total	Number	673	781	1189	1344	547	617	5151
	Percentage	27.94	28.48	49.36	49.02	22.71	22.50	100.00

Affected and unaffected in male, $\chi^2 = 2.51$, df = 2, $p > 0.05$, Insignificant.
Affected and unaffected in female, $\chi^2 = 1.24$, df = 2, $p > 0.05$, Insignificant.
Affected and unaffected in small family, $\chi^2 = 2.16$, df = 1, $p > 0.05$, Insignificant.
Affected and unaffected in medium family, $\chi^2 = 0.37$, df = 1, $p > 0.05$, Insignificant.
Affected and unaffected in large family, $\chi^2 = 0.60$, df = 1, $p > 0.05$, Insignificant.

Table 69 shows the prevalence of Oral Hygiene Index-Simplified [OHI (S)] according to family size where the highest prevalence (21.94%) of the OHI (S) was observed among the individuals that belong to the large family size, which is followed by the small family size (21.25%) among the males and the same trend was observed in the females also. However, the differences between the affected and unaffected of the OHI(S) in respect of family sizes are not found statistically significant.

Table 70. Prevalence of Gingivitis according to family size

		Small family (less than 5 members)		Medium family (5-6 members)		Large family (more than 6 members)		Total
		Male	Female	Male	Female	Male	Female	
Unaffected	Number	560	649	970	1104	446	498	4227
	Percentage	83.21	83.10	81.58	82.14	81.54	80.71	82.06
Affected	Number	113	132	219	240	101	119	924
	Percentage	16.79	16.90	18.42	17.86	18.46	19.29	17.94
Grand total	Number	673	781	1189	1344	547	617	5151
	Percentage	27.94	28.48	49.36	49.02	22.71	22.50	100.00

Affected and unaffected male, $\chi^2 = 0.90$, df = 2, $p > 0.05$, Insignificant.

Affected and unaffected female, $\chi^2 = 1.35$, df = 2, $p > 0.05$, Insignificant.

Affected and unaffected in small family, $\chi^2 = 0.002$, df = 1, $p > 0.05$, Insignificant.

Affected and unaffected in medium family, $\chi^2 = 0.13$, df = 1, $p > 0.05$, Insignificant.

Affected and unaffected in large family, $\chi^2 = 0.12$, df = 1, $p > 0.05$, Insignificant.

Table 70 shows the prevalence of gingivitis according to family size. Highest percentage of gingivitis in males is observed in large family size (18.46%) followed by the medium family size (18.42%) and lowest was recorded in the small family size. Same trend was observed in the females also. However, no statistical significant difference between the affected and unaffected was observed between the sexes and family sizes.

Table 71. Prevalence of Periodontal disease according to income

		Low income group		Middle income group		High income group		Total
		Male	Female	Male	Female	Male	Female	
Unaffected	No	585	668	810	936	537	625	4161
	%	77.28	78.87	79.57	79.93	84.70	86.33	80.78
Affected	No	172	179	208	235	97	99	990
	%	22.72	21.13	20.43	20.07	15.30	13.67	19.22
Total	No	757	847	1018	1171	634	724	5151
	%	14.70	16.44	19.76	22.73	12.31	14.06	100.00

Affected and unaffected in male, $\chi^2 = 12.41$, df = 2, $p < 0.05$, Significant.
Affected and unaffected in female, $\chi^2 = 16.77$, df = 2, $p < 0.05$, Significant.
Affected and unaffected in low income, $\chi^2 = 0.59$, df = 1, $p > 0.05$, Insignificant.
Affected and unaffected in middle income, $\chi^2 = 0.04$, df = 1, $p > 0.05$, Insignificant.
Affected and unaffected in high income, $\chi^2 = 0.73$, df = 1, $p > 0.05$, Insignificant.

The prevalence of periodontal disease according to income is presented in Table 71 which shows that in both the sexes, the percentage of periodontal disease is recorded highest in the low income group followed by the middle income group. In all the three income groups, periodontal diseases are observed to be higher in males than their female counterpart. In respect of the income also, the prevalence of the periodontal disease do not differ significantly.

Table 72. Prevalence of OHI (DI-S) according to income

		Low income group		Middle income group		High income group		Total
		Male	Female	Male	Female	Male	Female	
Unaffected	No	659	735	931	1056	587	664	4632
	%	87.05	86.78	91.45	90.18	92.59	91.71	89.92
Affected	No	98	112	87	115	47	60	519
	%	12.95	13.22	8.55	9.82	7.41	8.29	10.08
Grand total	No	757	847	1018	1171	634	724	5151
	%	14.70	16.44	19.76	22.73	12.31	14.06	100.00

Affected and unaffected in male, $\chi^2 = 14.52$, df = 2, $p < 0.05$, Significant.

Affected and unaffected in female, $\chi^2 = 11.06$, df = 2, $p < 0.05$, Significant.

Affected and unaffected in low income, $\chi^2 = 0.02$, df = 1, $p > 0.05$, Insignificant.

Affected and unaffected in middle income, $\chi^2 = 1.06$, df = 1, $p > 0.05$, Insignificant.

Affected and unaffected in high income, $\chi^2 = 0.34$, df = 1, $p > 0.05$, Insignificant.

The prevalence of Oral Hygiene Index, Debris Index-Simplified, OHI (DI-S) according to income level is shown in Table 72 which shows that OHI (DI-S) are higher (8.29%) in females compared to the males (7.41%) in the high income group. The percentage of individuals having OHI (DI-S) are found highest in the lower income group (12.95% in males; 13.22% in females) and lowest is in high income group (7.41% in males; 8.29% in females) which reveals that the income also plays some role in regulating the prevalence of oral hygiene index.

Table 73. Prevalence of OHI (CI-S) according to income

		Low income group		Middle income group		High income group		Total
		Male	Female	Male	Female	Male	Female	
Unaffected	No	676	758	917	1059	584	671	4665
	%	89.30	89.49	90.08	90.44	92.11	92.68	90.56
Affected	No	81	89	101	112	50	53	486
	%	10.70	10.51	9.93	9.56	7.89	7.32	9.44
Grand total	No	757	847	1018	1171	634	724	5151
	%	14.70	16.44	19.76	22.73	12.31	14.06	100.00

Affected and unaffected in male, $\chi^2 = 3.31$, df = 2, $p > 0.05$, Insignificant.
Affected and unaffected in female, $\chi^2 = 4.93$, df = 2, $p > 0.05$, Insignificant.
Affected and unaffected in low income, $\chi^2 = 0.02$, df = 1, $p > 0.05$, Insignificant.
Affected and unaffected in middle income, $\chi^2 = 0.08$, df = 1, $p > 0.05$, Insignificant.
Affected and unaffected in high income, $\chi^2 = 0.16$, df = 1, $p > 0.05$, Insignificant.

The prevalence of Oral Hygiene Index, Calculus Index-Simplified, OHI (CI-S) according to income is presented in Table 73, which shows that the total percentage of the persons having OHI (CI-S) is 9.44%. In respect of OHI (CI-S), female subjects show less prevalence than their male counterpart. In both the sexes the prevalence of OHI (CI-S) found to be highest among the individuals belonging to the low income group (male 10.70%; female 10.51%) followed by the middle income group (males 9.93%,females 9.56%) and lowest in the high income group (males - 7.89%; females- 7.32%). However, no significant difference was found between the affected and unaffected individuals, in respect of the family income.

Table 74. Prevalence of OHI (S) according to income

		Low income group		Middle income group		High income group		Total
		Male	Female	Male	Female	Male	Female	
Unaffected	No	576	645	821	960	523	628	4153
	%	76.09	76.15	80.65	81.98	82.49	86.74	80.63
Affected	No	181	202	197	211	111	96	998
	%	23.91	23.85	19.35	18.02	17.51	13.26	19.37
Grand total	No	757	847	1018	1171	634	724	5151
	%	14.70	16.44	19.76	22.73	12.31	14.06	100.00

Affected and unaffected in male, $\chi^2 = 9.71$, df = 2, $p < 0.05$, Significant.
Affected and unaffected in female, $\chi^2 = 29.36$, df = 2, $p < 0.05$, Significant.
Affected and unaffected in low income, $\chi^2 = 0.0008$, df = 1, $p > 0.05$, Insignificant.
Affected and unaffected in middle income, $\chi^2 = 0.64$, df = 1, $p > 0.05$, Insignificant.
Affected and unaffected in high income, $\chi^2 = 4.72$, df = 1, $p < 0.05$, Insignificant.

Prevalence of Oral Hygiene Index (Simplified) OHI (S) according to income is presented in Table 74, which shows that this index prevails in a total of 19.37% individuals belonging to all income groups viz., high, middle and low income groups. The prevalence of OHI (S) found to be highest in the low income group followed by middle income group and lowest in the high income group in both the sexes. When compared between the males and females, males show slightly higher OHI (S) in all the income groups than their female counterpart. However, statistically no significant difference was observed between the sexes in respect of affected and unaffected OHI (S) in the three different income groups. The above table reveals that income also plays some role in regulating the prevalence of OHI(S) in the present population.

Table 75. Prevalence of Gingivitis according to income

		Low income group		Middle income group		High income group		Total
		Male	Female	Male	Female	Male	Female	
Unaffected	No	610	675	835	962	531	614	4227
	%	80.58	79.69	82.02	82.15	83.75	84.81	82.06
Affected	No	147	172	183	209	103	110	924
	%	19.42	20.31	17.98	17.85	16.25	15.19	17.94
Grand total	No	757	847	1018	1171	634	724	5151
	%	14.70	16.44	19.76	22.73	12.31	14.06	100.00

Affected and unaffected in male, $\chi^2 = 2.35$, df = 2, $p > 0.05$, Insignificant.
Affected and unaffected in female, $\chi^2 = 6.95$, df = 2, $p < 0.05$, Significant.
Affected and unaffected in low income, $\chi^2 = 0.19$, df = 1, $p > 0.05$, Insignificant.
Affected and unaffected in middle income, $\chi^2 = 0.006$, df = 1, $p > 0.05$, Insignificant.
Affected and unaffected in high income, $\chi^2 = 0.28$, df = 1, $p > 0.05$, Insignificant.

Table 75 shows the prevalence of gingivitis according to income among the Mizo of Aizawl town, Mizoram. The above table shows that 17.94% of individuals are affected by gingivitis irrespective of their income. Highest percentage of gingivitis is observed among the low income group (males- 19.42%; females- 20.31%) followed by the middle income group (male- 17.98%; females- 17.85%) and lowest in the high income group (males- 16.25%); females- 15.19%). The percentage of gingivitis decreases as the income level increases. There is no significant difference observed between affected and unaffected males and females in respect of the prevalence of gingivitis. The above table also shows that gingivitis is also regulated by income of the individuals in the present population.

Chapter VI

DENTAL MORPHOLOGY

This chapter deals with the dental morphology of the Mizo of Aizawl town of Mizoram. We have included the occurrence of supernumerary teeth, carabelli's cusps, shovel-shaped incisors, diastema, crowding and cingulum for the present study.

Table76. Occurrence of supernumerary teeth by sex among the Mizo of Aizawl town

Sex	No. of subjects with deciduous teeth			No. of subjects with permanent teeth		
	Number of subjects examined	With super-numerary teeth	Percen-tage	Number of subjects examined	With super-numerary teeth	Percen-tage
Male	701	0	0.00	1708	33	1.93
Female	710	0	0.00	2032	47	2.31
Total	1411	0	0.00	3740	80	2.14

Table 76 shows the occurrence of supernumerary teeth by sex among the Mizo subjects of Aizawl town. Supernumerary teeth are present only in the permanent dentition, where 33(1.93%) males and 47(2.31%) females are with the supernumerary teeth. The overall percentage of the supernumerary teeth among the Mizo is 2.14%. This morphological trait is found absent in the deciduous teeth of both the sexes.

Table 77. Frequency distribution of subjects with supernumerary teeth by age group and sex

Age group (in years)	Male			Female		
	Number of subjects examined	With super-numerary teeth	Percen -tage	Number of subjects examined	With super-numerary teeth	Percen -tage
0-5	324	0	0.00	329	0	0.00
6-10	206	0	0.00	193	0	0.00
11-15	215	3	1.40	226	5	2.21
16-20	298	11	3.69	310	8	2.58
21-25	257	6	2.33	356	13	3.65
26-30	217	2	0.92	281	6	2.13
31-35	197	3	1.52	205	1	0.49
36-40	142	3	2.11	179	5	2.79
41-45	117	1	0.85	156	2	1.28
46-50	117	2	1.71	134	1	0.75
51-55	79	1	1.27	112	3	2.68
56-60	98	0	0.00	92	2	2.17
61-65	51	1	1.96	68	0	0.00
66-70	30	0	0.00	32	1	3.13
71+	61	0	0.00	69	0	0.00
Total	2409	33	1.37	2742	47	1.71

Table 77 shows the frequency distribution of the subjects with supernumerary teeth by age group and sex. The percentage frequencies of supernumerary teeth are found highest in the age group of 16-20 years in males (3.69%) and 21-25 years in females (3.65%). The total numbers and percentages of supernumerary teeth are 33(1.37%) in males and 47(1.71%) in females. The above table also shows that the percentage of supernumerary teeth increases up to 16-20 years of age group in males and 21-25 years in the female subjects. No supernumerary teeth were observed in the earlier age groups till 10 years old children and again in the 70+ years old males and females.

Table78. Incidence of supernumerary permanent teeth by jaws and sex

Jaws		Male					Female					Both the sexes combined				
		Number of teeth examined	With supernumerary teeth				Number of teeth examined	With supernumerary teeth				Number of teeth examined	With supernumerary teeth			
			Left	%	Right	%		Left	%	Right	%		Left	%	Right	%
Maxilla	I1	3416	2	0.06	1	0.03	4064	4	0.10	5	0.12	7480	6	0.08	6	0.08
	I2	3416	0	0.00	3	0.09	4064	2	0.05	3	0.07	7480	2	0.03	6	0.08
	C	3416	4	0.12	7	0.20	4064	6	0.15	7	0.17	7480	10	0.13	14	0.19
	P1	3416	1	0.03	2	0.06	4064	1	0.02	0	0.00	7480	2	0.03	2	0.03
	P2	3416	0	0.00	0	0.00	4064	0	0.00	2	0.05	7480	0	0.00	2	0.03
	M1	3416	3	0.09	1	0.03	4064	2	0.05	1	0.02	7480	5	0.07	2	0.03
	M2	3416	0	0.00	0	0.00	4064	0	0.00	0	0.00	7480	0	0.00	0	0.00
	M3	2193	0	0.00	0	0.00	2672	0	0.00	0	0.00	4865	0	0.00	0	0.00
	Total	26105	10	0.04	14	0.05	31120	15	0.05	18	0.06	57225	25	0.04	32	0.06
Mandible	I1	3416	1	0.03	0	0.00	4064	2	0.05	3	0.07	7480	3	0.04	3	0.04
	I2	3416	1	0.03	1	0.03	4064	0	0.00	1	0.02	7480	1	0.01	2	0.03
	C	3416	2	0.06	3	0.09	4064	3	0.07	2	0.05	7480	5	0.07	5	0.07
	P1	3416	0	0.00	0	0.00	4064	0	0.00	0	0.00	7480	0	0.00	0	0.00
	P2	3416	0	0.00	0	0.00	4064	1	0.02	0	0.00	7480	1	0.01	0	0.00
	M1	3416	1	0.03	0	0.00	4064	2	0.05	0	0.00	7480	3	0.04	0	0.00
	M2	3416	0	0.00	0	0.00	4064	0	0.00	0	0.00	7480	0	0.00	0	0.00
	M3	2240	0	0.00	0	0.00	2715	0	0.00	0	0.00	4955	0	0.00	0	0.00
	Total	26152	5	0.02	4	0.02	31163	8	0.03	6	0.02	57315	13	0.03	10	0.02

Table 78 shows the incidence of supernumerary permanent teeth by jaw and sex. Highest frequency of supernumerary teeth in both the jaws and sexes were observed in the canine teeth, followed by the medial incisors. No supernumerary teeth were observed on the second and the third molars of both the jaws and sexes. The above table also reveals that the incidence of supernumerary teeth is higher in the upper jaw than that of the lower jaw.

Table 79. Frequency distribution of carabelli's anomaly in deciduous teeth

Sex	No. of subjects examined	No. Subjects with Carabelli's anomaly	Percentage
Male	701	59	8.42
Female	710	46	6.48

Table 79 shows the frequency distribution of carabelli's anomaly in the deciduous teeth, where the number and percentage of this trait are 59(8.42%) and 46(6.48%) in males and females respectively. The above table further shows that carabelli's anomaly occurs in higher percentage (8.42%) among the males than that of their female counterparts (6.48%).

Table 80. Frequency distribution of children with carabelli's anomaly by age and sex

Age (in years)	Sex					
	Males			Females		
	No. of subjects examined	Number with Carabelli's anomaly	Percen -tage	No. of subjects examined	Number with Carabelli's anomaly	Percen -tage
Below 1	40	0	0.00	42	0	0.00
1	58	0	0.00	69	0	0.00
2	62	2	3.23	63	1	1.59
3	54	6	11.11	59	5	8.47
4	64	9	14.06	57	7	12.28
5	46	5	10.87	39	3	7.69
6	37	3	8.11	25	2	8.00
7	39	4	10.26	47	5	10.64
8	57	7	12.28	40	4	10.00
9	43	5	11.63	45	3	6.67
10	33	3	9.09	36	2	5.56
11	49	6	12.24	45	4	8.89
12	42	4	9.52	51	4	7.84
13	35	2	5.71	39	2	5.13
14	45	3	6.67	53	4	7.55
Total	701	59	8.42	710	46	6.48

Frequency distribution of children with carabelli's anomaly by age and sex is given in Table 80 which shows that up to 1 year of age this trait was not present. Highest percentage of carabelli's anomaly i.e. 14.06% in the boys and 12.28% in the girls were observed in the age group of 4 years. In general, the frequency of the carabelli's cusp increases with the increase in age up to 4 years in both boys and girls, thereafter, the frequency starts decreasing. The above table also shows that the total frequency of carabelli's anomaly is higher in boys (8.42%) than that of the girls (6.48).

Table 81. Frequency distribution of subjects with carabelli's anomaly by age and sex

Age group (in years)	Male			Female		
	No. of subjects examined	Number of subjects with Carabelli's anomaly	Percent age	No. of subjects examined	Number of subjects with Carabelli's anomaly	Percen tage
0-5	324	22	6.79	329	16	4.86
6-10	206	22	10.68	193	16	8.29
11-15	215	24	11.16	226	19	8.41
16-20	298	37	12.42	310	33	10.65
21-25	257	33	12.84	356	39	10.96
26-30	217	19	8.76	281	24	8.54
31-35	197	14	7.11	205	11	5.37
36-40	142	9	6.34	179	18	10.06
41-45	117	5	4.27	156	9	5.77
46-50	117	7	5.98	134	6	4.48
51-55	79	4	5.06	112	6	5.36
56-60	98	8	8.16	92	4	4.35
61-65	51	1	1.96	68	3	4.41
66-70	30	0	0.00	32	1	3.13
71+	61	2	3.28	69	0	0.00
Total	2409	207	8.59	2742	205	7.48

The frequency distribution of subjects with carabelli's anomaly is given in Table 81, which shows that this trait is present in almost all the age groups in both the sexes excepting the age group 66-70 years in the males and 70+ years in the females. Highest percentage of the males (12.84%) and females (10.96) with this trait are observed in the age groups 21-25 years each. The percentage of the persons with carabelli's anomaly initially increases as the age group increases and then gradually decreases in respect of both the sexes.

Table 82. Frequency distribution of children with shovel-shaped incisors by age and sex

Age (in years)	Male			Female		
	No. of subjects examined	No. of subjects with shovelling	Percent age	No. of subjects examined	No. of subjects with shovelling	Percen tage
Below 1	40	0	0.00	42	0	0.00
1	58	2	3.45	69	3	4.35
2	62	2	3.23	63	5	7.94
3	54	1	1.85	59	2	3.39
4	64	4	6.25	57	3	5.26
5	46	1	2.17	39	3	7.69
6	37	3	8.11	25	1	4.00
7	39	2	5.13	47	4	8.51
8	57	5	8.77	40	2	5.00
9	43	3	6.98	45	2	4.44
10	33	1	3.03	36	1	2.78
11	49	4	8.16	45	2	4.44
12	42	3	7.14	51	5	9.80
13	35	3	8.57	39	2	5.13
14	45	4	8.89	53	3	5.66
Total	701	38	5.42	710	38	5.35

Table 82 shows the number and percentage of shovel-shaped incisors in children by age and sex. The percentage of shovel-shaped incisors is slightly higher in males (5.42%) than in females (5.35%). The highest percentage of this trait is found at 14 years and 12 years of age in the males and females respectively. In respect of shovel-shaped incisors, the present population does not show any specific trend. In both the sexes, shovel-shaped incisors are not found at the age of below 1 year.

Table 83. Incidence of shovel-shaped incisors in permanent teeth by jaw and sex

Teeth	Male									Female								
	No. of teeth examined	Proportion with shovelling								No. of teeth examined	Proportion with shovelling							
		Mild		Moderate		Severe		Total			Mild		Moderate		Severe		Total	
		No.	%	No.	%	No.	%	No.	%		No.	%	No.	%	No.	%	No.	%
Maxilla																		
CI	2085	145	6.95	94	4.51	32	1.53	271	12.99	2424	161	6.64	113	4.66	45	1.86	319	13.16
LI	2069	121	5.85	68	3.29	12	0.58	201	9.71	2409	129	5.35	81	3.36	21	0.87	231	9.59
Total	4154	266	6.40	162	3.90	44	1.06	472	11.36	4833	290	6.00	194	4.01	66	1.37	550	11.38
Mandible																		
CI	2079	54	2.60	23	1.11	0	0.00	77	3.70	2401	62	2.58	31	1.29	2	0.08	95	3.96
LI	2051	43	2.10	17	0.82	0	0.00	60	2.93	2398	47	1.96	22	0.92	0	0.00	69	2.88
Total	4130	97	2.35	40	0.97	0	0.00	137	3.32	4799	109	2.27	53	1.10	2	0.04	164	3.42

CI= central incisors, LI= lateral incisors.

Table 83 shows that the incidence of shovel-shaped incisors in permanent teeth by jaws and sex. The incidence of shovelling is found slightly higher females compared to that of the males in both the jaws. But, when jaw-wise compared, the incidence of shovelling is much higher in maxillary incisors than that of the mandibular. The above table further shows that this trait occurs in much higher frequency in the central incisor compared to the lateral incisors. In the present population, the mild form of shovelling observed to be highest followed by the moderate and the least is the severe form.

Table 84. Frequency distribution of children with diastema by age and sex

Age (in years)	Male			Female		
	No. of subjects examined	With diastema	Percen -tage	No. of subjects examined	With diastema	Percen -tage
Below 1	40	0	0.00	42	0	0.00
1	58	6	10.34	69	7	10.14
2	62	15	24.19	63	13	20.63
3	54	13	24.07	59	13	22.03
4	64	18	28.13	57	15	26.32
5	46	14	30.43	39	11	28.21
6	37	9	24.32	25	5	20.00
7	39	7	17.95	47	6	12.77
8	57	4	7.02	40	5	12.50
9	43	4	9.30	45	4	8.89
10	33	3	9.09	36	3	8.33
11	49	5	10.20	45	3	6.67
12	42	2	4.76	51	3	5.88
13	35	3	8.57	39	2	5.13
14	45	4	8.89	53	4	7.55
Total	701	107	15.26	710	94	13.24

Table 84 shows the frequency distribution of children with diastema by age and sex. The total incidence of diastema is higher (15.26%) in the males than that of the females (13.24%). In both the sexes, the percentage of diastema is found highest in the age group of 5 years, followed by the 4 years and found absent in the infants. The above table shows that the percentage of diastema initially increases with the increase of age up to 5 years, and then, again decreases in both the sexes.

Table 85. Incidence of diastema in deciduous teeth by sex

Teeth	Male			Female			Total		
	Number of subjects examined	With diastema	Percentage	Number of subjects examined	With diastema	Percentage	Number of subjects examined	With diastema	Percentage
Maxilla									
ci-ci	701	63	8.99	710	59	8.31	1411	122	8.65
ci-li	701	51	7.28	710	47	6.62	1411	98	6.95
li-c	701	77	10.98	710	82	11.55	1411	159	11.27
Total	2103	191	9.08	2130	188	8.83	4233	379	8.95
Mandible									
ci-ci	701	81	11.55	710	68	9.58	1411	149	10.56
ci-li	701	67	9.56	710	57	8.03	1411	124	8.79
li-c	701	94	13.41	710	86	12.11	1411	180	12.76
Total	2103	242	11.51	2130	211	9.91	4233	453	10.70

ci= central incisor, li= lateral incisor, c=canine.

Incidence of diastema in deciduous teeth among the Mizo is given in Table 85. The percentage occurrence of diastema is higher in the lower jaws compared to the upper jaws. When compared sex-wise, males show higher percentage of diastema than the females in both the jaws.

Table 86. Frequency distribution of crowding by age and sex

Age (in years)	Male			Female		
	No. of subjects examined	With crowding	Percent age	No. of subjects examined	With crowding	Percent age
Below 1	40	0	0.00	42	0	0.00
1	58	0	0.00	69	0	0.00
2	62	0	0.00	63	0	0.00
3	54	0	0.00	59	0	0.00
4	64	0	0.00	57	0	0.00
5	46	0	0.00	39	0	0.00
6	37	1	2.70	25	0	0.00
7	39	2	5.13	47	3	6.38
8	57	5	8.77	40	2	5.00
9	43	5	11.63	45	8	17.78
10	33	3	9.09	36	3	8.33
11	49	6	12.24	45	5	11.11
12	42	2	4.76	51	3	5.88
13	35	3	8.57	39	4	10.26
14	45	6	13.33	53	8	15.09
Total	701	33	4.71	710	36	5.07

The above table presents the frequency distribution of crowding of teeth in children by age and sex. Crowding is not present up to the age of 5 years and 6 years in boys and girls respectively. In boys, the highest frequency of crowding is observed at the age of 14 years (13.33%), followed by 11 years (12.24%), and whereas, in the girls the highest frequency of crowding occurred at 9 years of age followed by 11 years. The overall occurrence of crowding found to be slightly higher in the girls (5.07%) than that of the boys (4.71%).

Table 87. Incidence of crowding in deciduous teeth by age and sex

Teeth	Male			Female			Both sexes combined		
	Number examined	With crowding	Percentage	Number examined	With crowding	Percentage	Number examined	With crowding	Percentage
Maxilla									
ci-ci	701	0	0.00	710	1	0.14	1411	1	0.07
ci-li	701	6	0.86	710	4	0.56	1411	10	0.71
li-c	701	3	0.43	710	3	0.42	1411	6	0.43
Total	2103	9	0.43	2130	8	0.38	4233	17	0.40
Mandible									
ci-ci	701	4	0.57	710	6	0.83	1411	10	0.71
ci-li	701	12	1.71	710	13	1.83	1411	25	1.77
li-c	701	8	1.14	710	9	1.27	1411	17	1.20
Total	2103	24	1.14	2130	28	1.31	4233	52	1.23

ci= central incisor, li= lateral incisor, c=canine.

The incidence of crowding in deciduous teeth by age and sex is given in Table 87, which shows that the highest percentage of occurrence of crowding is observed in the ci-li in both the jaws and sexes. The occurrence of crowding is observed to be higher in the lower jaw than that of the upper jaw in both the males and females.

Table 88. Incidence of crowding in permanent teeth by jaws and sexes

Teeth	Male			Female			Both sexes combined		
	Number of teeth examined	With crowding	Percentage	Number of teeth examined	With crowding	Percentage	Number of teeth examined	With crowding	Percentage
Maxilla									
CI-CI	2085	19	0.91	2424	32	1.32	4509	51	1.13
CI-LI	2069	127	6.14	2409	158	6.56	4478	285	6.36
LI-C	2034	154	7.57	2371	213	8.98	4405	367	8.33
Total	6188	300	4.85	7204	403	5.59	13392	703	5.25
C-PM1	2009	11	0.55	2347	42	1.79	4356	53	1.22
PM1-PM2	1981	9	0.45	2328	21	0.90	4309	30	0.69
PM2-M1	1967	15	0.76	2297	29	1.26	4264	44	1.03
Total	5957	35	0.59	6972	92	1.32	12929	127	0.98
Grand total	12145	335	2.76	14176	495	3.49	26321	830	3.15
Mandible									
CI-CI	2079	21	1.01	2401	29	1.21	4480	50	1.12
CI-LI	2051	119	5.80	2398	155	6.46	4449	274	6.16
LI-C	2023	168	8.30	2368	220	9.29	4391	388	8.84
Total	6153	308	5.01	7167	404	5.64	13320	712	5.35
C-PM1	2001	18	0.89	2332	37	1.59	4333	55	1.27
PM1-PM2	1984	11	0.55	2304	28	1.22	4288	39	0.91
PM2-M1	1972	14	0.71	2294	21	0.92	4266	35	0.82
Total	5957	43	0.72	6930	86	1.24	12887	129	1.00
Grand total	12110	351	2.89	14097	490	3.48	26207	841	3.21

CI= central incisor, LI= lateral incisor, C= canine, PM1= first premolar, PM2= second premolar, M1= first molar, M2= second molar.

The incidence of crowding in permanent teeth by jaws and sex is given in Table 88, which shows that the percentage of crowding is higher in the anterior teeth than that of the posterior teeth in both the jaws and both the sexes. When compared between the sexes, females show the higher incidence of crowding than that of their male counterpart in respect of both the jaws.

Table 89. Frequency distribution of cingulum among the Mizo children (upto 14 years) by sex

Sex	Number of children examined	Number of subjects with Cingulum	Percentage
Boys	701	26	3.71
Girls	710	22	3.09
Total	1411	48	3.40

Frequency distribution of cingulum in both boys and girls is given in Table 89, where the boys show higher incidence of occurrence (3.71%) than the girls (3.09%) and the total being 3.40%.

Table 90. Frequency distribution of cingulum by age and sex

Age (in years)	Male			Female		
	Number of subjects examined	With Cingulum	Percent age	Number of subjects examined	With Cingulum	Percent age
Below 1	40	0	0.00	42	0	0.00
1	58	3	5.17	69	2	2.89
2	62	2	3.23	63	1	1.59
3	54	2	3.70	59	4	6.78
4	64	2	3.13	57	2	3.51
5	46	3	6.52	39	4	10.26
6	37	4	10.81	25	2	8.00
7	39	2	5.13	47	2	4.26
8	57	3	5.26	40	2	5.00
9	43	1	2.33	45	2	4.44
10	33	2	6.06	36	1	2.78
11	49	2	4.08	45	0	0.00
12	42	0	0.00	51	0	0.00
13	35	0	0.00	39	0	0.00
14	45	0	0.00	53	0	0.00
Total	701	26	3.71	710	22	3.09

The frequency distribution of cingulum by age and sex is shown in Table 90. The highest frequency of cingulum in boys are found at 6 years of age (10.81%) followed by 5 years (6.52%), whereas, among the girls the highest frequency was found at 5 years (10.26%) followed by 6 years (8.00%). The total percentage of occurrence of cingulum is higher among the boys (3.71%) compared to the girls (3.09%).

Table 91. Incidence of cingulum in children by age (both sexes combined)

Age (in years)	Right									Left								
	CI			LI			CI & LI			CI			LI			CI & LI		
	No. of subjects	With cingulum	Percentage	No. of subjects	With cingulum	Percentage	No. of subjects	With cingulum	Percentage	No. of subjects	With cingulum	Percentage	No. of subjects	With cingulum	Percentage	No. of subjects	With cingulum	Percentage
Below 1	82	0	0	82	0	0	164	0	0	82	0	0	82	0	0	164	0	0
1	127	5	3.94	127	1	0.79	254	6	2.36	127	5	3.94	127	1	0.79	254	6	2.36
2	125	3	2.4	125	3	2.4	250	6	2.4	125	4	3.2	125	3	2.4	250	7	2.8
3	113	6	5.31	113	4	3.54	226	10	4.42	113	6	5.31	113	3	2.65	226	9	3.98
4	121	4	3.31	121	4	3.31	242	8	3.31	121	4	3.31	121	2	1.65	242	6	2.48
5	85	7	8.25	85	3	3.53	170	10	5.88	85	5	5.88	85	3	3.53	170	8	4.7
6	62	6	9.68	62	2	3.23	124	8	6.45	62	6	9.68	62	2	3.23	124	8	6.45
7	86	4	4.65	86	0	0	172	4	2.33	86	5	5.81	86	0	0	172	5	2.91
8	94	5	5.32	94	3	3.19	188	8	4.26	94	4	4.26	94	3	3.19	188	7	3.72
9	87	3	3.45	87	1	1.15	174	4	2.3	87	3	3.45	87	1	1.15	174	4	2.3
10	69	3	4.35	69	0	0	138	3	2.17	69	3	4.35	69	0	0	138	3	2.17
11	94	2	2.13	94	0	0	188	2	1.06	94	2	2.13	94	0	0	188	2	1.06
12	93	0	0	93	0	0	186	0	0	93	0	0	93	0	0	186	0	0
13	74	0	0	74	0	0	148	0	0	74	0	0	74	0	0	148	0	0
14	98	0	0	98	0	0	196	0	0	98	0	0	98	0	0	196	0	0
Total	1410	48	3.4	1410	21	1.49	2820	48	1.7	1410	47	3.33	1410	18	1.28	2820	48	1.7

CI= central incisor, LI= lateral incisor.

Incidence of cingulum in children by age is shown in Table 91. The highest percentage of cingulum i.e. 9.68% each is observed in CI followed by CI-CL of both the right and left jaws with 6.45% occurrence each. In the LI of right jaw it is 3.54% and the least being 3.53% in the left jaw. No occurrence of cingulum was recorded among the infants as well as in the 12, 13 and 14 years of age groups. In general, the incidence of cingulum appeared first in the 1 year age group and then starts increasing and then again decreases. The incidence of occurrence of cingulum found highest in CI followed by LI and least being CI-LI.

Table 92. Frequency distribution of cingulum in permanent teeth

Sex	Number of subjecst examined	with Cingulum	Percentage
Male	2085	197	9.45
Female	2424	254	10.48
Total	4509	451	10.00

Table 92 shows the frequency distribution of cingulum in the permanent teeth. Out of 2085 males, 197(9.45%), and out of 2424 females, 254 (10.48%) are with cingulum. The number and percentage of the occurrence of cingulum is found more in female than their male counterpart.

Table 93. Incidence of cingulum in permanent teeth by jaws and sex

Quadrant	Tooth	Male			Female			Both sexes combined		
		No. of teeth examined	No.of cingulum	Percent age	No. of teeth examined	No.of cingulum	Percentage	No. of teeth examined	No.of cingulum	Percentage
MAXILLA										
Right	CI	2085	197	9.45	2424	254	10.48	4509	451	10.00
	LI	2069	81	3.91	2409	113	4.69	4478	194	4.33
	Total	4154	278	6.69	4833	367	7.59	8987	645	7.18
Left	CI	2085	191	9.16	2424	251	10.35	4509	442	9.80
	LI	2069	86	4.16	2409	115	4.77	4478	201	4.49
	Total	4154	277	6.67	4833	366	7.57	8987	643	7.15
MANDIBLE										
Right	CI	2079	12	0.58	2401	16	0.67	4480	28	0.63
	LI	2051	3	0.15	2398	5	0.21	4449	8	0.18
	Total	4130	15	0.36	4799	21	0.44	8929	36	0.40
Left	CI	2071	9	0.43	2398	14	0.58	4469	23	0.51
	LI	2053	3	0.15	2398	3	0.13	4451	6	0.13
	Total	3339	12	0.36	3988	17	0.43	7327	29	0.40

CI= central incisor, LI= lateral incisor.

Table 93 shows the incidence of cingulum in permanent teeth by jaws and sex. The above table reveals that maxillary teeth shows higher percentage of cingulum compared to that of the mandibular teeth in both the sexes and both the quadrants. When both the sexes are combined, the highest percentage of cingulum is observed in the right maxilla followed by the left maxilla. Among all the teeth examined, least incidence of occurrence of this trait is seen in lateral incisor of left mandible (0.13%).

Table 94. Incidence of occlusion among the Mizo males by age

Age (in years)	No. of Subjects examined	Over-bite		Normal-bite		Under-bite	
		Number	Percentage	Number	Percentage	Number	Percentage
0-5	324	170	52.47	153	47.22	1	0.31
6-10	206	109	52.91	97	47.09	0	0.00
11-15	215	114	53.02	101	46.98	0	0.00
16-20	298	154	51.68	141	47.32	3	1.01
21-25	257	130	50.58	126	49.03	1	0.39
26-30	217	115	52.99	102	47.00	0	0.00
31-35	197	108	54.82	89	45.18	0	0.00
36-40	142	75	52.82	66	46.48	1	0.70
41-45	117	60	51.28	57	48.72	0	0.00
46-50	117	64	54.70	53	45.30	0	0.00
51-55	79	40	50.63	39	49.37	0	0.00
56-60	98	51	52.04	47	47.96	0	0.00
61-65	51	26	50.98	24	47.06	1	1.96
66-70	30	15	50.00	14	46.67	1	3.33
71+	61	32	52.46	29	47.54	0	0.00
Total	2409	1262	52.39	1138	47.24	9	0.37

Table 94 shows the incidence of occlusion among the Mizo males by age. The above table shows that the total percentage of over-bite is 52.39%; while only 0.37% of the total samples are with under-bite. The highest percentage of over-bite

(54.82%) and normal-bite (49.37%) are observed at 31-35 years and 51-55 years age group respectively. The under-bite occlusion is observed only at the age group of 0-5years, 16-20 years, 21-25 years, 31-40 years, 61-65 years and 66-70 years.

Table 95. Incidence of occlusion among the Mizo female by age

Age (in years)	No. of Subjects examined	Over-bite		Normal-bite		Under-bite	
		Number	Percentage	Number	Percentage	Number	Percentage
0-5	329	172	52.25	157	47.72	0	0.00
6-10	193	109	56.48	83	43.01	1	0.52
11-15	226	119	52.65	107	47.35	0	0.00
16-20	310	170	54.84	138	44.52	2	0.65
21-25	356	190	53.37	164	46.07	2	0.56
26-30	281	145	51.60	136	48.40	0	0.00
31-35	205	111	54.15	94	45.85	0	0.00
36-40	179	91	50.84	87	48.60	1	0.56
41-45	156	85	54.49	71	45.51	0	0.00
46-50	134	73	54.48	61	45.52	0	0.00
51-55	112	60	53.57	52	46.43	0	0.00
56-60	92	53	57.61	39	42.39	0	0.00
61-65	68	41	60.29	27	39.71	0	0.00
66-70	32	19	59.38	13	40.63	0	0.00
71+	69	43	62.32	26	37.68	0	0.00
Total	2742	1481	54.01	1255	45.77	6	0.22

The incidence of occlusion among the Mizo females is given in Table 95, which shows that 55.01%, 45.77% and 0.22% of occlusion are found as the over-bite, normal-bite and under-bite respectively. The under-bite occlusion is observed only in four age groups i.e. 6-10years, 16-20years, 21-25years and 36-40 years. The highest percentage of over-bite and normal-bite are observed at 70+years and 36-40 years age groups respectively.

Chapter VII

DISCUSSION

The abundant published literature available on the Southeast Asian, East Asian and Pacific populations demonstrates the existence of similarities and dissimilarities in the distribution of frequencies of different dental characteristics among different populations which are as notable and significant as those that can be encountered in other biogenetic markers such as blood-groups and red cell enzymes, dermatoglyphics, etc. that greatly render it possible to compare and classify populations. The large genetic component and high habitability of dentition have been demonstrated by a number of genetic studies, which facilitated the postulation of the modes of inheritance for various dental traits (Lundstrom, 1948 and 1963; Kraus, 1951; Turner, 1967 and Cadein, 1970). More such work is, however, necessary to substantiate these hypotheses.

In most of the foreign countries dental anthropological researches till recently were devoted to bring to light phenotypic trait frequencies and their distribution pattern bearing on which attempts were made to contemplate on the question of population interrelationships. In recent years, however, emphasis has been shifted to the study of dental genetic and development to deduce conceptual model explaining the ways in which the genes operates in bringing about dental variations and their adaptive nature as reflected in the cultural and behavioural changes occurring in different populations in space and time. Cadien (1972) opines thus: "... there are definite genetic factors that influence the entire dentition, those that affect only certain groups of teeth; and those that act upon single tooth. These must be sorted out before the differences between human populations can be fully understood".

"Dental anthropology is defined as a study of people (and their close relatives) from the evidence provided by teeth" (Hillson, 1996). Dental anthropology is a subfield of physical anthropology under the broad discipline of anthropology which is concerned with the study of human teeth-one of the anatomical systems of man. One of the main themes of dental anthropology has been a study of variation in size and shape of the teeth, as recorded in casts of living mouths or seen in the skulls of archaeological and fossil collections. Dental anthropology studies the variation in size and shape of the teeth, the development of teeth in relation to age, their appearance in the mouth, and the processes of wear and other changes that occur once they are in place. It also includes the microscopic traces, preserved inside the tissues of the teeth, of the growth and ageing processes. Yet another area of interest is the study of dental diseases in relation to diet and other factors, and the most recent development is the study of the biochemistry of dental tissues (Hillson, 1996).

The present study was carried out among the Mizo of Aizawl town, Mizoram; considering their socio-economic traits such as income, literacy and family size etc. Other parameters such as time of eruption of deciduous and permanent teeth, oral and dental pathology and dental morphology among the Mizo have been recorded and analyzed in the present study.

Table 96. Comparison of eruption age of permanent teeth in some Indian populations

People or Place	Author	Maxillary							Mandibular						
		I^1	I^2	C°	P^1	P^2	M^1	M^2	I_1	I_2	C_0	P_1	P_2	M_1	M_2
Male															
North India(Lahore)	Shourie, 1946	6.9	8.6	11.0	10.4	11.1	6.0	11.9	6.8	8.1	10.4	10.5	13.2	5.9	11.3
Punjab (Chandigarh)	Kaul*et al.*, 1975	7.0	8.1	11.0	10.5	11.5	6.4	12.0	6.6	7.6	10.7	11.0	11.9	6.2	11.2
Karnataka (Gulbarga)	Reddy 1985	6.4	8.1	11.3	10.0	11.0	5.8	12.1	7.0	7.1	10.4	10.6	11.8	5.5	12.0
Madrasis	Shourie, 1946	7.3	8.4	11.3	10.5	10.7	7.0	12.4	7.0	7.8	10.7	10.8	11.9	6.5	12.3
Punjabi	Chhabra et al. 1993	7.1	8.1	10.8	10.3	11.2	5.9	11.7	6.9	7.6	10.5	10.6	11.3	5.8	11.5
Gallong	Limbu, 1996	7.6	8.5	11.5	10.6	11.4	6.5	12.7	6.6	7.6	9.9	10.8	11.3	6.4	12.0
Mizo	Present study	6.6	7.8	11.5	10.6	11.6	6.3	12.1	6.2	7.5	10.6	10.2	11.3	6.1	12.1
Female															
North India(Lahore)	Shourie, 1946	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Punjab (Chandigarh)	Kaul*et al.*, 1975	6.9	8.2	10.5	10.2	11.2	6.0	11.2	6.5	7.6	9.8	10.5	11.2	5.6	10.7
Karnataka (Gulbarga)	Reddy 1985	6.5	8.0	10.9	10.1	11.0	5.8	11.0	6.8	6.9	10.0	10.0	11.0	5.5	10.6
Madrasis	Shourie, 1946	7.3	7.5	10.9	10.5	11.5	6.9	11.9	7.2	7.5	10.5	10.1	11.4	6.8	11.6
Punjabi	Chhabra et al. 1993	7.2	8.0	10.8	10.3	11.1	5.8	11.6	6.8	7.6	10.4	10.6	11.3	5.7	11.3
Gallong	Limbu, 1996	7.2	8.4	10.7	9.8	10.8	6.4	12.7	6.4	7.5	9.5	10.1	10.9	6.1	11.4
Mizo	Present study	6.7	7.5	10.7	10.6	11.4	5.9	12.2	6.1	6.9	10.7	10.3	10.8	5.9	11.6

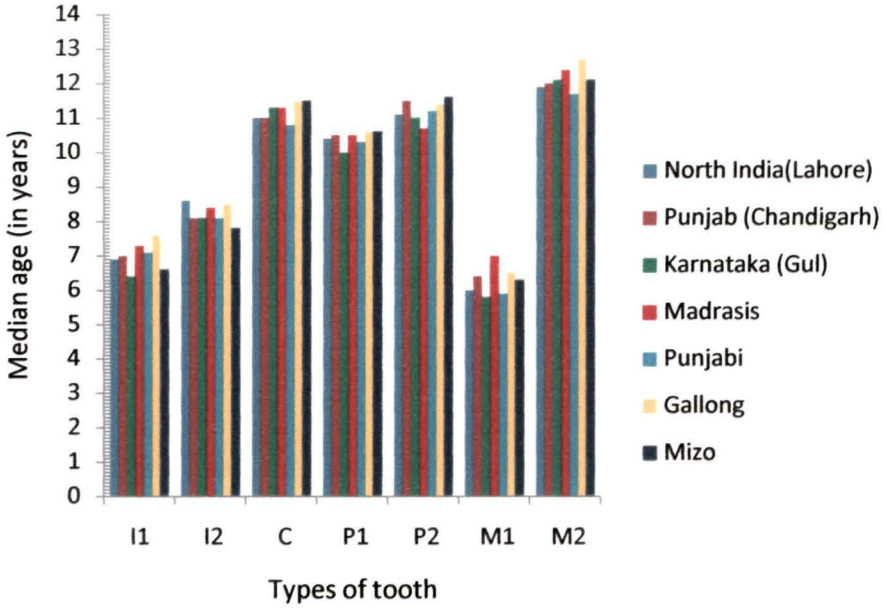


Figure5. Median age of eruption in some Indian male populations (maxillary)

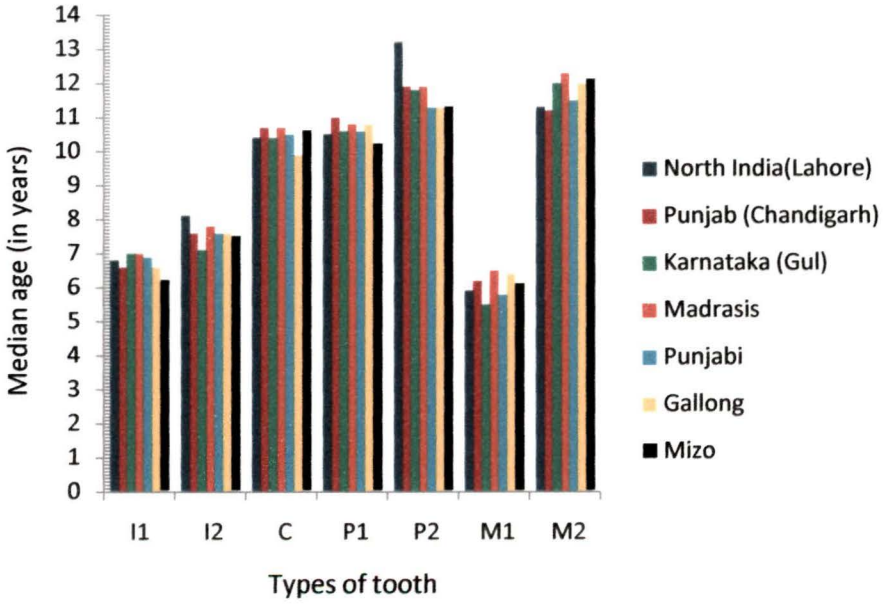


Figure 6. Median age of eruption in some Indian male populations (mandibular)

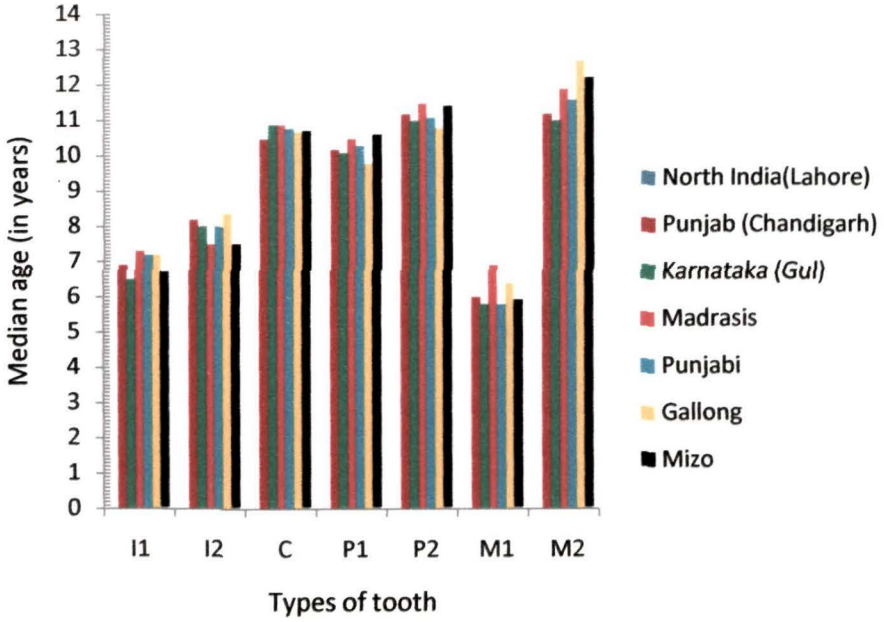


Figure 7. Median age of eruption in some Indian female populations (maxillary)

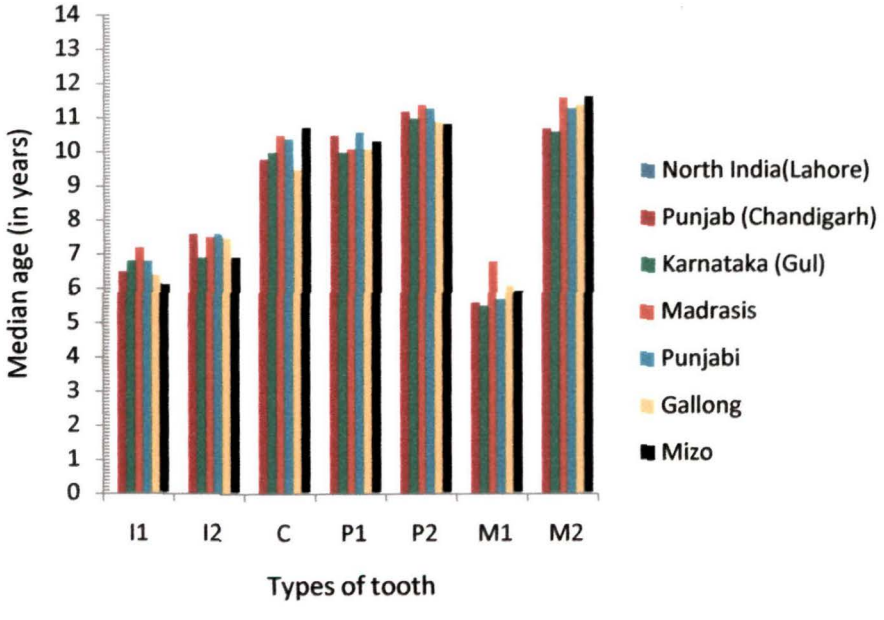


Figure 8. Median age of eruption in some Indian female populations (mandibular)

A comparative study of emergence of the permanent teeth (excluding third molar) among some Indian population by jaw and sex is shown in Table 96. As the available data on eruption of permanent teeth were excluding the third molars, the present study also compared data on the similar number of tooth i.e., excluding the third molars. This table also shows that most of the mandibular teeth tend to emerge earlier than their maxillary counterparts. A comparison with other populations of India shows that the earliest tooth to erupt is the mandibular first molar which erupts at the median age 5.5 years among the Gulbarga (Karnataka) of both sexes.

In males, the maxillary central incisor is erupted earlier than the mandibular central incisor among the Gulbarga (Karnataka) whereas in the present study and other compared populations it is reverse. In all the populations except in the present study, the maxillary first premolar is erupted earlier than their mandibular counterpart among the males. It is also observed that the maxillary second premolar has erupted earlier than their mandibular counterpart in all the populations except among the Gallong and the present population.

In females, the maxillary central incisor (6.5 years) is erupted earlier than their mandibular counterpart (6.8 years) among the Punjab population, whereas in all the other populations the mandibular central incisor is much erupted earlier. It is also revealed that the mandibular lateral incisor is erupted earlier than their maxillary counterpart in all the populations, except among the Madrasis, which is erupted at the

same time (7.5 years). In respect of canine, the present study showed the same eruption time (10.7 years); whereas, in all the other populations, the mandibular canine is erupted earlier than its maxillary counterpart. Among the Punjab (Chandigarh), Punjabi and Gallong populations, the maxillary first premolar has emerged earlier than the mandibular, while in the other populations (including the present study) it is found reverse. Among the Punjab (Chandigarh) and Gulbarga populations, the maxillary and mandibular second premolar has erupted at the same time, and among the Gallong and Punjabi the maxillary second premolar has erupted earlier than the mandibular ones; whereas, among the Madrasis and Mizo populations, the mandibular second premolar is erupted earlier than the maxillary ones. In case of first molar, the present study showed the same emergence time (5.9 years) in both the jaws, whereas, in all the other populations it is earlier in the mandibular. It also reveals that, among the females of all the populations compared, the mandibular second molars have emerged earlier than their maxillary counterparts.

In males and females, the earliest tooth to erupt is the mandibular first molar in all the populations. However, the eruption time is same for the mandibular and maxillary first molars among the present population.

The sequences of eruption of permanent teeth (excluding the third molar) among some Indian populations are as follows:

Males

North India (Lahore)	$M_1>M^1>I_1>I^1>I_2>I^2>C_0=P_1>P^1>C^0>P^2>M_2>M^2>P_2$
Punjab (Chandigarh)	$M_1>M^1>I_1>I^1>I_2>I^2>P^1>C_0>C^0=P_1>M_2>P^2>P_2>M^2$
Karnataka (Gulbarga)	$M_1>M^1>I^1>I_1>I_2>I^2>P^1>C_0>P_1>P^2>C^0>P_2>M_2>M^2$
Madrasis	$M_1>M^1=I_1>I^1>I_2>I^2>P^1>P^2=C_0>P_1>C^0>P_2>M_2>M^2$
Punjabi	$M_1>M^1>I_1>I^1>I_2>I^2>P^1>C_0>P_1>C^0>P^2>P_2>M_2>M^2$
Gallong (Arunachal.)	$M_1>M^1>I_1>I^1=I_2>I^2>C_0>P^1>P_1>P_2>P^2>C^0>M_2>M^2$
Mizo (Present study)	$M_1>I_1>M^1>I^1>I_2>I^2>P_1>C_0=P^1>P_2>C^0>P^2>M_2=M^2$

Females

North India (Lahore)	
Punjab (Chandigarh)	$M_1>M^1>I_1>I^1>I_2>I^2>C_0>P^1>P_1=C^0>M_2>P^2=P_2=M^2$
Karnataka (Gulbarga)	$M_1>M^1>I^1>I_1>I_2>I^2>C_0=P_1>P^1>M_2>C^0>P^2=P_2=M^2$
Madrasis	$M_1>M^1>I_1>I^1>I_2=I^2>P_1>C_0=P^1>C^0>P_2>P^2>M_2>M^2$
Punjabi	$M_1>M^1>I_1>I^1>I_2>I^2>P^1>C_0>P_1>C^0>P^2>P_2=M_2>M^2$
Gallong (Arunachal)	$M_1>M^1=I_1>I^1>I_2>I^2>C_0>P^1>P_1>C^0>P^2>P_2>M_2>M^2$
Mizo (Present study)	$M_1=M^1>I_1>I^1>I_2>I^2>P_1>P^1>C_0=C^0>P_2>P^2>M_2>M^2$

There is no sex difference for the population compared, since the sequence of emergence in the mandible and that of the anterior teeth of the maxilla in both the sexes was found same. Gingival emergence of the canine relative to the premolars has been ascribed to sexual dimorphism, C_1P^1 for females and P^1C_1 for males (Clements et

al., 1953). The usual predominantly female sequence C_1P^1 is observed only among the Gallong and Punjab (Chandigarh) populations. Punjab (Chandigarh), Gulbarga (Karnataka) and the present study populations have shown the mandibular canine-maxillary first premolar (P^1C_1) sequence. Sexual dimorphism with respect to the canine-second premolar sequence in the maxilla (C^1P^2 for females, P^2C^1 for males) has also been reported (Hurme, 1957; Steggerda and Hill, 1942). The above mentioned predominant female sequence (C^1P^2) and the predominantly male sequence (P^2C^1) are observed among the Gulbarga and the Gallong populations. No usual predominant sequences are observed in all the other populations of both the sexes.

The above sequence of eruption of permanent teeth further shows that the emergence sequence of P_2M_2 was observed among the males of Gulbarga and Madrasis; whereas, in females it is observed among Punjabi, Gulbarga and Gallong populations. The sequence of P_2M_2 is relatively ancient. However, Garn and Lewis (1963) have suggested the possibility of genetic control of the P_2M_2 and M_2P_2 sequences. Females at large are evolutionarily more advanced than males. The maxillary sequence, P^2M^2 did not reveal sex differences in all the populations compared. The mandibular first molar-first incisor also seems to show polymorphism. The M_1I_1 sequence predominates in both sexes in many populations. The sequence elaborated above have been suggested to be due to the genetically differences in the tooth formation timing and can be demonstrated within populations (Garn *et al.,* 1973). The sexual dimorphism for the above sequences observed in various populations is

clearly due to evolutionary trends, as early hominids were also sexually dimorphic in this respect in the time of tooth emergence.

The above sequence of tooth eruption shows the earliest tooth to be emerged in all the populations compared is the mandibular first molar (M_1) followed by maxillary first molar (M^1). However, in the present population, the mandibular first molar (M_1) is followed by the mandibular first incisor in males, whereas, in females the mandibular and maxillary first molars are erupted at the same time. The maxillary second molar (M^2) emerges last in all the population compared. The eruption timing for the canine and the premolars falls in between the incisors and the molars except for the Gulbarga females and both the sexes of Punjabi. However, they do not show any pattern of eruption.

For dental pathology, our present data have been compared with the available data on dental pathology from the populations of North-eastern region of India.

Table 97. Percentage frequency of caries affected Mongoloid boys of north-east India by age.

Age in years	Populations		
	Gallong (n=494)	Khasi (n=1254)	Mizo(n=480)
6	2.86	29.03	0.00
7	9.52	25.01	0.00
8	6.98	28.00	0.00
9	13.15	21.88	4.65
10	17.64	25.81	15.15
11	15.38	19.52	12.24
12	18.75	39.29	14.29
13	16.29	30.55	20.00
14	17.39	41.17	26.67
15	21.96	34.49	27.27
16	19.35	29.04	28.81

The percentage frequency of caries affected Mongoloid boys of north-east India by age is given in Table 97. It is seen that no caries affected permanent teeth is recorded till 8 years of age, in the present population, however, it is observed among the other populations compared. No particular trend is being followed in all the compared populations in respect of the occurrence of carious teeth. It is also observed that the highest frequency is recorded among the Khasi in all the ages. Figure 9 depicts the percentage frequency of caries affected girls by age.

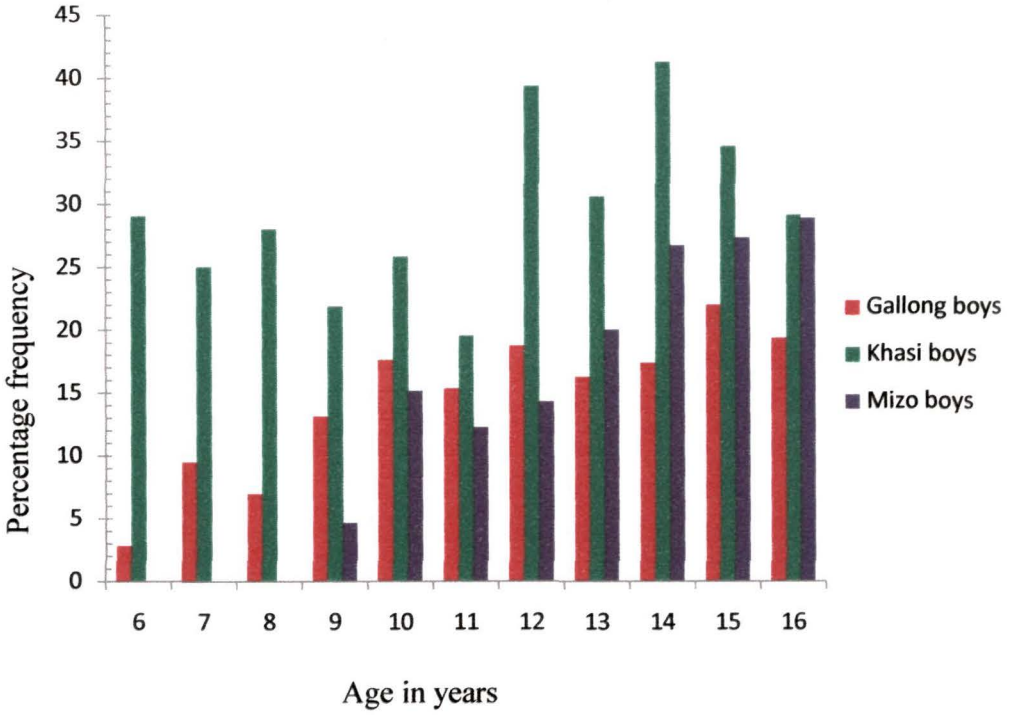


Figure 9. Percentage frequency of caries affected boys by age

Table 98. Percentage frequency of caries affected Mongoloid girls of north-east India by age.

Age group (in years)	Population		
	Gallong(n=515)	Khasi(1263)	Mizo(n=486)
6	6.25	25.50	0.00
7	6.99	21.05	0.00
8	8.69	20.69	0.00
9	9.76	24.24	4.44
10	8.00	40.74	11.11
11	11.76	39.47	6.67
12	14.28	37.93	11.76
13	15.09	29.41	28.21
14	15.92	32.13	26.42
15	21.42	43.24	28.94
16	22.73	30.30	25.37

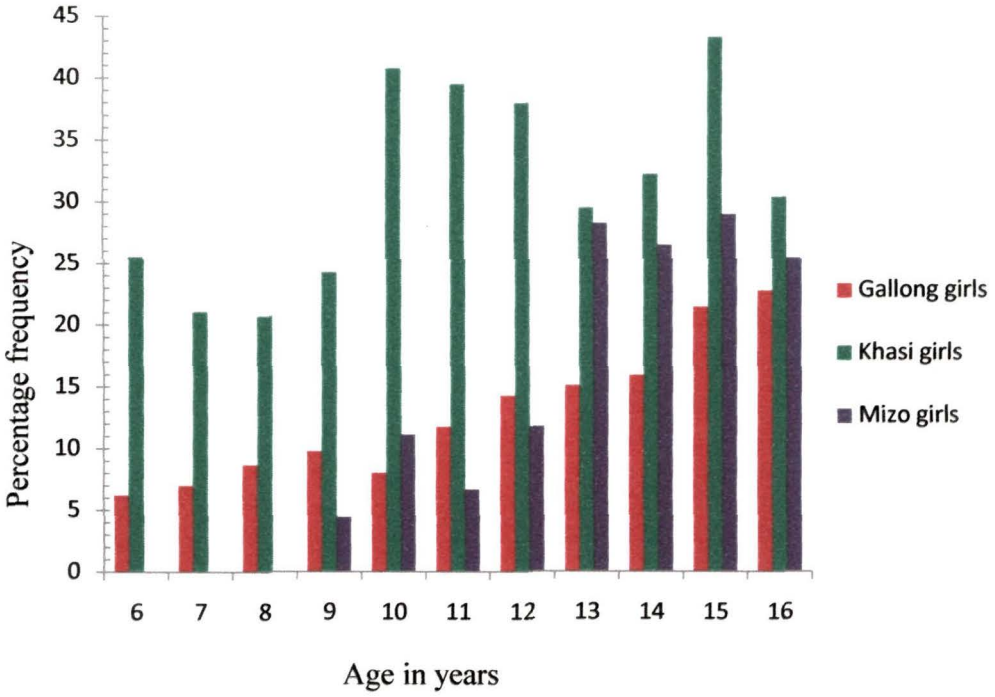


Figure 10. Percentage frequency of caries affected girls by age

Table 98 shows the percentage frequency of caries affected Mongoloid girls of north-east India by age. The carious teeth are recorded slowest among the present population, where it is observed earliest at the age of 9 years. It is observed from the above table that generally the percentage of caries affected persons increase as they grow up. Like the boys, in girls also the prevalence of caries is recorded highest among the Khasi. While comparing the Gallong with the present population, it is found that, in the lower age groups, caries is observed higher among the Gallong, while it is reverse in the higher age groups. Fig. 10 depicts the percentage frequency of caries affected girls by age.

Other than the time of emergence and morphology of their teeth, the present study in relation to their socio-economic traits could reveal certain facts about their dental health. It was expected that the incidence of dental caries and oral pathology is low in high income group, smaller family size and higher education and, high in the low income group, large family size, low education and high chewing of *Kuhva*, tobacco etc. which is not always true. Present study reveals that the low incidence of dental caries, calculus and oral pathology may be found among the high income group, large family size and *Kuhva* as well as the tobacco chewers.

Chapter VIII

SUMMARY AND CONCLUSION

"Dental anthropology is defined as a study of people (and their close relatives) from the evidence provided by teeth" (Hillson, 1996). Dental anthropology is a subfield of physical anthropology under the broad discipline of anthropology which is concerned with the study of human teeth - one of the anatomical systems of man. One of the main themes of dental anthropology has been a study of variation in size and shape of the teeth, as recorded in casts of living mouths or seen in the skulls of archaeological and fossil collections. Dental anthropology studies the variation in size and shape of the teeth, the development of teeth in relation to age, their appearance in the mouth, and the processes of wear and other changes that occur once they are in place. It also includes the microscopic traces, preserved inside the tissues of the teeth, of the growth and ageing processes. Yet another area of interest is the study of dental diseases in relation to diet and other factors, and the most recent development is the study of the biochemistry of dental tissues (Hillson, 1996).

Dental anthropology is academically located within the human bone biology studies. Its main goal is to recognize attributes in the teeth form which can help us create bicultural dynamics of human populations, specially related to health–illness state, feeding habits and micro evolutionary transformations, related themselves to the ethno genesis of current and ancient times. In Dental anthropology, teeth are used to obtain

information on culture, health, diet, variability and evolutionary trends as well as eruption and dental pathologies in the past and modern populations.

The abundant published literature available on the Southeast Asian, East Asian and Pacific populations demonstrates the existence of similarities and dissimilarities in the distribution of frequencies of different dental characteristics among different populations which are as notable and significant as those that can be encountered in other biogenetic markers such as blood-groups and red cell enzymes, demographics, etc. that greatly render it possible to compare and classify populations. More such work is, however, necessary to substantiate these hypotheses.

Dental anthropology much like those of other subfields of anthropology can be applied to the welfare of the mankind in the areas of dental development, pathology, morphology, forensic deontology and odontometry. The area of dental development can be used in the application of tooth eruption times and calcification standards in the nationwide nutritional survey, in the diagnosis and treatment of children with growth disturbances, in solving a number of orthodontic problems including malocclusion, in the age estimation of skulls of unknown age, in the evaluation of racial differences and primate evolution, in the determination of personal identity or individuality of persons involved in different crimes-accidents-explosions etc. and tooth formation standards based on the study of crown and root development of teeth in clinical assessment of early or late dental maturity.

While the area of dental morphology is generally used in the understanding of biological history and racial classifications of human populations as also in micro-

evolutionary studies, it is necessary to assess the incidence of malocclusion cases in relation to a number of genetic and non-genetic factors to plan and gear up treatment needs. It is urgently needed to undertake carefully planned research investigations into the dental anthropology of the people to obtain and standardize the findings for application to different situations concerning their oral health, forensic and related problems in India in general and Northeast India in particular. Tooth morphology provides few clues as to age, sex, body size, elapsed time since death, etc., so its primary usage is in discerning the ethnic affiliation or race of an individual (Scott and Turner II, 2000).

In the area of dental pathology, dental caries and periodontal disease are the most common oral problems of man. In view of the alarming increase in the prevalence rates of these diseases in the human populations, it is of outmost importance to study these diseases in relation to different demographic, socio-economic, environmental and hereditary factors to delineate standards and levels of health for the public health planner to devise and extend preventive and treatment services to the well-being of one and all.

With this end in view we have undertaken a study on the dental anthropology of the Mizo of Aizawl, Mizoram with the following objectives:

1. To assess the eruption pattern of different types of teeth, both deciduous and permanent, their eruption age and order, in both boys and girls.

2. To record the various morphological patterns of teeth.

3. To assess the prevalence of dental pathology and impact of food habits, including chewing of betel nut, tobacco and smoking on dental health.

4. To find out the relationships of eruption pattern, dental pathology and frequency occurrence of various morphological traits with certain demographic and socio-economic variables such as age, sex, income and education.

The fieldwork for the present study was conducted among the Mizo of Aizawl town, Mizoram. 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 belonging 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 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.

Data were collected on eruption of the deciduous and permanent teeth, dental and oral pathology and dental morphology. All the educational background information of the parents as well as the subjects, their age ,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 findings of the present study may be briefly summarised as follows:

Dental eruption

1. The first deciduous tooth to erupt is the mandibular central incisor in boys, whereas in girls, the central incisor is erupted at the same time in both the jaws.

2. The deciduous teeth completed eruption at 37-42 months of age in both the sexes.

3. The first permanent tooth erupts at 5 years of age, in both boys and girls.

4. Except the third molar, all the permanent teeth completed eruption by 15 years of age, in both the sexes.

5. The third molar starts erupting at 14 years and 15 years of age in females and males respectively.

6. By 24 years of age, more than 50% of the third molars are found erupted in both the jaws and sexes.

7. The median age of eruption is lower in females except in the mandibular canine and first premolar and the maxillary central incisor and second molar, whereas, the maxillary first premolar is erupted at the same time in both the sexes.

8. The eruption of all the permanent teeth except the third molar takes place between the median ages 6.1 (± 0.15) years to 12.1 (±0.10) years in males and 5.9 (±0.15 years to 12.2 (±0.20) years in females.

9. The order of eruption of the permanent teeth is as follows:

Male: $M_1 > I_1 > M^1 > I^1 > I_2 > I^2 > P_1 > P^1 > C_0 > P_2 > C^0 = P^2 > M^2 > M_2 > M_3 > M^3$

Female: $M_1 = M^1 > I_1 > I^1 > I_2 > I^2 > P_1 > P^1 > C_0 > C^0 > P_2 > P^2 > M_2 > M^2 > M_3 > M^3$

Dental pathology

10. Prevalence of dental caries was observed earliest at the age group of 13-18 months in both the sexes, where, only mild and moderate forms of caries were recorded.

11. The severe form of caries is first observed at 37-42 months and 43-48 months age groups, in males and females respectively.

12. In both the sexes, the frequency of caries affected found higher in posterior teeth than that of the anterior teeth.

13. Prevalence of dental caries is higher among the illiterates compared to the literate subjects.

14. Prevalence of dental caries is observed highest in the low income group among the Mizo.

15. Prevalence of caries is found to be less among the *kuhva* (betel nut and leaf with lime) chewers, compared to the non-chewers in both the sexes.

16. Difference between the smokers and non-smokers, and tobacco chewers and non-chewers are statistically insignificant in respect of the prevalence of dental caries.

17. The incidence of gingivitis decreases as the age increases till 16-20 years and then gradually increases.

18. No poor form of OHI (DI-S) is observed in the 16-30 years age group in both the sexes.

19. Prevalence of poor form of OHI (CI-S) decreased from 6-10 years to 21-25 years age group and from 6-10 years to 16-20 years age group in males and females respectively, and then again increases with the increase of age.

20. More than 70% of the subjects are under the score of Good (0.0-1.2) in both the sexes in respect of the prevalence of OHI-S.

21. Periodontal disease is observed higher among the non-chewers of *kuhva* (betel nut and leaf with lime) than the chewers and, the same is observed higher among the smokers than the non-smokers.

22. The prevalence of periodontal disease is observed higher in males than female subjects irrespective of the tobacco chewers and non-chewers. Out of 1631 individuals belonging to the tobacco chewers, 1005 (61.62%), and out of 3520 non-chewers, 1470 (41.76%) have periodontal disease.

23. Lowest prevalence of the OHI (CI-S) was found in males (9.32%) belong to the large families and the females (8.41%) belong to the medium families.

24. No significant differences were observed in the prevalence of OHI (DI-S) in respect of the family size.

25. Highest prevalence (21.94%) of the OHI (S) was observed among the individuals who belong to the large family size, followed by the small family size (21.25%) among the males and the same trend was observed in the females also. However, the differences in respect of family sizes are not significant.

26. Highest percentage of gingivitis in males is observed in large family size (18.46%) followed by the medium family size (18.42%) and lowest was recorded in the small family size. Same trend was observed in the females also. However, no significant difference was observed between the sexes.

27. In both males and females, the percentage of periodontal diseases is recorded highest in the low income group followed by middle income group.

28. The percentage of individuals having OHI (DI-S) is highest in the lower income group (12.95% in males; 13.22% in females) and lowest in high income group (7.41% in males; 8.29% in females).

29. Females show less prevalence OHI (CI-S) than their male counterpart. In both the sexes, the prevalence of OHI (CI-S) found highest among the individuals belonging to the low income group (male 10.70%; female 10.51%) followed by

the middle income group (9.93% in males; 9.56% in females) and lowest in the high income group (male- 7.89%; females- 7.32%).

30. The prevalence of OHI (S) found to be highest in the low income group followed by middle income group and lowest in the high income group in both the sexes. When compared between the males and females, males show slightly higher prevalence of OHI (S) in all the income groups than the females.

31. The percentage of gingivitis decreases as the income level increases. There is no significant difference observed between males and females in respect of the prevalence of gingivitis.

Dental Morphology

32. No supernumerary teeth are observed in the deciduous teeth as well as in the permanent dentition up to 10 years of age in both the sexes.

33. The highest frequency of supernumerary teeth is observed at 16-20 years and 21-25 years age groups in males (3.69%) and females (3.65%) respectively.

34. The incidence of carabelli's anomaly is found highest among 4 years age group in boys (14.06%) and girls (12.28%). However, this trait does not follow any specific pattern regarding its distribution.

35. The occurrence of carabelli's anomaly is slightly higher in males (8.59%) compared to their female counterpart (7.48%).

36. The incidence of shovelling in both the jaws is found to be slightly higher in females than in males.

37. The occurrence of diastema is higher in the lower age group in both the boys and girls.

38. In respect of the deciduous dentition, the incidence of diastema is recorded higher in both the jaws of the boys than that of the girls.

39. The incidence of crowding in the deciduous teeth is comparatively low in both the sexes.

40. The frequency of crowding in the permanent teeth is found to be higher in the anterior teeth compared to the posterior teeth in both the jaws and sexes.

41. No incidence of cingulum is found below 1 year of age and 12-14 years of age in boys and girls. The highest frequency of cingulim is recorded at 5 years and 6 years of age in the girls and boys respectively.

42. In all the quadrants of both the jaws, the incidence of cingulum in the permanent teeth is found to be higher in the central incisor than that of the lateral incisor in both the sexes.

43. The incidence of occlusion is recorded as 52.39% over-bite, 47.24% normal-bite and 0.37% under-bite among the males; whereas in females, the incidence of occlusion is 54.01% over-bite, 45.77% normal bite and 0.22% under-bite.

CONCLUDING REMARKS

The present study was conducted to examine the dental eruption, dental and oral pathology and dental morphology among the Mizo of Aizawl town, Mizoram. Medial incisor is the earliest deciduous tooth to erupt in the lower jaw of both the sexes. Deciduous tooth have completed their eruption at 37-42 months of age in both the sexes. The first permanent tooth to emerge is the mandibular first molar and the last to erupt is the maxillary second molar (excepting, M3) in both the boys and girls. By 15 years of age, all the teeth except the third molar have completed their eruption. Except the mandibular canine and first premolar and maxillary medial incisor and second molar, all the teeth in female erupt earlier than their male counterpart. A comparative study of emergence of permanent teeth (excluding ,M3) among some Indian populations by jaw and sex shows that in all the populations, the mandibular first premolar erupts earlier than their maxillary counterpart; however, the eruption takes place at the same time among females also.

The occurrence of dental caries was observed earliest at of 13-18 months age in both the sexes, where, only mild and moderate forms of caries were recorded. The frequency of caries affected teeth is higher in the posterior teeth than the anterior teeth in both males and females. In both the sexes of the Mizo of Aizawl town, the prevalence of caries appears in low frequency among the *kuhva* (betel nut and leaf with lime) chewers, compared to that of the non-chewers.

The present study reveals that the chewing of *Kuhva* to certain extent protects the teeth from the dental caries and periodontal diseases in the present population. However, smoking and tobacco chewing show negative effect in the dental health. The prevalence of the OHI (CI-S), OHI (DI-S) is also affected by certain socio-economic factors like the family size, literacy, income etc. High income, small family size and high education are negatively associated with the dental and the oral diseases.

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APPENDIX-I

INTERVIEW SCHEDULE FOR DOCTORAL DISSERTATION ON
DENTAL ANTHROPOLOGY OF THE MIZO OF AIZAWL TOWN, MIZORAM

BACKGROUND INFORMATION Sl. No.....

(CONFIDENTIAL)

1. Name of Subject: .....Clan: .....
2. Sex: Male/Female Marital Status: Unmarried/Married/Divorced/Widower
3. D.O.B.: ..... D.O.E.: .....
4. Religion: ..... Locality:.....
5. School: ..... E&Q : .....
6. Subject's Occupation: .....
7. Subject's Income (p.m.): .....
8. Father's E & Q: .....
9. Father's Occupation: .....
10. Mother's E & Q: .....
11. Mother's Occupation: .....
12. Types of family: Nuclear/Joint/Any other. No. of Family Member: .....
13. Total family income per year (cash/kind): .....
    (a) Income from salary per month, if any: .....
    (b) Income from rental, if any: .....
    (c) Pension per month, if any: .....
    (d) Total income from cultivation: .....
    (e) Total yearly expenditure of the family: .....
15. Household Characteristics:
    (a) Residence: Own/Rented/Others.
    (b) House type: RCC/Assam Type/ Kachha.
    (c) Kitchen separated: Yes. No.
    (d) Types of toilet: No toilet/Septic tank/Drainage/Public toilet/Own pit/open field.
    (e) Source of light: Electricity/ kerosene/ other
    (f) Source of drinking water: Unprotected Well/Protected Well/Hand pump/Pond Reservoir/ PHE supply/Streams/Rivers/any other.

ERUPTION

M^3	M^2	M^1	P^2	P^1	C^0	I^2	I^1	I^1	I^2	C^0	P^1	P^2	M^1	M^2	M^3
M_3	M_2	M_1	P_2	P_1	C_0	I_2	I_1	I_1	I_2	C_0	P_1	P_2	M_1	M_2	M_3

m^2	m^1	c^0	i^2	i^1	i^1	i^2	c^0	m^1	m^2
m_2	m_1	c_0	i_2	i_1	i_1	i_2	c_0	m_1	m_2

CARIES

M^3	M^2	M^1	P^2	P^1	C^0	I^2	I^1	I^1	I^2	C^0	P^1	P^2	M^1	M^2	M^3
M_3	M_2	M_1	P_2	P_1	C_0	I_2	I_1	I_1	I_2	C_0	P_1	P_2	M_1	M_2	M_3

m^2	m^1	c^0	i^2	i^1	i^1	i^2	c^0	m^1	m^2
m_2	m_1	c_0	i_2	i_1	i_1	i_2	c_0	m_1	m_2

PERIODONTAL INDEX (PI)

M^3	M^2	M^1	P^2	P^1	C^0	I^2	I^1	I^1	I^2	C^0	P^1	P^2	M^1	M^2	M^3
M_3	M_2	M_1	P_2	P_1	C_0	I_2	I_1	I_1	I_2	C_0	P_1	P_2	M_1	M_2	M_3

m^2	m^1	c^0	i^2	i^1	i^1	i^2	c^0	m^1	m^2
m_2	m_1	c_0	i_2	i_1	i_1	i_2	c_0	m_1	m_2

ORAL HYGIENE INDEX (OHI –S)

DI – S

M^1	I^1		M^1		m^1	i^1		m^1
---	----------	|	----------		----------		|	----------
M_1		I_1	M_1		m^1		i^1	m^1

CI – S

M^1	I^1		M^1		m^1	i^1		m^1
---	----------	|	----------		----------		|	----------
M_1		I_1	M_1		m^1		i^1	m^1

MORPHOLOGY

1. **Numerical variations:**

A. **Hyperdontia** : Yes No

If yes, which are the regions of each occurrence: .....

B. **Hypodontia** : Yes No

If yes, which are the regions of each occurrence: .....

2. Diastema :

C^0	I^2	I^1	I^1	I^2	C^0	c^0	i^2	i^1	i^1	i^2	c^0
----------			| ----------		-------	----------			| ----------		
C_0	I_2	I_1	I_1	I_2	C_0	c_0	i_2	i_1	i_1	i_2	c_0

3. **Crowded** : Yes No

Which area: .....

4. **Carabelli's cusp** : M^1 M^1 m^1 m^1 L/M/S

---|--- -------|-------

5. **Shovel-shaped Incisors** :

C^0	I^2	I^1	I^1	I^2	C^0	c^0	i^2	i^1	i^1	i^2	c^0
----------			| ----------		------	----------			| ----------		
C_0	I_2	I_1	I_1	I_2	C_0	c_0	i_2	i_1	i_1	i_2	c_0

6. Cingulum :

C^0	I^2	I^1	I^1	I^2	C^0	c^0	i^2	i^1	i^1	i^2	c^0
----------			| ----------		-------	----------			| ----------		
C_0	I_2	I_1	I_1	I_2	C_0	c_0	i_2	i_1	i_1	i_2	c_0

7. **Occlusion** : Normal/Overbite/Underbite
8. **Failed to Develop** : Yes/No If yes, which are the teeth?.....

FACTORS

1. Habits:

A. Smoking : Yes No. Bidi, Cigarette, Pipe, Any other,
If Yes, how much/day: .....

B. Chewing :
i. Tobacco : Yes No If Yes, how much/day: .....
ii. Betel nut &leaf : Yes No If Yes, how much/day: .....

C. Any other (drugs): .....

2. Dental Care :

A. Brushing teeth : Yes No

If yes, how? Toothpowder & brush, Toothpaste & brush Twig, Charcoal
Any other.....

If twig, which? : .....

B. Frequency : Twice a Day, Daily, Alternate day, Weekly Biweekly .....

C. Do you mouth wash after eating : Yes No

D. Do you mouth wash before sleeping at night : Yes No

E. Have you ever visited dentist : Yes No
If yes, how many times? ..... When? .....

What were the problems? .....

F. Do you feel sensation on your tooth/teeth while brushing? YES/NO
If Yes, which are the tooth/teeth .....

3. Diet: Pork, Beef, Chicken, Fish, Mutton, Others.

Green leaf, Vegetables, Sweets, Chocolates, etc.

APPENDIX-II

CANDIDATE'S BRIEF BIO-DATA

1.	Name:	C. Lalrammuana
2.	Father's Name:	C. Thangvela
3.	Date of Birth:	28th April, 1976
4.	Registration No and date:	1189 of 06.09.2007
5.	Nationality:	Indian
6.	Religion:	Christian
7.	Marital status:	Married
8.	Educational qualification:	M.Sc. (Anthropology), NEHU.
9.	Area of Research:	'Dental Anthropology'.
10.	Title of Ph.D. Thesis:	'Dental anthropology of the Mizo of Aizawl town, Mizoram'.

11. Presented paper at "National Seminar on Problems and Prospects of Ethnic Communities of India with Special References to North-East India" (Date 18th and 19th January 2012, organized by Department of Anthropology; Dibru College, Dibrugarh).

12. National workshop on 'Lithic: Issues and Problems' (Date 3rd-45th November, 2011, organized by Department of Anthropology; NEHU, Shillong) was attended.