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Biology of the People of Sikkim: Comparative Evaluation of Growth Patterns among Different Caste and Tribal Groups of Sikkim

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ABSTRACT The present paper is from the series "Biology of the People of Sikkim", which form one of the part of the research project entitled "Impact of human activities on the ecosystem and vice-versa with reference to the Sikkim Himalayas" under MAB (Man and Biosphere) Programme of UNESCO. In this paper an attempt has been made to study growth and development among various population groups of Sikkim from 8-19 years. A total of 42 biological variables (34 anthropometric and 8 physiological measurements) have been taken on 2,777 boys. It could be demonstrated that respiratory functions can be predicted best from a combination of body weight, projective height measurements, breadth, depth and circumference measurements. In body growth and physiological variables the various population groups show almost similar patterns. Whatever differences have been observed may be attributed to the genetic structure of that populaiton group.

INTRODUCTION

Every ecological situation involves complex interaction between various components of an environment. Physical elements interact with each other to determine the impact they make on a living organism beside the genetic control. It has been proved beyond doubt that genetical factors guide the course to maturity and the environmental factors accelerate or retard the rate of growth. Man who is an essential part of the ecosystem, has an unique ability to adapt to different external conditions and a wide range of diet. Due partly to this ability man has become the most ubiquitous and populous large mammalian species in our biosphere.

The man's adaptation to environment takes various forms and involves different types of reaction. The important environmental situations/ stresses to which man has to adjust are extremes of temeprature, high altitude, diseases and poor nutrition etc. Man adjust to these stresses either by structural modifications when exposed during growing period, physiological changes and genetic changes when exposed for generations. In addition to biological responses to environmental coditions, man is capable of manipulating the environment in order to meet his needs by use of cultural factors. The relationship between man and his environment is never static and is under constant process of change. The increasing scale and rate of change in many situations today, and their impact upon both society and the biosphere, threaten to exceed the present adaptative capacity of the vaiours natural and sociocultural systems that collectively constitute the biosphere. It is this situtation that calls for a systematic attempt to study the changing relationship between the environment and morphological, demographic and genetic structure of human populaitons.

The environmental conditions of mountains offer a variety of opportunities to examine the ways in which the structure of human body and populaiton is conditioned by the physical environment. The most important stress at high altitude is hypoxia which affects virtually all organ systems and physiological functions. The various aspects of human biology affected mainly are pre-natal growth (McClung, 1969; Beall, 1976), infant and child growth (Hurtado, 1932, 1966, 1972; Frisancho, 1966; Frisancho and Baker, 1970; Haas, 1973, 1976; Pawson, 1977; Bhasin et al., 2008), work capacity (Hurtado, 1964; Baker, 1976 and Nayar, 1975), fertility (Baker and Dutt, 1972; Abelson et al., 1974; Hoff and Abelson 1976 and Goldstein, 1983), disease patterns (Monge and Monge, 1966), nutritional needs (Ward, 1975) and body composition (Hannon et al., 1969; Consolazio et al., 1968, Krisywicki et al., 1969 and Bhardwaj et al., 1973, 1974, 1977, 1981)

Existing knowledge regarding the effect of life at high altitude on human development derives principally from data gathered in the Andes.

Regular differences between high amd low altitude Andean populations are consistent with the interpretation that they reflect adaptive responses to hypoxia stress. But it is not always conclusively demonstrated that a particular charcteristic represents an adaptation to a stress at high altitude. Consquently, if other high altitude population manifest the same characteristic, this would strengthen the inductive argument that these traits represent adaptation to the high altitude environment. If on the other hand, other populations do not exhibit the same pattern, it may indicate either that the two populations have adapted differently to the same stress as that or both reflect some process other than altitude adaptation.

The growth trend, rate of growth and morphological variations display positive relationship, with the surrounding environment on the stress to which a man is exposed during growing period warrants adaptive changes in growth pattern and rate of growth and ultimately the body structure. So the study of growth trend and morphological variation in a population reflect the structural adaptation to its surrounding environment.

In view of the ambiguity associated with the growth and development trends at high altitude, the present study lays emphasis on the altitude related changes in growth trend adult body dimension and several functional traits among Sikkim Himalayan populaiton groups.

Growth is a continuous process and it proceeds in an orderly sequences but not at a uniform rate. No two individuals grow at the same rate and different part of the same body grow at different rates which cause changes in body proportions apart from size till adulthood.

The development of foetus occur in cephalocaudal progression i.e., changes in structure and function begin in the head and upper body and proceed downwards legs (Tanner, 1962). The embryo and neonate is always top heavy because the head is the most developed and extremities the least developed. Postnatally there is proportionally less growth of the head and more of the lower part of the body so that body proportions change considerably. In the extremities the development is in an opposite direction, at any given age in a child, the hands are more developed than fore arm and upper arm and within the hand, fingers are more developed than palm. The development of different body parts can be measured metrically through anthropometry which is the science of measuring different body parts scientifically in order to assess and compare the growth pattern and nutritional status of different individuals or different populations. A number of body measurements are selected for this purpose because the use of height and weight alone taken for simplicity of procedure in growth studies has its limitations as it masks the fact that each organ and segment of the body is growing at a rate that is uniquely its own. As each measurement has its own significance in growth study, they are divided into different groups accordingly, such as

1. Projective height measurements
2. Breadth and depth measurements
3. Girths
4. Skinfold thickness

Projective measurements or linear measurements represents the linear growth of an individual, more so of the skeleton. The height obtained by an individual relfects his/her genetic potential and influence of environmental factors, especially nutrition on it. All the linear measurements are affected significantly on the face of malnutrition, and the individual never attains his/her full height despite having the genetic potential if the nutritional deficiency is prolonged. Other projective variable measures the specific segments of the body and reflects the influence of malnutrition during a specific period in the course of growth because of the differential rate of growth.

Body breadths and depths or the measures of the breadth of the bony framework reflects (i) the growth achieved during specific periods, (ii) the size of the chest cavity encompassing the lungs as one has yet to see large chests with small lungs and vice versa. The condylar breadths are the maximum of skelton width of elbow, knee, ankle, wrist etc. as these sites do not have excess of muscles or fats and accordingly it gives an indication solely of skelton development.

Body girths and skinfold thickness are the indicators of the development of soft tissue over the body. Body girths measures the bone + muscles + subcutaneous fat + skin, whereas the skinfold thickness are exclusively the measure of subcutaneous fat + overlying skin layer. Skinfold thickness tells about the enrgy stores (fat) in the body and hence are a reliable index of the nutritional status of an indiviudal. Girths have double fold function, (1) on the extremities they mostly reflect the muscular development in association with respective skinfold thickness as two individuals with identical arm/leg girths may have different muscular and fat development, (2) On the

trunks, especially upper trunk, girths display the size of the chest cavity, hence lung size and on the lower trunk the fat deposits as this region does not have strong musculature or broad bony frame.

Skinfold thickness, as mentioned above also, are the most reliable indices of the adiposity of an individual and can differentiate between two individual of same body weight and same body height but different muscle and fat content. Secondly skinfolds also reveal the subcutaneous fat distribution pattern over the body and how it changes with age etc. Skinfolds also serve it as important parameters of sexual dimorphism as females at any given age have more fat stores than their counterpart males. Same skinfold thickness at a given site in individual of different age does not indicate the same amount of fatness, because with age fat not only increases grossly, a redistribution of fat also occurs. With age relatively more fat is found to be deposited on the trunk compared to extremities which is the case in the younger years. So two individuals with identical subscapular skinfold thickness but on 12 year old and other 50 year old may not be having same amount of fat.

As each set of measurement has its own significance, a proper growth survey needs to incorporate all.

Man adapts to environmental stresses by biological and cultural means. The first biological response to any environmental condition is always physiological regardless of the age. It makes the study of physiological parameter of utmost importance. The crucial physiological parameters at higher elevations are of cardiorespiratory system. Under the hypoxia stress there is a need to increase the oxygen carrying capacity of the blood to working tissues, and a larger pulmonary surface will normaly mean an increased availability of oxygen for the blood haemoglobin. Guided by such considerations, pulmonary volumes have assumed an important role in determination of habitual physical activity, level of physical fitness and hence level of adaptation.

During the years from 1981 to 1984, an extensive research project on the "Biology of the People of Sikkim" has been carried out which is one part of the project entitled "Impact of human activities on the ecosystem and vice-versa with reference to the Sikkim Himalays", which took place within the frame of the MAB (Man and Biosphere) Programme of UNESCO.

The anthropological part of this interdisciplinary project had for subject growth patterns and pysiological properties of the various Sikkim population groups as well as the genetic variability among them. In this paper the results of growth and physiological studeis will be demonstrated and discussed.

AREA AND PEOPLE

Area

Sikkim is a small mountaineous state in the Eastern Himalayas with an area of 7,299 square kilometers. It lies between 27^0 and 28^0N latitude and 88^0 and 89^0E longitude. To its north, lies the Tibetan plateau, to the west the kingdom of Nepal, to the east the kingdom of Bhutan and the Chumbi valley of Tibet and to the south, the Darjeeling district of West Bengal (Fig. 1). The state is almost rectangular, 113 kilometers long and 64 kilometers wide. The elevation of hill ranges varies from 300 to 8400 metres above mean sea level. The geographical position of Sikkim allowed currents of change to enter and influence. Sikkim has been strongly influenced by Tibet in its religious and cultural life. By virtue of being a protectorate of India until 26 April, 1975, it is politically and economically influenced by Indian ideology. It became the twenty second state of India after that. Sikkim contains within its borders a variety of non-tropical and geographic environments from the low-snow-free outer hills to the high peaks with permanent snow and glaciers.

Administratively, Sikkim is divided into four districts - Mangan (North), Gangtok (East), Namchi (South) and Gyalshing (West), the divison being based on the dividing line of the two rivers, Tista and Ranjit. The data for the present study were collected in the Inner, Mid and Outer Himalayan zones and from all the four districts of Sikkim (Fig. 2).

People

The population of Sikkim according to 1981 census is 3,16,385 out of whichh 2,65,301 are rural and 51,084 urban i.e. 84% of the total population is rural (Census of India 1981, Seires 19 part IIA & Part IIB). The average density of population per square kilometer is 45.

The three main language of the state are Nepali, Bhutia and Lepcha spoken by about 90, 28 and 10 per cent of the population respectively. Hindi is generally understood by majority of the people.

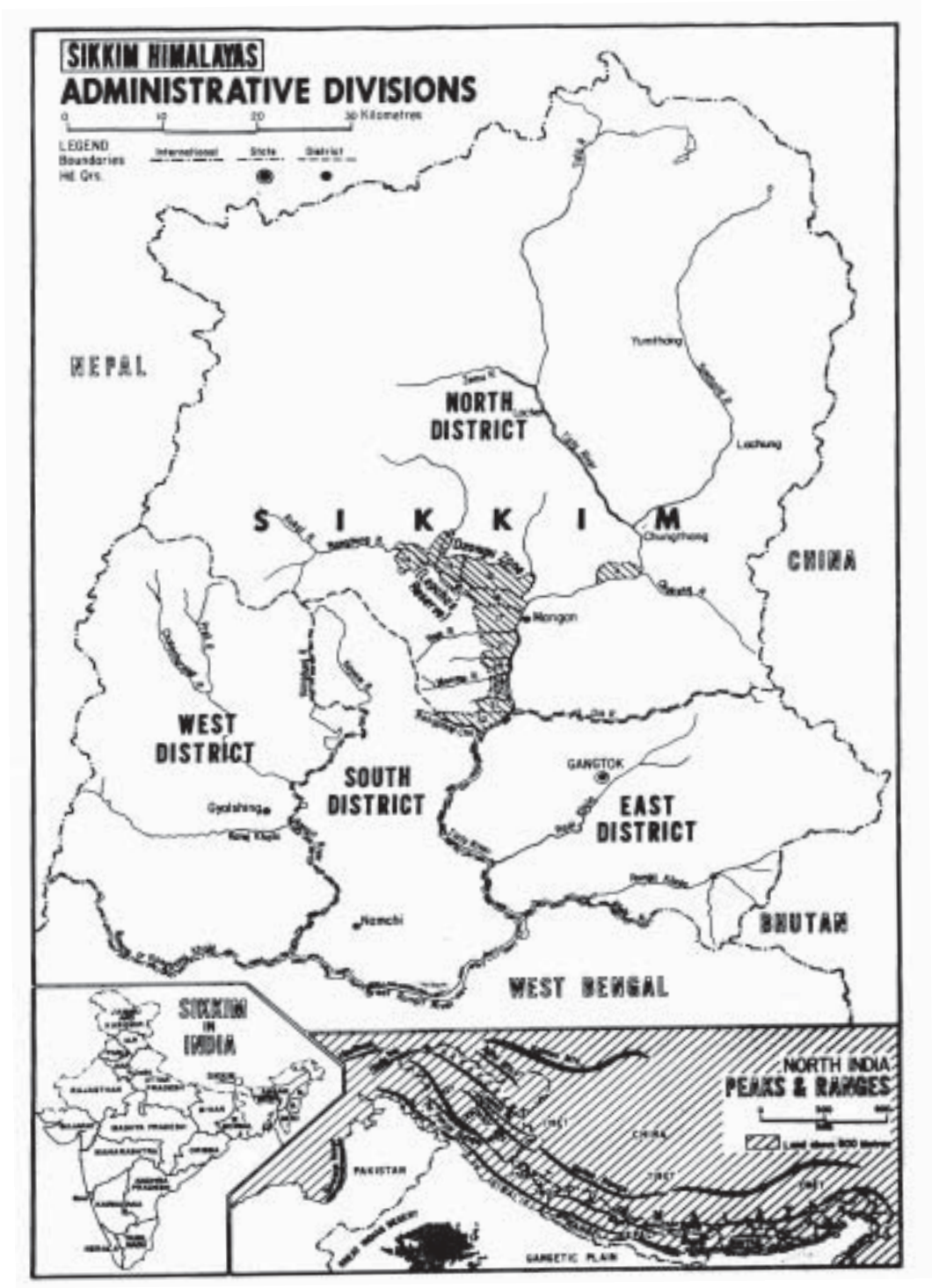
SIKKIM HIMALAYAS
ADMINISTRATIVE DIVISIONS
LEGEND
Boundaries
Int.
State
District
Hd. Qrs.
NEPAL
NORTH DISTRICT
S I K K I M
CHINA
WEST DISTRICT
SOUTH DISTRICT
EAST DISTRICT
GANGTOK
Gyalshing
Mangan
Ranchi
BHUTAN
WEST BENGAL
SIKKIM IN INDIA
NORTH INDIA PEAKS & RANGES
PAKISTAN
CHINA
GANGETIC PLAIN

Fig. 1


SIKKIM HIMALAYAS
PHYSIOGRAPHY
INNER
HIMALAYAN
ZONE
NEPAL
NORTH
DISTRICT
S I K K I M
CHINA
MID
HIMALAYAN
ZONE
WEST
DISTRICT
SOUTH
DISTRICT
GANGTOK
EAST
DISTRICT
OUTER
HIMALAYAN ZONE
BHUTAN
WEST BENGAL
SIKKIM
IN
INDIA
PEAKS & RANGES
PAKISTAN
TIBET
CHINA

Fig. 2

Buddhism, Hinduism and Animism are practised by different ethnic groups, but it is very difficult to classify them accurately. Some Nepalis are Hindus and others are Buddhists, while Lepchas are animists and Buddhists. Religion of the Scheducled Castes is uncertain. Table 1 presents the different social, religious, linguistic and ethnic groups composing Sikkim society.

Table 1: Distribution of ethnic groups by religion and language

S. No.	*Ethnic groups*	*Religion*	*Language*	*Percent*
1.	Lepchas*	Buddhism/ Christianity	Lepcha (Tibeto-Burman)	12.8
2.	Bhutias	Buddhism	Bhutia (Tibeto-Berman)	14.1
3.	Sherpas	Buddhism	Sherpa (Tibeto-Burman)	3.7
4.	Tamangs	Buddhism	Tamang (Tibeto-Burman)	5.0
5.	Brahmans	Hindusm	Nepali (Indo-Aryan)	8.4
6.	Chhetris	Hinduism	Nepali (Indo-Aryan)	11.6
7.	Pradhans (Newars)	Hinduism	Nepali Newari	3.5
8.	Rais	Hinduism	Nepali/Rai	14.6
9.	Limboos/ Subbas	Hinduism	Nepali /Limbu	9.4
10.	Mangars	Hinduism	Nepali/Mangar	2.6
11.	Gurungs	Hinduism	Nepali/Gurung	6.1
12.	Scheduled Castes	Hinduism	Nepali (Indo-Aryan)	5.9
13.	Trading communities			2.2

* A few follow Christianity

Some of the major groups in Sikkim state are found throughout the state, while scheduled tribal groups (Lepchas, Bhutias, Sherpas) are found in limted areas. All these groups are characterised by specific ecological adaptations as well as social organisation of each region where they live.

Population Groups Studied

Lepchas are probably indegenous population of the area. *Bhutias* are the people of Tibet origin who took refuge in the country after schism in Tibet in fifteenth and sixteenth century. One of their chieftains was crowned Chogyal as religious and secular ruler in 1642. The Lepchas and Bhutias are mainly concentrated in the North District of the Sikkim while in other districts they are found in widely scattered pockets.

Sherpas are originally from Nepal but they have mixed with the Tibetans. Most of them are small land owners or cultivators and also practise animal husbandry. They are mainly found in a few pockets of Kabi-Thingda area in North Sikkim.

The Lepchas, Bhutias and Sherpas are notified as Scheduled Tribes (The Constitution of Sikkim, Scheduled Tribes Order, 1978). During the British time, large number of Nepali immigrants came to construct roads and extend agriculture. The encouragement given to Nepali settlers completely altered the ethnic composition of country. At present more than 70 per cent of the peoples are Nepalis.

Tamangs are one of the ancient Nepalese group. Traditionally it is known that Tamangs came from a region of inner Tibet. Tamangs are very skilled at a number of crafts. Their economy is mainly based on agriculture.

The *Brahmans* are also referred as *Bahun* or *Sharma.* Their main occupation is farming and government services. They also act as family priests. The *Chhetris* form a majority of influential and wealthy people of Sikkim. Brahmans rank highest in the caste hierarchy, followed by Chhetris.

Pradhans belong to Newars, who are the members of the ancient Napalese ethnic group. They belong to the Shresta caste groups of Newars. They are shopkeepers, big businessmen and farmers.

The *Kirantis (Rais* and *Limboo/Subbas)* were the first people to settle in the Nepal valley. Rais and Limboos probably have a common origin, but today they live separately. Limboo people are addressed as "Subba", a term which, like Rai, means "Chief" or "Headman".They cultivate both dry and wet fields.

The *Gurungs* also belong to the ancient Nepalese group, whose economy is based mainly on agriculture and sheep breeding.

The *Mangars,*the largest ancient ethnic group of Nepal and in Sikkim, are mostly spread to West and South Districts. The basis of Mangars economy is agriculture.

Schedule Castes constitute of Damai (tailors), Kami (smiths), Lohar (blacksmiths), Majhi (fishermen) and Sarki (cobblers) after the Constitution (Sikkim) Schedules Castes Order, 1978. In North District their number is less, whereas in other districts they are more or less

evenly distributed. Their total population was 18,281 in 1981, which is about 6 per cent to general population of Sikkim (Census of India, 1981, Series 19, Sikkim District Census Hand Book, Sikkim, India). *Kamis* are mainly dominating in Scheduled Castes. They rank lowest in the caste hierachy.

MATERIAL AND METHODS

Material

The present study has been conducted among Lepchas, Bhutias, Sherpas, Tamangs, Brahmans, Chhetris, Pradhans, Rais, Limboos/ Subbas, Gurungs, Mangars and Scheduled Castes of Sikkim. The Lepchas and Bhutias have further been divided into two subgroups: 1. Lepchas of North Sikkim and Lepchas of East, South and West Sikkim and 2. Bhutias of North Sikkim and Bhutias of East, South and West Sikkim, on the basis of their regional distribution. The data have been collected only on male subjects. A cross-sectional sample of apparently healthy subjects ranging in age from 8+ to 20+ years (Table 2). The Nepalese populations are widely scattred throughout the four districts of Sikkim. The subjects of different populations under study are not intermarrying with one another. All the necessary precautions were taken to collect the data on the subjects who are not closely related in all the endogamous groups of Sikkim.

Methods

For observing the age changes in the growth and development the categorization of age groups has been done in the following manner. Those subjects who have completed 8 years of age but are less than 9 years even by one day, are grouped under 8+ age groups. Similar pattern has been followed for each age group from 8+ to 19+ years.

The anthropometric measurements (34) have been taken on each of subjects apparently healthy individuals following the standard techniques of Martin and Saller (1959); W.H.O. (1964); Singh and Bhasin (1968) and Weiner and Lourie (1969). The blood pressure and respiratory functions have been taken following the standard technique of Weiner and Lourie (1969).

The measurements are:

A. *Anthropometric Variables (Morphological Measurements)*

(a) *1. Body Weight (B Wt)*

(b) *Projective Height Measurements*

2. Standing Heigth Vertex (St HtV)
3. Height Acromion (Ht Ac)
4. Height Supersternale (Ht Su)
5. Height Tragus (Ht Tr)
6. Height Illiospinale (Ht Il)
7. Sitting Height Vertex (Si Ht V)

(c) *Breadth and Depth Measurements*

(i) Trunk Measuremnts

8. Biacronial Breadth (Bi Ac B)
9. Bicristal Breadth (Bi Cr B)
10. Transverse Diameter of Chest (TDC)
11. Antero-posterior Diameter of Chest (APDC)

(ii) *Condylar Breadth*

12. Bicondylar Breadth - Right (Bc BR)
13. Bicondylar Breadth -Left (Bc BL)

(d) *Girths*

14. Head Circumference (HC)
15. Chest Circumference - Normal (CCN)
16. Chest Circumference at Maximum Inspiration (CCE)
17. Chest Circumference at Maximum Expiration (CCI)
18. Upper Arm Girth-Relaxed (UAGR)
19. Upper Arm Girth-Contracted (UAGC)
20. Calf Girth (CG)

(e) *Head and Face Measurements*

21. Head Length (HL)
22. Head Breadth (HB)
23. Minimum Frontal Breadth (M Fr)
24. Maximum Bizygomatic Breadth (M Bz)
25. Bigonial Breadth (Bg B)
26. Nasal Height (NH)
27. Nasal Breadth (NB)
28. Physiognomic Upper Facial Height (PUF Ht)
29. Morpological Upper Facial Height (MUF Ht)

(f) *Skinfold Measurements*

30. Skinfold at Biceps (Sk Bi)
31. Skinfold at Triceps (Sk Ti)
32. Forearm Skinfold - Radial (Sk FR)
33. Forarm Skinfold - Ulnare (Sk FU)
34. Subscapular Skinfold (Sk SS)

B. *Physiological Measurements*

35. Pulse Rate (PR)
36. Buccal Temperature (BT)
37. Diastolic Blood Pressure (DBP)
38. Systolic Blood Presure (SBP)
39. Vital Capactiy (VC)
40. Forced Vital Capacity (FVC)

Table 2: Sample size in different age groups among various population groups of Sikkim State.

Age (Years)	Practical Represen-tation	Buddhists: Lepchas North Sikkim	Lepchas Rest of Sikkim	Lepchas Total	Bhutias North Sikkim	Bhutias Rest of Sikkim	Bhutias total	Sher-pas	Taman-gas	Hindus: Brah-mans	Chhetris	Pra-dhans (Newars)	Rais	Limboos/ Subbas	Gurungs	Mangars	Sche-duled Castes
8.00-9.00	8+	18	13	31	16	20	36	22	13	13	19	20	21	19	17	8	5
9.00-9.99	9+	18	12	30	13	20	33	22	16	13	24	16	21	20	15	7	5
10.00-10.99	10+	20	13	33	14	21	38	24	19	13	21	17	21	22	15	7	5
11.00-11.99	11+	17	12	29	13	19	32	20	18	10	20	19	19	19	20	6	5
12.00-12.99	12+	15	17	32	14	24	38	22	20	16	23	19	21	21	21	6	5
13.00-13.99	13+	13	17	30	14	20	34	20	19	18	21	23	20	21	20	2	5
14.00-14.99	14+	13	18	31	14	23	37	22	20	19	23	21	23	23	22	7	6
15.00-15.99	15+	17	16	33	15	20	35	20	20	19	21	21	23	20	22	7	5
16.00-16.99	16+	15	12	27	13	20	33	19	15	20	24	23	24	24	20	11	5
17.00-17.99	17+	12	12	24	12	24	36	22	11	21	23	18	22	21	19	8	5
18.00-18.99	18+	13	11	24	20	23	43	21	13	18	22	13	25	22	17	2	5
19.00-19.99	19+	16	10	26	17	18	35	20	11	11	22	13	23	20	14	2	6
20.00 years and above	20+	67	46	113	61	64	125	56	48	54	58	44	52	44	54	32	11
Total		254	209	463	236	316	552	310	243	245	321	267	315	296	277	106	73

41. Forced Expiratory Volume in One Second (FEV_1)
42. Maximum Breathing Capacity (MBC)

In the present study, the data have been analyzed statistically in order to interpret the data in numerical terms.

RESULTS AND DISCUSSION

The results of the present study have been discussed as follows:

1. The population groups of the prsent study have been divided into two major religious groups 1. Buddhists (Lepchas, Bhutias, Sherpas and Tamangs) and 2. Hindus (Brahmans, Chhetris, Pradhans-Newars, Rais, Limboos/Subhas, Gurungs, Mangars and Scheduled Castes) to understand the variation among the population groups falling in these two groups.

2. The concentration of Lepchas and Bhutias is higher in North District, whereas in other districts they are found in a few scattered pockets. In the present study Lephas and Bhutias are divided into subgroups on the regional basis, i.e. 1. Lepchas and Bhutias of North District of Sikkim (Lepchas, N and Bhutias N.) and 2. Lepchas and Bhutias of East, South and West districts of Sikkim (Lepchas, E, S & W and Bhutias, E, S & W or Lepchas, Rest and Bhutias, Rest) to study the regional differences.

The magnitude of growth has been studied on the basis of distance curves, velocity curves, adolecent spurts, growth gradients, coefficient of correlations and regression lines.

Analysis of the present data on various population groups reveal that all the biological variables are growing from 8 to 19 years. Head length, head breadth, minimum frontal breadth, maximum bizygomatic breadth, bigonial breadth, skinfold at biceps, skinfold at triceps, forearm skinfold - "radial" and - "ulnar", and pulse rate are showing variation in growth whereas buccal temperature is showing almost stationary growth. (Table 3).

Morphological and Physiological Measurements

(i) Anthropometric Variables (Morphological Measurements)

(a) Body Weight

Body weight shows gradual rise from 8 to 20 years. It has been observed that among Buddhist

population groups at the age of 8+ years the Body weight ranges from 18.8 kg (Sherpas) to 22.4 kg (Bhutias, Rest) whereas at 20+ years from 50.6 kg (Tamangs) to a maximum of 61.4 kg (Bhutias, N). Growth achieved at 8+ years ranges from 33 (Bhutias, N) to 41 per cent (Tamangs), thus indicating the late maturation of this variable. Growth achieved at 19+ years ranges from 83 (Bhutias, N) to 96 per cent (Bhutias Rest). Among the Hindu population groups the mean value of Body weight in 8+ years age group ranges from 17.8 kg (Mangars) to 21.7 (Pradhans) whereas in 20+ years from 48.2 kg (Mangars) to 56.1 kg (Scheduled Castes). Body weight in Hindu population groups shows graudal rise up to adult stage. Body weight shows the late maturation i.e., at a age of 8+ years, 35.8 per cent (Pradhans) to 46.1 per cent (Brahmans) growth takes palce.

It has been observed that among both Buddhist and Hindu population groups, body weight has shown a gradual increase from 8 years of age till adulthood (20+years). Eight years old Sherpas were found to be lightest and Bhutias (Rest) were the heaviest but by the adult stage, Tamangs beacame the lighest and Bhutias (N) the heaviest group. Among Hindu groups, Mangars are found to be lightest 8 years onward till adulthood and Pradhan the heaviest with the exception of Scheduled Castes who showed highest body weight mean value in the group 20+. In both the population groups, adolescent spurt occurred between 12+ and 17 years and each group showed more than one peak valocities.

(b) Projective Height Measurements

Projective height measurements are showing gradual rise from 8 to 20 years. Among the Buddhist population groups, the mean value of Stature, Height illiospinale and Sitting height vertex in 8+ years varies from 113.2 cm (Sherpas) to 119.1 cm (Bhutias, Rest); 60.2 cm (Sherpas) to 64.8 cm (Lepchas, Rest); 62.3 cm (Sherpas) to 64.8 cm (Bhutias, Rest), respectively, whereas in 20 years age group the mean values of these measurements varies from 156.8 cm (Lepchas, Rest) to 164.5 cm (Bhutias, N); 86.0 (Lepchas, Rest) to 90.6 cm (Bhutias, Rest); 83.3 cm (Lepchas, Rest) to 87.3 cm (Bhutias, Rest), respectively. It has been observed that Bhutias (Rest) are showing higher mean values as compared to rest of the population groups of the present study for all the projective height measurements, except for Height acromion where Bhutias (N) are showing maximum mean values, whereas the minimum, mean values have been observed for Lepchas (N). Value of growth gradient at age of 8+ years ranges from 67 (Sherpas) to 76 per cent (Lepchas, Rest). Bhutias (Rest), Bhutias (T) and Sherpas are showing 100 per cent growth at 19+ years for all the Projective height measurements, except for Sitting height vertex. The occurrence of adolescence growth spurt, in general, ranges in between 9 to 15 years.

It has been observed among Hindu population groups that the mean values of Stature, Height illiospinale and Sitting height vertex in 8+ years age group varies from 111.1 cm (Mangars) to 121.4 cm (Brahmans); 59.1 cm Mangars) to 66.8 cm (Brahmans) and 56.6 cm (Scheduled Castes) to 63.3 cm (Pradhans), respectively, whereas in 20+ years age group, the mean values of those measurements varies from 155.8 cm (Mangars) to 162.8 cm (Pradhans); 83.8 cm (Mangars) to 91.2 (Brahmans) and 81.7 (Scheduled Castes) to 85.5 cm (Pradhans), respectively. Projective height measurements among Hindu population groups show a rise up to adult age group. Growth achieved in early age groups range from 68 to 74 per cent.

The adolescent spurt in general appeared between 11 to 15 years age groups. In each population group two peak valocities in stature are observed.

(c) Breadth and Depth Measurements

Breadth and Depth measurements exhibit gradual rise from 8 to 20 years and it has been observed among Buddhist population groups that the mean value of Transverse diameter of chest at 8+ years ranges from 17.5 cm (Sherpas) to 18.8 cm (Bhutias, N) and at 20+ years from 26.1 cm (Tamangs) to 26.7 cm (Bhutias, Rest) and the mean value of Antero-posterior diameter of chest at 8+ years ranges from 14.1 cm (Sherpas) to 15.0 cm (Lepchas, N) and at the 20+ years from 19.2 cm (Tamangs) to 20.9 cm Lepchas (Rest). Bhutias (N) are ahead of all other groups for Bicristal breadth, Antero-posterior diameter of chest and Bicondylar breadth 'left' and 'right' whereas Bhutias (Rest) for Biacromial breadth and Transverse diameter of chest. The values of growth gradient ranges from 63 (Sherpas) to 76 per cent (Tamangs) at age of 8+ years and from 93 (Lepchas, Rest) to 100 per cent (Bhutias, Rest;

Table 3: Morphological (34 anthropometric measurements) and Physiological (8 measurements) varaibales among 12 population groups of sikkim

S. No.	Measurement Age (in Yrs.)	Population Groups: Lepchas – North Sikkim	Lepchas – Rest Sikkim	Lepchas – Lepchas Total	Bhutias – North Sikkim	Bhutias – Rest Sikkim	Bhutias – Bhutias Total	Sherpas	Tamangs	Brahmans	Chhetris	Pradhans	Rais	Limboos/ Subbas	Gurungs	Mangars	Scheduled Castes
		Mean±S.D.	Mean±S.D.	Mean±S.D.	Mean±S.D.	Mean±S.D.	Mean±S.D.	Mean±S.D.	Mean±S.D.	Mean±S.D.	Mean±S.D.	Mean±S.D.	Mean±S.D.	Mean±S.D.	Mean±S.D. M	ean±S.D.	Mean±S.D.
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
A. ANTHROPOMETRIC VARIABLES:																	
A. 1. Body Weight (BWt) in Kilograms																	
	8+	21.8±2.9	20.9±3.4	21.4±3.1	20.8±3.6	22.4±5.5	21.7±4.7	18.8±2.5	21.3±5.2	21.7±3.1	19.6±2.9	21.1±3.7	19.1±3.0	19.9±3.8	20.1±3.6	17.8±2.3	20.30±1.8
	9+	21.6±3.0	22.9±3.4	22.1±3.2	21.1±2.2	23.5±2.9	22.5±2.9	21.7±3.3	21.9±3.8	22.1±2.8	20.9±2.4	19.6±2.5	21.4±3.5	20.9±3.1	20.6±2.3	23.0±7.9	21.2± 0.9
	10+	23.5±3.0	26.0±4.0	24.2±4.0	29.7±7.7	23.7±3.8	26.1±6.3	23.8±4.1	22.2±3.6	23.8±3.2	21.5±2.9	24.4±5.8	24.8±4.0	23.1±3.9	23.2±2.7	26.1±7.8	22.9 ±1.6
	11+	25.0±3.8	27.5±5.1	26.0±4.5	26.4±4.0	26.5±4.3	26.5±4.1	25.2±4.7	25.1±3.4	28.0±5.2	23.2±4.6	25.7±3.7	26.7±6.0	25.3±3.0	26.7±5.4	21.9±3.1	26.6 ±1.6
	12+	25.8±5.5	28.4±3.9	27.2±4.8	30.6±5.4	27.9±4.2	28.9±4.8	26.9±6.0	31.9±7.1	28.0±5.1	28.1±6.8	29.1±7.0	29.1±5.3	30.2±4.7	28.0±6.1	28.0±2.4	30.7 ±2.2
	13+	35.4±8.3	32.0±5.8	33.5±7.0	31.6±9.0	31.5±6.3	31.5±6.5	28.0±4.7	33.2±5.3	30.1±6.0	31.0±6.6	32.7±6.8	28.9±5.4	32.1±6.8	33.6±10.0	34.8±8.8	32.1±4.3
	14+	30.6±4.5	36.7±7.4	34.2±6.9	38.3±7.7	39.2±7.8	38.9±7.6	33.7±6.9	35.0±6.8	32.3±7.2	31.8±5.7	38.0±7.0	30.1±8.2	37.3±8.3	37.6±7.6	34.2±6.1	38.3 ±4.2
	15+	38.3±8.3	43.0±7.1	40.6±7.4	38.7±6.6	42.6+8.8	40.9+8.1	38.0±6.5	40.3±7.2	38.0±6.7	38.3±7.6	44.4±9.6	39.0±6.7	41.0±7.3	39.6±7.3	38.7±9.2	38.5 ±3.2
	16+	43.6±8.9	49.2±11.1	46.1±10.2	47.6±7.9	43.1±9.0	44.9±8.7	40.3±6.5	46.1±5.0	45.8±4.0	42.3±6.4	45.4±4.1	42.9±4.4	47.4±6.3	43.3±5.9	40.2±7.1	45 .2±10.5
	17+	47.8±7.2	46.4±6.8	47.1±6.9	51.6±4.8	50.2±5.0	50.1±4.9	46.9±5.5	46.2±7.7	46.6±6.4	44.0±6.6	48.1±4.5	46.3±4.3	47.2±5.0	49.4±6.0	44.6±4.8	47.9 ±4.8
	18+	52.2±8.2	48.5±4.9	50.5±7.0	54.5±6.8	51.8±10.4	55.0±8.9	45.8±8.1	47.4±4.5	48.7±7.3	47.7±5.6	49.2±2.4	48.4±5.7	49.9±5.1	47.0±7.9	49.8±6.0	56. 8±6.1
	19+	50.0±4.4	51.3±7.5	50.5±5.7	51.1±11.3	54.4±5.7	52.8±8.9	51.3±4.9	47.3±7.2	48.6±4.4	49.5±4.7	53.2±4.5	50.1±5.0	50.1±5.2	52.6±5.4	48.1±2.1	51. 6±6.0
	20+	55.6±8.7	56.0±6.9	55.8±7.9	61.4±9.0	56.3±8.3	58.7±9.0	54.1±7.8	50.6±7.0	51.5±7.1	50.8±6.5	54.9±7.7	50.1±5.1	52.3±5.4	50.5±5.6	48.2±5.9	56.1 ±7.7
B. Projective Height Measurement																	
2. Standing Height Vertex (St Ht V) in cm																	
	8+	110.4±5.4	118.2±9.0	118.3±7.0	117.0±7.6	119.1±8.9	118.2±8.3	113.2±7.1	116.9±10.6	121.4±6.4	119.6±7.7	118.1±8.6	112.8±6.7	112.8±10.4	115.2±7.4	111.1±6.7	114.9±3.0
	9+	117.8±7.2	120.2±8.4	118.8±7.7	118.6±7.8	123.6±6.9	121.6±7.6	119.1±6.3	120.7±9.3	123.6±5.5	121.3±9.0	118.3±6.1	119.2±7.8	115.8±5.6	117.6±5. 8	121.4±14.2	120.8±5.0
	10+	121.9±6.9	127.5±7.1	124.1±7.4	131.4±11.7	126.1±7.4	120.2±9.6	125.1±6.4	122.8±7.5	125.1±9.7	121.9±7.3	126.8±9.4	128.1±8.4	121.8±7.9	124.7± 5.5	126.8±13.0	125.8±6.5
	11+	125.8±10.1	130.0±8.8	127.5±9.8	129.3±5.4	130.6±9.0	130.1±7.7	127.6±8.2	129.3±4.4	135.3±7.9	126.5±7.2	128.7±7.7	129.1±11.0	128.0±5.5	130.9±8.9	119.2±11.2	127.0±2.0
	12+	126.8±9.7	132.7±7.7	130.0±9.1	135.1±6.7	136.5±7.3	136.0±7.0	131.3±9.7	138.7±12.0	135.8±9.0	133.9±11.7	133.5±11.1	134.6±8.5	136.3±8.3	133.7±9.1	133.2±6.3	137.6±4.2
	13+	142.4±11.0	139.1±9.2	140.1±10.0	135.7±11.0	138.2±11.4	137.2±11.1	134.3±6.9	142.1±9.3	140.8±9.7	137.2±10.6	139.9±7.8	136.3±10.7	138.4±9.4	141.8±12.1	140.6±15.7	141.3±7.5
	14+	135.3±6.0	145.4±10.1	141.2±10.1	146.9±10.4	150.0±9.9	148.8±10.1	141.8±8.7	144.5±9.1	144.2±10.9	140.6±16.8	148.9±9.8	148.0±9.8	145.5±10.5	147.9±9.0	142.7±9.9	147.2±3.5
	15+	145.5±9.8	152.2±9.5	148.8±10.1	148.7±9.3	154.1±10.8	151.8±10.4	150.1±8.4	150.7±8.8	153.0±10.7	150.0±9.3	155.1±13.4	148.2±9.8	151.0±9.8	14 9.2±10.9	147.9+13.0	151.3±3.2
	16+	153.0±10.2	155.7±12.8	154.2±11.3	159.1±9.9	155.1±9.4	156.7±9.4	152.7±7.4	157.6±10.4	149.5±4.0	155.0±7.3	159.3±5.6	154.4±7.0	156.2±7.4	155.8±7.3	151.5±10.4	158.2±7.4
	17+	154.6±6.3	155.6±8.3	155.1±7.2	163.3±6.7	163.5±5.9	163.5±6.1	157.8±4.7	156.2±7.7	162.4±5.9	158.1±6.9	162.2±5.8	158.7±5.5	15.0±6.5	160.0±6.6	153.5±6.4	158.6±6.8
	18+	160.5±9.2	153.5±4.1	157.3±8.0	162.6±6.7	163.7±10.2	163.2±8.6	158.4±8.0	163.5±6.1	163.4±8.5	157.2±10.4	161.8±5.6	159.1±6.6	157.9±4.6	158.1±11.4	166.8±4.5	166.0±8.2
	19+	154.3±6.0	156.5±9.2	155.2±7.3	163.8±5.6	167.5±5.6	165.7±5.8	161.3±5.6	157.5±7.2	160.7±5.6	164.5±7.7	164.7±4.8	160.3±4.5	158.8±7.2	162.8±5 .9	158.3±3.3	158.9±10.5
	20+	159.2±6.1	156.8±5.7	158.2±6.0	164.5±6.5	164.4±7.6	164.4±7.0	160.8±5.1	158.9±7.0	162.6±6.7	162.1±10.4	162.8±6.4	157.5±6.6	158.9±5.5	158.3±6.6	155.8±6.5	158.7±5.4
3. Height Acromion (Ht Ac) in cm																	
	8+	94.7±5.3	94.8±8.1	94.8±6.5	94.3±6.7	94.8±7.6	94.6±7.1	88.2±5.5	92.8±8.4	97.0±5.2	94.2±6.9	93.1±7.1	90.1±55.3	88.7±10.0	91.3±6.3	88.6±7.0	90.7±1.8
	9+	93.7±5.5	96.5±6.0	94.8±5.8	92.7±5.9	98.6±6.5	96.3±6.8	95.2±4.6	95.3±8.3	98.9±5.7	95.8±5.3	93.9±4.7	95.2±6.1	92.5±6.9	93.1±5.6	98.7±12.5	97.7±4.9
	10+	98.1±5.1	102.5±6.6	99.9±6.1	105.0±11.1	101.6±6.4	103.4±8.7	100.7±5.7	95.2±9.6	104.8±6.1	99.1±7.1	101.3±7.6	102.2±8.6	97.3±7.2	100.2±5.5	101.3±11.1	102.6±5.2

Table 3: Contd...

S. No.	Measurement Age (in Yrs.)	Lepchas			Bhutias			Sherpas	Tamangs	Brahmans	Chhetris	Pradhans	Rais	Limboos/ Subbas	Gurungs	Mangars	Scheduled Castes
		North Sikkim	Rest Sikkim	Lepchas Total	North Sikkim	Rest Sikkim	Bhutias Total										
		Mean±S.D.	Mean±S.D.	Mean±S.D.	Mean±S.D.	Mean±S.D.	Mean±S.D.	Mean±S.D.	Mean±S.D.	Mean±S.D.	Mean±S.D.	Mean±S.D.	Mean±S.D.	Mean±S.D.	Mean±S.D.	M ean±S.D.	Mean±S.D.
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
	11+	101.1±6.0	106.2±8.9	103.2±7.6	104.1±5.4	106.0±8.4	105.2±7.3	102.8±8.1	104.0±3.8	109.2±7.6	102.0±5.9	103.3±6.8	104.5±9.2	102.5±5.1	105.1±7 .6	96.2±11.2	101.8±3.0
	12+	101.9±8.8	107.7±6.9	105.0±8.3	110.0±6.4	108.3±6.0	108.9±6.1	105.4±8.7	112.5±10.8	112.1±8.2	108.2±10.3	108.6±10.3	108.3±7.2	109.0±5.7	107. 1±8.6	107.7±6.2	113.7±1.8
	13+	116.0±9.5	113.5±8.5	114.6±8.9	110.7±10.5	111.2±9.1	111.0±9.6	108.5±6.6	115.9±7.4	114.8±8.4	112.6±10.2	113.4±7.0	109.9±10.2	111.3±8.8	115. 5±11.3	114.8±14.3	115.1±7.6
	14+	109.9±6.3	118.6±8.7	115.0±9.8	120.0±9.1	121.4±9.4	120.9±9.2	114.6±7.5	117.5±8.3	117.9±8.6	113.9±6.9	121.7±7.3	120.6±9.2	118.3±8.7	120.3±7 .4	115.3±7.4	119.1±3.5
	15+	118.0±7.9	123.5±8.5	120.6±8.5	121.8±8.8	125.2±8.8	123.7±3.9	121.2±6.8	121.8±7.0	125.2±9.2	122.2±7.9	128.6±7.1	120.9±7.6	122.9±8.1	121.7±8 .2	120.0±11.6	122.6±2.8
	16+	125.7±8.8	126.8±11.4	126.2±9.8	130.2±9.0	127.2±6.6	128.4±7.7	124.0±6.7	128.4±8.1	129.9±4.1	127.1±6.6	129.2±4.6	124.6±6.1	127.1±6.2	126.2± 5.3	123.1±8.6	128.9±6.3
	17+	126.6±5.1	128.6±7.6	127.8±6.4	134.7±5.7	133.6±5.2	134.0±5.3	128.5±4.4	127.8±5.4	132.9±5.1	129.5±6.2	132.5±5.3	128.0±4.7	128.2±4.6	130.6±6 .2	124.9±7.7	130.1±6.4
	18+	130.0±7.6	125.3±3.1	127.9±6.3	134.3±6.8	133.6±8.4	134.0±7.6	128.9±7.0	133.0±5.0	133.5±5.8	130.5±5.1	131.5±4.2	129.5±5.3	127.6±3.7	128.9±10.1	137.0±5.7	138.5±8.0
	19+	125.4±4.6	129.2±8.3	126.8±6.4	133.4±5.1	136.9±5.7	135.2±5.6	131.4±5.0	129.6±7.3	130.8±4.6	134.9±6.8	134.2±3.3	131.2±4.4	129.9±6.3	132.7±4 .9	128.0±2.3	130.7±10.2
	20+	130.1±5.5	129.2±5.0	129.7±5.3	135.1±6.0	134.1±6.8	134.6±6.5	131.2±4.5	129.7±5.4	133.2±6.3	132.5±9.4	133.4±5.7	128.2±5.1	129.5±4.9	128.8±5 .9	126.8±5.7	130.3±4.9
4. Height Superasternale (Ht Su) in cm																	
	8+	94.9±4.9	94.6±7.6	94.7±6.1	94.1±6.5	95.2±7.8	94.7±7.2	89.8±4.7	93.5±8.4	97.3±5.1	94.6±6.9	93.8±6.7	90.5±5.6	88.9±9.1	92.3±7.0	91.2±6.3	90.1± 2.3
	9+	94.1±5.9	96.8±6.5	95.1±6.1	94.1±5.5	99.6±6.0	97.4±6.4	96.2±5.1	96.5±8.4	99.9±5.7	96.2±5.6	94.6±4.7	95.7±6.9	93.0±6.3	94.1±6.0	98.0±12.1	97.5±5.1
	10+	97.7±5.7	102.7±5.6	99.7±6.1	105.6±10.6	102.6±7.0	103.7±8.6	101.3±5.6	98.1±5.5	103.7±5.3	99.2±6.5	103.1±7.8	102.8±8.4	97.6±7.0	100.7±4.9	101.9±11.4	101.5±4.9
	11+	101.0±5.7	105.9±8.0	103.0±7.0	104.1±4.7	105.5±7.8	105.0±6.7	103.1±7.7	104.3±3.5	109.8±8.0	104.9.16.1	104.1±6.8	104.7±9.0	103.2±4.7	106.3±8.0	96.3±10.0	102.5±2.8
	12+	102.6±8.6	108.3±7.6	105.6±8.4	110.1±5.5	108.6±6.6	109.1±6.2	105.8±7.1	112.3±10.5	111.8±8.1	108.5±10.5	108.4±10.0	109.5±7.3	109.1±6.3	107.6±8.4	108.8±4.9	112.8±2.9
	13+	115.4±9.4	113.7±7.7	114.4±8.3	111.1±10.2	110.7±9.3	111.4±±9.5	108.9±6.4	116.2±7.5	115.2±8.7	112.3±9.0	113.7±6.8	110.7±10.5	111.5±8.6	115.0±10.5	114.3±13.2	114.8±7.9
	14+	109.3±6.6	118.4±8.3	114.6±8.0	119.7±9.2	121.0±8.5	120.5±8.6	115.9±8.4	117.2±8.0	118.3±9.1	113.8±7.6	121.4±7.6	120.6±8.4	118.7±8.2	120.8±7 .5	116.9±8.1	118.9±2.6
	15+	118.9±8.3	124.9±8.3	121.8±8.7	122.2±8.9	125.1±9.2	123.8±9.0	121.9±7.2	122.1±7.5	125.3±10.0	122.1±7.9	128.7±7.7	121.6±7.0	123.4±8.5	121.9±8.8	120.5±11.3	123.4±3.7
	16+	125.1±8.6	126.4±11.2	125.7±9.7	130.7±9.2	126.8±7.5	128.3±8.3	124.1±5.9	128.9±7.8	130.1±3.2	127.0±6.4	129.8±5.5	125.8±5.7	127.2±6.2	126.4±5.7	123.5±8.3	128.3±5.7
	17+	127.2±5.6	126.8±7.2	127.0±6.3	134.4±6.0	133.9±4.8	134.1±5.2	128.9±4.2	127.6±6.3	132.5±6.0	129.0±6.5	132.3±5.5	129.2±5.4	128.7±5.5	130.6±6 .1	125.8±7.4	130.8±7.0
	18+	131.1±8.5	124.5±3.6	128.3±7.3	133.4±5.8	133.8±8.8	133.6±7.5	129.2±6.9	133.0±5.3	133.2±5.7	130.1±4.4	132.3±4.6	129.2±6.0	127.5±3.7	128.0±10.7	136.5±3.4	136.2±6.5
	19+	125.6±5.1	128.4±8.4	126.7±6.6	133.9±5.1	137.6±5.2	135.8±5.4	131.8±5.2	129.4±6.2	131.5±4.4	133.8±5.9	134.3±3.3	130.3±4.3	129.9±6.0	133.5±3 .9	128.8±5.1	129.6±9.6
	20+	129.7±5.5	128.8±4.8	129.4±5.2	135.1±6.2	133.7±6.5	134.1±6.3	131.3±4.4	129.4±5.5	132.8±6.0	132.1±6.7	132.2±5.7	127.8±5.1	129.3±4.6	128.6±5 .6	126.7±5.7	129.7±4.3
5. Height Tragus (Ht Tr) in cm																	
	8+	106.4±5.8	106.5±8.8	106.5±7.1	106.0±8.3	105.4±14.6	105.7±12.1	100.7±6.2	105.1±10.2	109.4±5.7	107.3±8.1	105.1±7.3	101.1±6.3	99.9±10.7	103.6±7.9	99.5±7.1	103.6±2.4
	9+	106.1±6.7	107.3±8.3	106.6±7.0	105.9±7.0	111.7±7.0	109.4±7.5	107.2±6.0	108.6±8.6	111.6±4.7	108.5±5.8	106.8±5.2	108.2±7.2	104.5±7.4	105.9±5. 8	110.1±13.5	111.0±4.7
	10+	110.1+7.1	115.6±6.7	112.3±7.4	119.7±11.9	114.4±6.7	116.5±9.4	113.6±6.3	110.1±6.8	116.2±5.9	111.7±7.1	114.8±9.4	117.0±8.9	111.6±10.2	112.7±5.4	114.3±12.4	116.3±5.8
	11+	113.8±6.7	117.6±9.2	115.4±7.9	117.3±5.4	119.2±8.7	118.5±7.5	115.2±8.5	118.2±5.0	122.3±10.2	114.6±6.9	117.0±7.7	112.1±27.4	116.2±5.3	120.0±8.6	108.5±11.1	115.0±1.9
	12+	115.1±8.9	120.9±8.0	118.2±8.8	123.4±6.8	122.2±7.9	122.6±7.4	118.6±10.1	126.4±11.5	125.4±8.8	122.9±12.2	123.2±11.0	123.4±8.6	123.1±3.1	122.6±9.3	122.7±7.1	128.8±1.6
	13+	129.6±10.7	128.8±9.6	128.6±9.9	124.4±10.9	126.1±11.1	125.4±10.9	122.2±7.1	131.3±8.4	128.7±9.6	127.0±10.8	128.4±7.7	125.3±11.2	126.5±9.8	1 29.8±11.8	129.8±16.8	128.4±7.4
	14+	123.5±6.5	133.4±9.6	129.3±9.7	134.3±10.4	136.6±10.1	135.7±10.1	129.9±8.4	132.3±8.5	132.9±10.8	128.8±8.4	136.9±9.0	135.8±7.0	133.6±10.5	136.4±9.2	131.2±9.6	135.6±4.6
	15+	133.2±9.3	140.1±9.5	136.5±9.9	136.8±9.9	141.9±10.8	139.7±10.6	137.5±7.7	138.6±8.6	141.8±9.7	137.6±9.5	145.2±8.9	137.7±8.0	140.2±8.7	137.1±10.5	136.5±12.6	139.7±4.8
	16+	140.6±10.2	143.0±12.0	141.7±10.9	147.0±10.1	142.8±9.3	144.4±9.7	140.4±7.1	145.4±10.0	147.8±4.2	143.3±7.2	146.4±6.4	142.4±6.5	144.1±6.7	142.1±6.5	139.5±10.1	145.7±7.0

Table 3: Contd...

S. No.	Measurement Age (in Yrs.)	Population Groups: Lepchas – North Sikkim	Lepchas – Rest Sikkim	Lepchas – Lepchas Total	Bhutias – North Sikkim	Bhutias – Rest Sikkim	Bhutias – Bhutias Total	Sherpas	Tamangs	Brahmans	Chhetris	Pradhans	Rais	Limboos/ Subbas	Gurungs	Mangars	Scheduled Castes
		Mean±S.D.	Mean±S.D.	Mean±S.D.	Mean±S.D.	Mean±S.D.	Mean±S.D.	Mean±S.D.	Mean±S.D.	Mean±S.D.	Mean±S.D.	Mean±S.D.	Mean±S.D.	Mean±S.D.	Mean±S.D. M	ean±S.D.	Mean±S.D.
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
	17+	143.5±6.8	143.2±7.9	143.3±7.2	150.9±7.6	150.3±5.6	150.5±6.2	145.6±4.5	144.3±7.6	148.7±7.3	145.1±7.1	149.5±5.8	145.7±5.7	146.4±5.7	147.8±6 .5	141.5±8.3	146.4±7.0
	18+	148.4±9.3	142.3±4.1	145.6±7.9	150.3±5.9	151.5±10.2	150.9±8.4	145.6±7.7	150.8±6.3	149.8±7.0	146.8±6.2	149.9±5.5	146.8±6.7	145.8±4.3	146.5± 2.7	154.1±7.3	153.9±8.9
	19+	142.2±5.0	144.0±9.0	142.9±6.7	151.3±5.6	155.1±5.7	153.2±5.9	148.7±5.4	141.9±14.1	148.5±5.5	152.6±6.6	152.7±3.6	148.3±4.4	145.6±7.1	150.1±5.2	145.7±3.8	146.4±10.8
	20+	146.9±6.0	144.6±5.6	145.9±5.9	152.4±6.5	151.5±7.7	152.0±+7.1	148.0±5.5	146.8±6.8	149.9±6.4	149.4±7.6	150.0±6.8	145.5±5.3	146.8±5.1	145.3±6.7	143.4±6.1	147.±24.8
6. Height Illiospinale (Ht Il) in cm																	
	8+	63.3±3.8	64.8±6.4	63.8±5.0	62.2±5.5	65.0±5.4	63.5±5.5	60.2±4.1	61.7±7.2	66.8±4.4	64.1±7.0	62.9±4.6	59.9±5.6	59.9±6.9	61.4±5.9	59.1±3.7	59.8± 3.4
	9+	62.9±6.2	63.5±5.8	63.2±5.9	62.7±5.9	67.1±4.5	65.4±5.5	63.8±4.7	64.9±6.8	69.2±5.0	67.0±6.0	64.4±3.8	63.7±5.6	61.9±5.5	62.4±5.7	65.8±8.3	66.3± 5.3
	10+	65.4±4.7	68.3±5.1	66.6±5.0	71.7±7.1	69.5±5.9	70.4±6.4	67.8±4.7	66.4±4.6	71.3±4.5	67.1±5.8	69.9±5.7	70.0±7.1	66.0±5.7	67.9±4.5	69.4±6.8	69.0 ±6.0
	11+	67.7±5.2	71.6±6.2	69.3±5.9	70.2±2.6	72.1±5.2	71.3±4.4	70.0±6.6	70.8±3.9	76.5±6.9	70.0±5.0	70.5±6.5	69.9±7.4	69.5±4.5	71.3±6.5	63.6±7.9	67.9 ±4.3
	12+	69.0±7.9	73.4±5.9	71.4±7.2	73.3±5.2	74.0±5.6	73.8±5.4	71.0±5.9	76.3±7.8	77.7±6.8	74.2±8.3	74.9±6.7	74.9±7.0	74.7±4.4	74.2±6.9	73.5±5.7	77.6 ±1.2
	13+	80.1±5.4	83.5±3.4	82.0±17.8	75.8±7.5	76.9±7.1	76.4±7.2	74.1±5.1	78.4±5.2	81.2±6.8	76.9±7.3	77.9±5.0	75.3±7.8	76.5±6.6	78.7±7.9	77.4±11.9	78.1±7.0
	14+	75.5±4.0	80.2±6.4	78.2±5.9	82.7±6.0	83.0±7.5	82.9±6.8	79.0±6.4	79.6±5.8	81.4±7.4	79.2±5.6	83.4±4.6	82.3±7.0	80.9±6.3	81.8±4.4	76.7±6.4	81.9 ±3.5
	15+	80.1±6.4	84.9±6.5	82.4±6.8	84.8±6.8	85.4±8.5	85.1±7.8	84.4±5.3	84.0±6.2	87.3±7.4	85.1±5.6	87.8±5.5	83.6±5.6	83.8±6.1	83.3±6.6	83.9±9.0	86.5±7.5
	16+	85.2±5.9	85.3±7.8	85.3±6.7	88.6±7.3	86.4±5.3	87.2±6.1	85.4±4.9	87.6±5.6	91.8±3.3	86.4±5.6	89.4±4.6	85.5±5.5	86.2±4.5	85.1±4.5	84.3±4.9	89.6 ±2.7
	17+	86.5±5.9	86.8±6.3	86.7±6.0	92.4±4.4	89.9±5.0	90.7±4.9	89.0±3.0	87.0±4.9	91.9±4.0	89.2±5.4	91.5±4.3	87.7±3.8	87.2±4.0	89.3±5.0	85.2±6.2	90.8 ±5.1
	18+	89.6±5.2	85.0±3.7	87.5±5.1	90.5±5.6	92.1±6.3	91.4±6.0	88.0±5.6	90.6±4.1	94.0±5.1	89.0±3.8	91.6±4.2	88.5±4.6	86.9±3.5	87.5±7.5	97.7±4.4	93.6 ±5.0
	19+	85.9±4.7	85.8±4.4	85.9±4.5	91.2±4.5	93.2±4.2	92.3±4.4	89.6±4.7	88.0±4.0	89.5±4.1	92.3±5.6	91.5±2.9	89.5±4.4	88.5±4.2	90.3±4.4	84.9±7.0	87.9 ±7.6
	20+	87.5±4.1	86.0±4.4	86.9±4.2	90.1±6.4	90.6±4.7	90.3±5.6	87.6±5.1	87.4±5.4	91.2±4.3	89.8±5.9	90.0±3.7	86.4±4.8	87.6±3.5	86.7±5.0	83.8±3.7	87.0 ±2.9
7. Sitting Height Vertex (St Ht V) in cm																	
	8+	62.9±2.8	63.5±4.6	63.1±3.6	62.3±4.0	64.8±4.9	63.7±4.6	62.3±6.2	63.8±5.7	62.9±2.8	62.5±4.3	63.3±4.8	61.2±3.5	61.2±5.4	62.7±3.9	59.9±4.0	56.6± 2.7
	9+	64.0±4.2	65.4±4.7	64.6±4.4	63.4±4.2	67.0±3.8	65.6±4.3	63.8±3.6	64.1±4.0	63.9±2.8	64.5±3.3	63.9±3.3	63.5±3.7	63.0±3.6	62.8±3.3	66.1±7.5	62.8± 3.8
	10+	65.3±4.1	69.7±4.3	66.3±4.3	70.0±5.9	68.4±5.5	69.0±5.6	66.4±3.1	64.2±3.4	65.8±3.8	65.3±4.1	66.1±5.3	68.5±4.0	64.6±4.2	66.6±3.2	67.7±6.3	64.2 ±1.9
	11+	66.2±3.9	68.6±5.5	67.2±4.7	68.9±3.2	69.4±4.7	69.2±4.1	66.6±4.7	67.5±3.0	68.7±3.0	66.6±4.2	67.1±3.6	68.9±5.5	67.4±3.2	69.3±4.5	64.8±5.9	66.7 ±2.8
	12+	67.5±4.7	70.9±6.0	69.3±5.6	71.7±3.5	71.5±4.1	71.6±3.9	69.3±5.5	73.2±5.8	69.3±3.8	70.8±6.1	71.4±5.3	71.1±3.8	71.8±4.7	70.9±4.7	70.2±3.5	69.1 ±1.2
	13+	73.2±6.1	72.4±4.4	72.7±5.2	71.7±5.3	73.4±5.5	72.7±5.4	71.2±3.0	74.9±5.5	72.3±4.9	71.9±5.7	74.0±5.2	71.4±5.3	72.6±4.4	74.7±6.4	73.8±10.7	72.4±5.7
	14+	72.2±3.4	75.7±6.3	74.2±5.4	76.2±6.1	78.9±5.2	77.9±5.7	74.4±5.1	76.4±5.9	73.8±6.0	73.6±5.0	77.9±5.9	78.1±4.8	76.3±6.4	78.1±4.8	77.2±6.1	74.4±4.7\
	15+	75.7±5.0	79.0±5.6	77.3±5.5	77.3±5.0	79.3±6.1	78.4±5.7	73.9±4.2	79.1±5.7	78.3±5.6	78.4±6.2	82.0±6.7	76.9±10.7	79.2±5.5	78.4±6.3	76.0±6.0	73.6±3.4
	16+	80.6±5.4	82.2±6.8	81.3±6.0	83.4±5.3	81.9±5.4	82.5±5.3	79.6±4.6	83.7±4.1	81.3±3.1	79.7±4.7	83.5±2.8	81.1±4.4	82.5±3.2	82.1±4.4	79.0±6.3	79.3 ±7.1
	17+	82.1±4.6	81.2±5.2	81.7±4.8	85.6±3.3	86.5±3.1	86.2±3.1	82.1±4.1	83.1±4.4	83.4±3.2	80.5±3.7	84.3±2.7	82.5±3.6	83.1±3.4	84.8±4.0	81.3±3.7	83.2 ±3.9
	18+	84.3±5.3	82.4±3.3	83.5±4.3	86.7±3.5	85.8±5.5	86.2±4.6	83.0±3.8	84.3±4..3	83.0±5..0	83.1±2.9	84.7±2.2	83.3±4.6	83.8±3.3	83.2±5.9	84.8±0.4	83 .5±1.1
	19+	82.3±2.7	81.7±7.7	82.1±5.1	85.6±3.3	88.5±3.9	87.1±3.8	83.6±6.8	83.8±3.3	82.9±2.8	84.8±3.3	86.6±2.2	84.6±3.0	83.6±3.3	87.1±4.4	82.8±1.0	82.1 ±3.7
	20+	84.7±4.4	83.3±2.9	84.2±3.4	87.2±3.6	87.3±4.7	87.3±4.2	85.5±3.5	84.7±4.1	83.5±3.9	83.8±4.1	85.5±3.3	84.3±2.9	84.8±3.0	84.6±3.5	83.1±4.3	81.7 ±2.0

Table 3: Contd...

S. No.	Measurement Age (in Yrs.)	Population Groups: Lepchas – North Sikkim	Lepchas – Rest Sikkim	Lepchas – Lepchas Total	Bhutias – North Sikkim	Bhutias – Rest Sikkim	Bhutias – Bhutias Total	Sherpas	Tamangs	Brahmans	Chhetris	Pradhans	Rais	Limboos/ Subbas	Gurungs	Mangars	Scheduled Castes
		Mean±S.D.	Mean±S.D.	Mean±S.D.	Mean±S.D.	Mean±S.D.	Mean±S.D.	Mean±S.D.	Mean±S.D.	Mean±S.D.	Mean±S.D.	Mean±S.D.	Mean±S.D.	Mean±S.D.	Mean±S.D. M	ean±S.D.	Mean±S.D.
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
C. Breadth and Depth Measurements																	
(i) Trunk Measurements																	
8. Biacromial Breadth (Bi Ac B) in cm																	
	8+	26.2±1.9	26.0±1.8	26.1±1.8	26.2+±1.5	26.4±2.1	26.3±1.8	24.9±1.4	26.3±1.8	26.0±1.1	26.1±2.7	25.7±2.0	25.3±1.8	24.8±2.3	25.5±1.8	24.9±2.3	25.4±1.9
	9+	25.8±1.8	25.9±2.3	25.8±2.0	25.5±1.4	26.91.3	26.3±1.5	26.2±1.9	25.3±2.9	26.4±1.4	26.4±1.7	26.0±1.7	26.0±2.0	25.0±2.6	26.0±1.0	27.6±4.8	27.1±1 .8
	10+	26.2±2.1	27.9±1.8	26.9±2.1	28.6±2.7	27.7±2.3	28.0±2.5	28.2±2.3	26.7±1.8	27.4±2.2	27.1±1.6	27.8±2.0	28.1±2.2	26.7±1.9	27.7±1.3	28.0±3.3	28.8 ±1.4
	11+	26.8±1.6	28.6±2.2	27.5±2.1	27.8±2.5	28.4±2.2	28.2±2.3	28.3±2.1	27.8±1.4	29.6±1.8	27.7±2.4	28.4±2.4	27.7±2.2	28.1±1.6	28.7±2.4	27.0±2.4	27.9 ±1.5
	12+	27.1±2.1	29.0±2.2	28.2±2.3	29.0±2.2	29.3±2.1	29.2±2.1	29.3±2.9	31.8±4.1	30.4±2.7	28.9±3.8	30.2±3.6	29.6±2.3	30.3±2.2	29.1±2.8	28.8±1.6	30.2 ±1.1
	13+	30.4±3.4	30.5±2.2	30.5±2.7	29.6±3.4	31.0±3.1	30.4±3.3	30.0±1.7	30.9±1.9	30.3±3.0	30.5±3.0	31.1±2.9	29.3±1.9	31.0±2.5	31.5±3.7	33.1±3.5	30.8 ±0.9
	14+	29.4±2.0	32.0±2.3	30.9±2.5	32.1±3.3	33.7±2.4	33.1±2.9	31.5±2.5	31.4±2.8	31.4±2.7	30.3±1.9	33.1±2.3	32.7±3.1	32.6±2.6	33.2±2.8	31.5±2.7	31.7 ±2.2
	15+	32.5±3.2	35.2±2.7	33.8±3.3	33.4±3.0	34.0±2.8	33.8±2.8	33.0±2.7	33.2±2.6	34.1±3.1	32.7±2.8	35.9±2.9	34.2±2.4	34.8±2.3	33.8±3.0	32.1±3.5	33.0 ±2.7
	16+	33.4±3.6	36.6±5.4	34.8±4.6	35.5±2.9	34.2±2.2	34.7±2.5	33.6±2.6	35.4±2.5	36.5±1.5	35.5±2.5	35.5±2.5	35.2±2.3	36.0±2.4	34.8±1.8	33.7±2.3	34.2 ±3.3
	17+	35.2±2.6	35.6±1.9	35.4±2.2	37.6±1.2	36.6±2.0	36.9±1.8	35.6±1.6	35.5±2.4	36.9±1.5	35.9±2.2	36.8±2.0	36.2±1.7	36.2±1.9	36.6±2.6	35.4±1.9	36.9 ±2.0
	18+	37.1±2.8	36.2±1.1	36.7±2.2	36.7±2.8	37.2±3.2	37.0±3.0	35.8±2.9	35.8±2.5	38.0±3.2	36.5±1.6	37.2±1.7	36.3±2.2	37.5±1.4	36.3±3.3	36.7±3.3	37.2 ±2.8
	19+	37.0±1.9	36.3±2.0	36.8±1.9	36.8±2.5	37.6±2.6	37.2±2.6	37.6±1.6	35.7±22.1	36.2±1.8	37.2±1.4	38.0±1.8	35.8±2.9	36.6±2.4	37.5±1.6	35.5±1.3	37.9±2.8
	20+	37.9±6.7	37.9±2.0	37.9±5.3	37.6±1.9	38.3±2.5	37.9±2.3	38.1±2.1	36.9±1.9	37.6±2.5	38.1±3.7	38.4±2.0	36.7±2.1	37.5±1.6	37.1±2.0	36.5±2.2	37.6 ±1.9
9. Bicristal Breadth (Bi Cr B) in cm																	
	8+	19.8±1.1	19.4±1.0	19.6±1.0	19.6±1.7	19.5±1.6	19.6±1.6	18.7±0.8	19.4±1.7	19.3±1.1	18.2±2.2	18.9±1.3	18.8±1.3	18.7±1.5	19.4±1.3	18.3±1.1	20.6± 1.1
	9+	19.2±1.5	19.8±1.7	19.4±1.6	19.6±1.1	20.0±1.4	19.8±1.3	19.8±1.4	19.4±1.3	19.9±1.4	19.1±1.4	19.1±1.1	18.8±2.3	18.7±1.2	19.6±2.0	19.6±2.3	21.9± 1.9
	10+	19.9±1.6	21.2±1.5	20.4±1.7	22.5±2.9	20.5±1.5	21.3±2.4	20.7±1.1	19.8±1.2	20.4±1.5	20.0±1.4	20.3±1.5	21.1±1.7	20.0±1.4	20.2±1.1	20.9±2.3	22.3 ±2.0
	11+	20.8±1.2	21.9±2.8	21.2±2.1	21.6±1.9	21.2±2.2	21.3±2.1	21.2±2.0	20.9±1.0	21.6±1.8	20.2±1.5	21.2±1.5	21.2±1.8	21.0±1.1	21.7±2.6	20.0±1.4	21.6 ±1.7
	12+	21.1±1.9	22.0±1.4	21.6±1.7	22.7±1.4	22.5±3.1	22.5±2.6	22.3+±2.7	23.1±3.2	21.5±1.3	21.7±2.6	21.6±2.5	22.4±1.7	22.6±1.6	21.7±1.6	22.2±1.4	23.9±0.9
	13±	23.9±2.4	23.3±1.8	23.5±2.1	23.0±2.2	23.2±3.1	23.1±2.7	22.2±1.5	23.2±1.8	22.9±1.7	22.8±2.2	23.4±2.0	22.7±2.3	23.3±1.9	23.4±2.8	25.1±1.4	24.2 ±1.9
	14+	22.6±1.7	24.6±1.8	23.8±2.0	24.5±2.1	24.6±2.0	24.6±2.0	24.7±3.3	23.9±2.1	23.8±2.1	22.6±1.8	24.4±2.0	24.5±2.5	24.2±1.9	24.2±1.9	24.0±1.6	24.7 ±2.9
	15+	24.2±1.8	25.7±1.8	24.9±1.9	25.3±1.9	25.7±2.3	25.6±2.1	25.2±2.7	25.6±2.0	24.7±1.7	25.5±3.1	26.0±2.1	24.8±1.8	25.7±1.8	25.0±1.9	24.2±2.2	24.6 ±1.9
	16+	25.6±2.2	26.5±2.9	26.0±2.5	27.2±2.2	25.4±2.3	26.1±2.4	26.1±2.6	25.8±1.6	26.3±1.3	26.0±1.4	26.5±1.3	25.8±1.1	26.9±1.9	26.2±1.7	25.5±2.0	27.0 ±2.8
	17+	26.9±3.5	27.2±1.8	27.1±2.7	27.9±1.5	27.5±3.2	27.6±2.8	27.1±1.3	25.6±1.5	26.7±1.5	26.5±2.0	26.7±1.4	26.4±0.7	27.0±1.9	27.0±2.1	26.6±1.7	27.1 ±1.0
	18+	27.9±1.6	27.2±0.8	27.6±1.3	27.9±1.7	27.4±2.2	27.7±2.0	26.5±1.9	27.3±1.3	27.7±1.7	26.9±1.6	26.8±1.0	26.7±1.6	27.4±1.4	26.4±2.2	27.1±0.0	29.0 ±0.6
	19+	27.3±1.4	28.3±1.6	27.7±1.5	28.5±1.6	28.7±1.9	28.6±1.8	27.5±1.5	27.7±4.0	27.1±1.3	27.3±0.9	27.9±1.8	27.0±1.3	27.6±2.0	27.7±1.7	27.3±1.6	28.6 ±2.3
	20+	29.1±2.2	29.2±2.1	29.2±2.2	30.1±4.0	28.9±2.1	29.5±3.3	29.2±1.9	28.4±2.2	28.5±2.1	27.5±2.0	28.7±2.6	28.2±5.0	28.1±1.6	27.8±1.5	27.5±1.5	29.5 ±2.2
10. Transverse Diameter of Chest (TDC) in cm																	
	8+	18.7±1.4	18.1±0.9	18.5±1.2	18.8±6.1	18.3±1.4	18.5±1.3	17.5±0.9	18.4±1.4	18.1±0.8	17.6±0.8	18.1±1.4	17.9±1.4	17.8±1.3	18.0±1.4	18.2±1.4	19.6± 2.2
	9+	18.2±1.2	18.6±1.5	18.3±1.3	18.7±0.8	19.0±1.2	18.9±1.1	18.5±1.3	18.4±1.4	17.7±1.0	17.9±1.3	17.8±1.2	18.1±1.0	18.0±0.9	17.9±0.8	18.0±2.0	19.6± 1.5
	10+	18.5±1.4	19.8±1.0	19.0±1.4	19.8±1.8	19.3±1.1	19.5±1.4	19.2±1.3	18.4±1.1	18.1±1.8	18.4±1.2	18.9±1.1	19.4±1.2	18.8±1.4	18.6±1.9	19.3±2.8	20.3 ±2.8

Table 3: Contd...

S. No.	Measurement Age (in Yrs.)	Population Groups: Lepchas – North Sikkim	Lepchas – Rest Sikkim	Lepchas – Lepchas Total	Bhutias – North Sikkim	Bhutias – Rest Sikkim	Bhutias – Bhutias Total	Sherpas	Tamangs	Brahmans	Chhetris	Pradhans	Rais	Limboos/ Subbas	Gurungs	Mangars	Scheduled Castes
		Mean±S.D.	Mean±S.D.	Mean±S.D.	Mean±S.D.	Mean±S.D.	Mean±S.D.	Mean±S.D.	Mean±S.D.	Mean±S.D.	Mean±S.D.	Mean±S.D.	Mean±S.D.	Mean±S.D.	Mean±S.D. M	ean±S.D.	Mean±S.D.
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
	11+	18.9±1.9	19.5±1.3	19.1±1.7	19.9±1.7	20.1±2.3	20.0±2.0	19.4±1.1	19.0±0.7	19.2±1.3	18.9±1.4	19.1±1.4	19.4±1.1	19.4±1.0	20.2±3.1	19.1±1.0	20.4 ±0.9
	12+	19.3±1.2	21.1±2.5	20.3±2.2	20.7±1.3	20.7±1.5	20.7±1.4	19.9±1.5	21.3±2.4	19.8±1.4	20.2±1.9	20.2±2.0	20.5±2.7	20.5±1.3	20.1±1.5	19.5±0.6	22.6±3.0
	13+	20.8±1.8	20.9±1.8	20.9±1.7	20.7±1.9	21.8±3.7	21.4±3.1	20.7±1.3	21.2±1.8	20.1±1.5	20.5±1.6	20.9±2.0	20.2±1.7	20.7±1.5	21.1±2.1	20.7±3.8	22.0 ±2.8
	14+	20.9±1.1	21.7±1.6	21.4±1.4	22.0±1.8	22.9±1.9	22.6±1.9	22.2±3.4	21.2±2.0	21.0±1.8	20.6±1.4	21.9±1.1	21.9±2.0	22.0±1.7	22.0±1.7	20.9±1.7	22.4 ±1.3
	15+	21.7±2.1	23.3±1.6	22.5±2.0	22.8±2.0	23.0±2.1	22.9±2.0	21.8±1.5	22.8±2.2	21.6±1.8	22.0±1.7	23.9±2.6	22.9±2.1	23.2±1.3	22.4±2.0	21.4±1.8	21.8 ±1.6
	16+	23.2±2.2	25.0±4.3	24.0±3.4	24.6±2.4	22.9±1.5	23.5±2.0	22.8±1.7	24.1±1.5	23.6±1.5	23.3±1.5	23.7±1.2	23.6±2.7	23.9±1.3	22.9±1.9	23.9±3.6	22.4 ±2.0
	17+	23.7±1.4	24.5±1.2	24.1±1.3	24.5±1.4	25.1±2.3	24.9±2.0	24.2±1.4	23.6±2.2	23.8±1.9	23.8±2.2	24.4±1.3	23.7±1.1	24.2±1.5	24.1±1.7	23.5±1.6	24.5 ±0.6
	18+	25.1±2.2	25.8±2.9	25.4±2.5	25.1±1.8	25.0±2.4	25.0±2.1	23.4±1.6	24.3±1.1	24.1±1.8	24.2±1.4	24.4±1.0	24.2±1.6	24.9±1.2	23.7±1.7	24.9±0.5	26.0 ±1.3
	19+	25.1±1.4	24.8±2.9	25.0±2.0	25.3±1.7	25.7±2.7	25.5±2.3	25.0±2.6	24.0±1.6	23.9±1.2	24.1±1.7	24.6±1.3	24.4±1.2	24.6±1.5	25.0±1.0	24.3±0.1	25.4 ±1.6
	20+	25.9±1.8	26.6±1.7	26.2±1.8	26.6±1.6	26.7±2.6	26.7±2.1	25.9±1.5	25.1±1.5	25.2±2.0	25.1±+1.8	25.9±1.4	24.9±1.6	25.5±1.3	25.0±2.1	24.6±1.7	25.4±1.5
11. Anteno±Posterio Diameter of Chest (APDC) in cm																	
	8+	15.0±1.0	14.2±0.9	14.7±1.0	14.9±1.1	14.4±1.0	14.6±1.0	14.1±1.1	14.4±1.6	13.5±1.0	13.0±1.0	13.6±1.0	13.8±1.1	14.4±1.2	14.2±1.0	14.4±1.1	15.8± 1.0
	9+	14.7±0.9	14.8±1.0	14.8±0.9	14.7±0.9	14.8±1.1	14.8±1.0	14.4±1.2	13.9±0.9	13.4±0.2	14.1±1.1	13.7±1.0	13.7±0.9	13.8±0.7	14.1±0.8	14.3±1.0	16.9± 1.1
	10+	15.0±1.3	16.4±1.1	15.6±1.4	15.7±1.2	14.8±1.2	15.1±1.3	14.6±1.2	14.0±0.9	13.9±1.2	14.2±1.0	14.7±1.2	15.0±1.2	14.5±1.1	14.6±0.8	14.7±1.6	16.5 ±1.1
	11+	14.8+0.8	15.5±1.7	15.1±1.2	15.8±1.7	14.9±1.1	15.3±1.4	14.6±1.7	14.9±1.3	15.2±1.5	14.2±1.1	14.6±1.1	15.0±1.0	15.0±1.0	15.9±3.6	15.0±1.0	16.5 ±0.6
	12+	14.7±0.9	16.0±1.2	15.4±1.3	16.0±1.0	15.5±1.7	15.7±1.5	15.7±1.7	16.0±1.6	14.8±1.2	15.3±1.7	15.0±1.9	15.6±1.6	15.5±1.4	16.0±1.0	15.7±0.8	17.5 ±1.1
	13+	16.2±1.4	15.9±1.7	16.0±1.5	16.5±1.6	15.8±1.5	16.1±1.6	15.7±1.1	16.0±1.7	14.9±1.4	15.7±1.5	15.6±1.5	15.6±1.2	16.0±1.6	15.7±1.6	17.7±2.7	17.3 ±1.4
	14+	16.5±1.2	16.7±1.5	16.6±1.3	16.9±0.9	16.9±1.5	16.9±1.3	16.2±1.4	16.2±1.6	15.6±1.5	15.5±1.2	16.7±1.4	16.9±1.4	16.8±1.8	16.9±1.4	16.5±1.3	17.9 ±0.6
	15+	17.0±1.6	18.0±1.7	17.5±1.7	17.5±1.7	17.2±1.7	17.3±1.7	20.2±1.4	17.6±1.7	16.6±1.3	16.6±1.7	17.4±2.0	16.8±1.9	17.7±1.3	17.3±1.8	17.2±2.0	18.2 ±0.9
	16+	17.2±1.7	18.5±2.4	17.8±2.1	18.3±1.5	17.2±1.6	17.7±1.7	17.4±1.2	18.4±1.3	17.3±1.2	17.2±1.5	17.9±1.4	20.3±12.7	18.7±1.6	18.0±1.3	16.8±1.3	18.5±0.5
	17+	18.1±1.7	18.2±0.9	18.2±1.4	19.3±0.8	18.4±2.0	18.7±1.7	18.3±1.2	17.9±1.5	17.8±1.6	17.8±2.5	17.8±1.4	18.1±1.4	18.4±1.6	18.8±2.1	17.9±0.9	19.4 ±0.9
	18+	18.8±1.6	18.5±1.2	18.7±1.4	19.5±1.8	19.0±1.8	19.2±1.8	18.5±1.6	17.6±1.6	18.8±1.7	18.8±1.3	18.3±2.0	18.2±1.4	18.5±1.2	18.3±2.0	19.2±1.6	19.0 ±0.6
	19+	20.1±2.4	19.8±2.0	20.0±2.2	19.9±1.5	19.3±1.8	19.6±1.7	19.0±1.7	18.5±1.6	17.8±1.4	18.3±1.5	18.4±1.3	18.8±1.4	18.6±1.5	19.7±1.4	19.1±0.9	18.1 ±0.6
	20+	19.6±1.5	20.9±1.7	20.1±1.7	20.7±1.6	20.0±1.8	20.3±1.7	20.0±1.4	19.2±1.6	19.5±2.0	18.7±1.7	19.4±1.7	19.2±1.6	19.6±1.4	19.0±1.7	19.9±1.4	20.0 ±1.7
(ii) Condylar Breadth																	
12. Bicodylar Breadth-Right (Bi B R) in cm																	
	8+	4.9±0.3	4.7±0.2	4.8±0.3	4.7±0.4	4.8±0.4	4.8±0.4	4.6±0.4	4.9±0.4	4.7±0.4	4.7±0.3	4.6±0.4	4.6±0.2	4.6±0.4	4.7±0.3	4.6±0.4	4.3±0.3
	9+	4.8±0.5	4.8±0.4	4.8±0.5	4.7±0.3	4.8±0.4	4.8±0.3	4.9±0.4	4.9±0.4	4.8±0.4	4.8±0.3	4.7±0.4	4.8±0.4	4.8±0.3	4.6±0.3	4.9±0.6	5.1±0.2
	10+	5.0±0.3	5.3±0.5	5.1±0.4	5.4±0.6	5.0±0.4	5.2±0.5	5.1±0.3	4.9±0.3	5.1±0.4	4.9±0.4	5.1±0.5	5.0±0.3	5.0±0.3	5.0±0.3	5.2±0.5	5.5±0.4
	11+	5.1±0.2	5.2±0.4	5.2±0.3	5.1±0.4	5.2±0.4	5.2±0.4	5.0±0.4	5.3±0.4	5.5±0.4	4.9±0.5	5.2±0.4	5.2±0.5	5.1±0.3	5.0±1.2	4.7±0.5	5.4±0.2
	12+	5.1±0.4	5.3±0.3	5.2±0.4	5.4±0.5	5.3±0.3	5.4±0.4	5.3±0.4	5.5±0.5	5.5±0.5	5.4±0.6	5.5±0.5	5.3±0.5	5.6±0.4	5.5±0.5	5.4±0.2	5.6±0.3
	13+	5.7±0.5	5.6±0.4	5.7±0.4	5.5±0.5	5.5±0.3	5.5±0.4	5.5±0.3	5.7±0.4	5.6±0.4	5.6±0.5	5.7±0.4	5.5±0.4	5.6±0.4	5.8±0.5	5.9±0.8	5.8±0.6
	14+	5.6±0.4	5.9±0.5	5.8±0.5	5.9±0.4	6.2±0.4	6.1±0.4	5.8±0.5	5.9±0.5	5.8±0.5	5.6±0.5	6.1±0.5	5.9±0.5	6.0±0.5	6.0±0.4	5.9±0.4	6.1±0.4
	15+	6.0±0.5	6.2±0.5	6.1±0.5	6.2±0.4	6.1±0.5	6.2±0.5	6.0±0.3	6.1±0.4	6.1±0.4	6.1±0.5	6.4±0.3	6.0±0.4	6.2±1.5	6.1±0.5	6.0±0.5	6.1±0.5

Table 3: Contd...

S. No.	Measurement Age (in Yrs.)	Lepchas			Bhutias			Sherpas	Tamangs	Brahmans	Chhetris	Pradhans	Rais	Limboos/ Subbas	Gurungs	Mangars	Scheduled Castes
		North Sikkim	Rest Sikkim	Lepchas Total	North Sikkim	Rest Sikkim	Bhutias Total										
		Mean±S.D.	Mean±S.D.	Mean±S.D.	Mean±S.D.	Mean±S.D.	Mean±S.D.	Mean±S.D.	Mean±S.D.	Mean±S.D.	Mean±S.D.	Mean±S.D.	Mean±S.D.	Mean±S.D.	Mean±S.D. M	ean±S.D.	Mean±S.D.
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
	16+	6.2±0.4	6.3±0.5	6.2±0.5	6.4±0.3	6.4±0.4	6.4±0.4	6.1±0.3	6.5±0.4	6.5±0.3	6.3±0.4	6.1±1.2	6.2±0.3	6.3±0.3	6.3±0.3	6.2±0.4	6.3±0.4
	17+	6.2±0.4	6.4±0.4	6.3±0.4	6.8±0.4	6.5±0.4	6.6±0.4	6.3±0.3	6.4±0.3	6.5±0.3	6.3±0.4	6.5±0.3	6.3±0.3	6.4±0.4	6.5±0.4	6.3±0.3	6.4±0.4
	18+	6.6±0.3	6.5±0.2	6.5±0.3	6.7±0.4	6.5±0.4	6.6±0.4	6.4±0.5	6.4±0.3	6.5±0.4	6.5±0.5	6.5±0.3	6.5±03	6.4±0.4	6.3±0.5	6.5±0.3	6.6±0.2
	19+	6.3±0.4	6.5±0.5	6.4±0.4	6.6±0.4	6.7±0.4	6.7±0.4	6.5±0.3	6.4±0.5	6.3±0.3	6.6±0.3	6.8±0.3	6.4±0.3	6.5±0.6	6.7±0.3	6.3±0.1	6.5±0.3
	20+	6.5±0.4	6.6±0.4	6.6±0.4	6.8±0.4	6.5±0.4	6.7±0.4	6.5±0.3	6.5±0.4	6.6±0.4	6.5±0.4	6.7±0.3	6.3±0.3	6.4±0.5	6.4±0.4	6.5±0.3	6.6±0.5
13. Bicondylar Breadth - Left (Bc B L) in cm																	
	8+	4.9±0.3	4.5±0.2	4.7±0.3	4.7±0.4	4.8±0.4	4.8±0.4	4.5±0.3	4.8±0.6	4.8±0.3	4.7±0.4	4.7±0.4	4.6±0.4	4.6±0.4	4.7±0.4	4.5±0.3	4.2±0.2
	9+	4.8±0.3	4.9±0.3	4.8±0.3	4.7±0.3	4.7±0.3	4.7±0.3	4.9±0.4	4.8±0.4	4.9±0.4	4.7±0.3	4.7±0.4	4.6±0.4	4.8±0.3	4.7±0.2	4.9±0.5	5.2±0.2
	10+	4.9±0.4	5.3±0.6	5.0±0.5	5.3±0.6	4.9±0.4	5.0±0.5	5.0±0.4	4.8±0.3	5.1±0.4	5.0±0.4	5.0±0.4	5.0±0.4	4.8±0.3	5.1±0.4	5.1±0.6	5.5±0.4
	11+	5.1±0.2	5.1±0.4	5.1±0.3	5.2±0.3	5.0±0.3	5.1±0.3	5.0±0.4	5.1±0.3	5.4±0.4	4.9±0.5	5.2±0.5	5.2±0.5	5.0±0.2	5.1±0.5	4.7±0.5	5.5±0.3
	12+	5.1±0.5	5.2±0.4	5.2±0.4	5.5±0.5	5.3±0.3	5.4±0.4	5.2±0.5	5.5±0.5	5.4±0.4	5.3±0.6	5.4±0.5	5.2±0.5	5.5±0.5	5.4±0.6	5.4±0.3	5.4±0.3
	13+	5.7±0.5	5.5±0.4	5.6±0.5	5.5±0.4	5.4±0.4	5.4±0.4	5.3±0.3	5.6±0.4	5.5±0.5	5.6±0.4	5.6±0.4	5.4±0.4	5.5±0.4	5.7±0.5	5.9±0.8	5.9±0.6
	14+	5.6±0.3	5.9±0.5	5.7±0.5	5.9±0.5	6.1±0.4	6.1±0.4	5.7±0.4	5.8±0.5	5.7±0.5	5.6±0.5	6.1±0.4	5.8±0.5	6.0±0.5	5.9±0.5	5.9±0.5	6.0±0.6
	15+	5.8±0.6	6.2±0.4	6.0±0.5	6.0±0.4	6.1±0.5	6.1±0.5	6.0±0.4	6.1±0.4	6.1±0.5	6.0±0.5	6.3±0.4	6.0±0.3	6.2±0.5	6.2±0.5	5.8±0.5	6.0±0.4
	16+	6.1±0.4	6.3±0.6	6.2±0.5	6.4±0.4	6.3±0.5	6.3±0.5	6.0±0.4	6.5±0.4	6.4±0.3	6.3±0.4	6.3±0.3	6.2±0.3	6.3±0.3	6.2±0.4	6.1±0.4	6.3±0.4
	17+	6.2±0.4	6.4±0.3	6.3±03	6.6±0.3	6.5±0.3	6.5±0.3	6.3±0.3	6.4±0.4	6.4±0.3	6.2±0.4	6.4±0.4	6.3±0.2	6.4±0.3	6.4±0.3	6.3±0.3	6.4±0.5
	18+	6.6±0.4	6.4±0.3	6.5±0.3	6.6±0.3	6.5±0.4	6.5±0.4	6.3±0.5	6.5±0.2	6.4±0.4	6.4±0.5	6.5±0.3	6.4±0.4	6.4±0.2	6.3±0.3	6.3±0.0	6.7±0.2
	19+	6.3±0.3	6.4±0.4	6.3±0.3	6.5±0.3	6.7±0.3	6.6±0.3	6.4±0.3	6.4±0.6	6.3±0.2	6.3±0.3	6.7±0.3	6.4±0.3	6.4±0.3	6.6±0.3	6.3±0.1	6.3±0.3
	20	6.5±0.4	6.6±0.3	6.5±0.4	6.8±0.3	6.6±0.4	6.7±0.4	6.5±0.4	6.5±0.4	6.6±0.4	6.5±0.4	6.6±0.3	6.4±0.4	6.4±0.3	6.4±0.4	6.4±0.4	6.5±0.4
(d) Girths																	
14. Head Circumferenc (HC) in cm																	
	8+	51.6±1.3	50.5±2.2	51.1±1.7	52.2±1.8	51.8±1.4	52.0±1.6	50.0±1.7	50.9±1.0	51.5±2.4	50.1±1.2	50.6±1.8	50.6±1.8	50.4±2.4	50.3±3.1	50.4±1.9	51.5± 1.4
	9+	50.4±1.8	50.6±1.5	50.5±1.7	51.6±2.5	52.1±1.8	51.9±2.1	51.2±1.4	50.4±1.8	49.8±1.9	50.5±1.8	50.9±1.2	50.8±1.6	50.7±1.3	50.6±2.0	50.6±2.4	52.2± 1.2
	10+	51.2±1.4	51.5±1.5	51.3±1.4	52.7±2.1	50.9±2.9	51.6±2.7	51.7±2.1	51.1±1.7	51.2±1.3	50.8±2.2	51.1±1.7	51.4±1.4	52.0±1.1	51.2±2.2	52.5±3.4	51.9 ±3.1
	11+	51.1±2.4	52.6±2.3	51.7±2.4	52.4±2.3	52.3±1.5	52.3±1.8	52.0±2.0	52.1±1.3	51.3±2.1	50.9±1.9	51.1±1.7	51.5±1.6	51.8±1.4	51.8±1.8	50.5±2.4	53.8 ±1.0
	12+	51.1±2.0	51.8±1.8	51.5±1.9	53.4±2.0	50.9±7.4	51.8±6.1	52.3±1.6	52.5±1.8	51.8±1.7	52.3±2.1	52.1±1.8	51.7±1.6	52.7±1.2	52.2±2.4	51.2±1.5	53.2±0.4
	13+	52.7±1.9	52.3±1.8	52.5±1.8	52.9±1.7	52.6±1.7	52.7±1.7	53.3±1.2	51.1±0.9	51.9±1.5	52.7±1.5	51.9±1.0	51.9±1.5	52.6±1.5	53.0±1.5	51.9±3.7	52.2 ±1.1
	14+	52.0±3.0	53.8±2.0	53.0±2.6	54.2±1.8	55.8±5.9	55.2±4.8	53.7±1.3	51.9±6.3	52.5±2.4	52.3±1.6	52.9±1.7	52.8±4.5	53.7±1.5	53.9±1.5	53.3±2.2	54.6 ±0.6
	15+	53.4±1.8	54.5±1.5	53.9±1.7	54.3±1.5	54.5±1.5	54.4±1.5	53.9±1.6	53.4±2.1	52.8±1.7	53.3±1.5	55.4±7.2	53.6±1.5	54.0±1.5	53.1±1.8	52.0±0.9	54.6 ±0.9
	16+	53.9±2.7	54.8±2.9	54.3±2.8	55.2±1.9	54.5±1.8	54.8±1.8	54.1±1.3	54.8±1.2	54.2±1.8	53.8±1.8	54.3±1.5	54.2±2.5	54.2±1.7	53.9±1.8	53.5±1.1	54.1 ±3.1
	17+	54.3±1.9	54.8±1.8	54.6±1.8	55.5±1.2	55.3±1.7	55.4±1.5	55.0±1.7	54.2±2.0	54.2±1.7	53.9±1.6	55.0±1.8	54.7±1.5	54.9±1.7	53.5±6.5	54.6±1.3	54.1 ±0.9
	18+	55.9±1.6	54.6±2.0	55.3±1.9	56.4±1.9	55.9±1.5	56.1±1.7	54.6±1.5	54.8±1.8	54.5±1.5	54.1±2.0	54.4±1.2	54.6±1.3	55.1±1.1	54.9±1.9	53.3±1.3	54.2 ±2.1
	19+	55.3±1.4	54.8±1.3	55.1±1.4	56.3±1.1	55.6±1.4	55.9±1.3	55.8±2.0	55.4±2.0	54.3±0.7	54.7±1.3	55.2±1.0	55.0±1.6	54.8±1.6	56.2±1.5	53.8±1.1	51.5 ±8.5
	20+	55.6±1.5	55.7±1.3	55.6±1.4	57.2±2.0	56.4±2.0	56.8±2.1	56.5±1.7	55.4±1.8	55.0±1.6	55.1±1.6	55.5±1.5	54.5±5.7	55.5±1.3	55.6±1.7	54.6±1.8	55.0 ±1.6

Table 3: Contd...

S. No.	Age (in Yrs.)	Population Groups: Lepchas – North Sikkim	Lepchas – Rest Sikkim	Lepchas – Lepchas Total	Bhutias – North Sikkim	Bhutias – Rest Sikkim	Bhutias – Bhutias Total	Sherpas	Tamangs	Brahmans	Chhetris	Pradhans	Rais	Limboos/ Subbas	Gurungs	Mangars	Scheduled Castes
	Measurement	Mean±S.D.	Mean±S.D.	Mean±S.D.	Mean±S.D.	Mean±S.D.	Mean±S.D.	Mean±S.D.	Mean±S.D.	Mean±S.D.	Mean±S.D.	Mean±S.D.	Mean±S.D.	Mean±S.D.	Mean±S.D.	M ean±S.D.	Mean±S.D.
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
15. Chest Circumference-Normal (CCN) in cm																	
	8+	62.0±3.4	59.4±3.1	60.9±3.5	61.7±3.1	61.1±4.1	61.3±3.7	57.5±1.7	60.4±3.9	59.5±2.6	57.8±2.8	59.1±3.5	57.6±2.8	58.8±4.0	59.0±3.8	58.0±2.3	60.8± 4.9
	9+	61.2±3.3	62.6±4.1	61.8±3.6	61.6±2.5	61.8±3.8	62.1±3.3	60.2±3.3	60.6±3.4	58.2±2.8	58.8±3.0	57.9±3.4	59.5±2.8	58.7±2.5	58.9±1.8	60.3±5.0	62.1± 2.4
	10+	62.7±3.3	65.4±3.8	63.7±3.7	68.8±6.2	61.7±3.0	64.6±5.7	62.4±7.0	60.6±2.5	60.5±2.9	60.4±4.1	61.9±3.4	62.3±3.3	61.2±3.5	62.8±3.2	64.5±6.3	66.5 ±5.3
	11+	63.5±4.0	63.9±3.0	63.7±3.6	65.1±3.8	63.5±3.7	64.2±3.7	62.8±4.4	63.7±2.5	62.7±5.1	61.2±4.3	62.3±3.9	62.7±3.8	63.4±3.1	64.6±4.7	60.1±2.9	65.8 ±2.2
	12+	63.9±4.5	65.2±3.2	64.6±3.8	69.5±3.9	65.6±4.4	67.0±4.6	64.2±4.6	70.3±7.6	63.3±3.0	64.1±4.8	65.3±6.1	66.9±4.2	67.4±4.3	65.2±5.7	65.6±3.2	67.7 ±2.1
	13+	70.2±6.5	69.1±4.2	69.6±5.2	69.9±6.4	67.5±4.2	68.5±5.2	66.9±3.9	68.0±4.1	66.7±4.3	66.2±5.1	67.9±4.5	65.8±4.0	68.4±5.1	68.5±6.9	71.9±7.9	69.0 ±4.8
	14+	67.3±3.3	71.8±5.2	69.9±5.0	74.1±6.0	74.4±5.6	74.3±5.6	69.8±5.3	68.8±5.8	68.0±6.7	67.3±5.5	71.2±5.0	71.6±5.2	71.9±5.8	72.5±5.0	70.5±3.8	72.2 ±1.3
	15+	73.2±6.8	76.3±4.7	74.7±6.0	74.0±5.5	75.1±6.3	74.6±5.9	72.5±4.8	73.8±5.6	71.6±4.2	71.9±6.1	77.5±8.0	74.4±7.3	74.3±4.4	73.8±6.3	71.7±6.3	73.5 ±3.1
	16+	76.9±6.6	78.8±8.9	77.7±7.6	81.6±6.7	73.3±12.9	76.5±11.5	74.6±5.4	77.7±4.3	76.9±3.1	76.2±5.6	78.4±4.9	75.5±3.4	79.6±6.2	77.2±5.4	74.7±4.0	77.7±7.9
	17+	80.8±4.4	79.8±4.5	80.3±4.4	81.9±3.5	80.6±4.7	81.1±4.4	81.2±6.6	78.0±6.1	77.9±5.1	77.1±5.4	80.8±2.9	78.9±3.5	79.8±4.9	80.9±4.4	78.9±5.8	83.6 ±3.1
	18+	83.4±3.8	81.8±2.7	82.7±3.4	84.2±6.1	81.8±7.4	82.9±6.8	80.3±5.4	79.5±4.0	80.4±5.9	79.4±4.5	80.2±2.5	80.9±4.1	82.1±4.4	78.6±5.6	83.5±1.4	86.2 ±3.8
	19+	83.9±3.3	83.5±5.2	83.7±4.1	84.5±3.7	83.3±3.4	83.9±3.6	84.2±3.6	79.3±4.8	80.5±3.0	80.8±4.5	81.6±4.0	80.8±4.2	82.5±3.6	84.0±5.0	82.5±0.7	84.7 ±5.4
	20+	87.2±5.4	88.0±6.1	87.5±5.7	91.0±5.3	87.3±6.3	89.1±6.1	87.0±5.0	84.3±5.0	83.7±5.2	82.6±5.4	86.4±4.9	84.2±4.7	86.0±4.3	83.8±4.3	81.9±4.2	87.4 ±5.2
16. Chest Circumference at Maximum Inspiration (CCI) in cm																	
	8+	65.4±3.6	64.2±3.6	64.9±3.6	65.5±3.7	64.6±4.8	65.0±4.3	61.1±2.2	63.9±5.1	62.5±3.1	60.7±3.5	62.7±3.7	60.9±3.5	61.9±4.1	62.6±4.2	60.9±2.2	64.9± 4.0
	9+	65.3±2.7	66.3±4.7	65.7±3.6	66.6±2.7	65.7±3.9	66.0±3.4	64.5±3.0	63.4±3.3	62.7±3.4	62.4±3.0	61.6±4.0	62.8±3.3	62.8±3.0	62.5±2.4	63.7±4.7	66.3± 1.5
	10+	66.8±3.3	69.5±3.7	67.9±3.6	72.5±6.9	65.2±3.6	68.1±6.1	65.5±5.0	64.0±4.4	64.6±3.5	64.0±4.7	65.8±3.7	66.2±3.6	65.2±4.1	66.1±3.6	68.2±6.1	70.3 ±5.6
	11+	67.3±4.3	68.6±3.2	67.8±3.9	70.0±3.8	67.9±4.6	68.7±4.3	66.3±4.7	67.5±3.1	65.7±5.0	64.6±.4.9	66.1±4.6	66.4±4.4	67.2±3.3	68.4±4.6	63.5±4.0	70. 2±3.0
	12+	67.9±4.4	69.4±3.8	68.7±4.1	73.8±4.4	69.1±3.3	70.9±4.4	68.1±5.4	72.6±6.3	67.5±3.5	67.5±5.3	69.4±7.4	71.6±4.4	71.2±4.1	69.4±6.3	69.4±2.4	71.1 ±2.2
	13+	74.8±7.2	73.6±4.5	74.1±5.7	73.4±6.2	71.6±4.4	72.3±5.2	70.4±5.4	72.0±4.2	70.7±4.7	70.1±5.4	72.1±4.7	69.6±5.2	73.6±5.9	73.4±7.6	75.8±7.9	73.3 ±5.3
	14+	72.4±2.8	76.4±5.1	74.7±4.7	78.3±6.0	78.6±5.4	78.5±5.6	74.2±6.1	72.9±6.7	72.0±6.5	71.3±6.0	75.8±5.2	76.1±5.4	76.7±6.2	77.8±5.4	76.0±4.5	77.3 ±1.7
	15+	77.7±6.7	81.1±5.1	79.3±6.1	79.2±5.0	79.2±6.2	79.2±5.6	77.2±5.8	79.0±5.8	76.3±4.5	75.3±7.8	81.8±7.8	78.6±6.5	79.4±4.9	79.2±7.4	76.5±6.7	78.9 ±1.8
	16+	81.8±6.9	84.0±8.8	82.8±7.7	86.0±5.9	80.2±7.6	82.5±7.5	80.6±5.5	82.9±4.7	81.2±4.0	80.1±5.4	83.7±5.1	81.1±4.3	84.1±5.7	82.3±5.6	79.4±5.5	83.6 ±9.2
	17+	85.9±4.6	85.3±4.2	85.6±4.3	87.6±3.6	85.3±5.4	86.6±5.0	85.2±5.6	84.0±6.3	83.1±5.7	81.6±5.4	85.7±3.6	83.5±3.4	85.5±5.1	87.5±5.0	82.6±6.2	88.0 ±2.3
	18+	88.6±5.1	86.5±2.9	87.7±4.3	89.8±6.4	87.5±7.6	88.6±7.1	85.4±5.9	84.6±3.8	85.4±5.8	84.2±4.0	85.8±2.7	85.8±0.9	86.7±5.0	83.7±7.0	89.0±0.8	92.6 ±3.3
	19+	89.1±3.4	87.8±6.4	88.6±4.7	89.3±3.9	89.6±4.5	89.5±4.1	89.2±4.0	85.6±5.7	84.3±3.4	86.4±4.9	87.1±4.6	86.2±0.9	88.2±3.8	89.4±5.9	86.6±0.6	90.1 ±5.2
	20+	91.8±5.2	93.1±5.7	92.3±5.4	96.8±6.2	92.4±6.3	94.5±6.6	91.9±5.3	88.8±5.0	88.5±5.4	86.4±7.3	91.2±5.1	89.0±5.1	90.8±4.6	88.5±4.5	87.3±4.4	93.3 ±5.6
17. Chest Circumference at Maximum Expiration (CCE) in cm																	
	8+	58.6±3.2	57.1±2.8	57.9±3.1	59.4±4.1	58.2±3.7	58.7±3.8	55.2±2.2	57.8±3.4	56.5±2.1	55.3±2.8	56.7±3.5	55.4±2.6	55.9±3.7	56.6±2.9	55.6±2.3	58.2± 4.6
	9+	57.4±2.6	59.5±3.7	58.3±3.2	58.5±2.1	59.4±3.6	59.5±3.1	57.0±2.9	56.9±3.7	55.1±2.8	56.4±2.8	55.6±3.3	57.5±3.5	55.7±2.4	56.4±2.2	58.2±4.6	59.8± 2.8
	10+	59.1±2.9	62.1±3.3	60.3±3.3	64.2±5.8	59.4±3.3	61.3±5.0	59.1±4.4	57.6±2.8	58.6±3.3	57.6±3.7	59.1±3.3	59.9±3.4	58.5±3.5	60.2±2.7	61.2±6.2	63.3 ±5.4
	11+	60.0±3.2	60.2±3.6	60.0±3.3	62.2±3.7	61.2±3.7	61.6±3.7	59.7±4.0	61.2±2.8	60.0±4.6	58.8±4.0	59.5±3.7	59.9±3.7	59.9±3.0	61.6±4.2	58.4±4.4	62.4 ±2.5
	12+	60.2±3.4	63.2±3.2	61.8±3.6	65.2±5.5	63.0±4.7	63.8±5.0	61.1±4.3	65.1±6.8	60.3±3.9	61.8±4.8	62.4±6.1	63.9±3.8	63.4±4.0	61.9±5.8	62.3±1.9	64.0 ±3.0

Table 3: Contd...

S. No.	Age (in Yrs.)	Lepchas			Bhutias			Sherpas	Tamangs	Brahmans	Chhetris	Pradhans	Rais	Limboos/ Subbas	Gurungs	Mangars	Scheduled Castes
		North Sikkim	Rest Sikkim	Lepchas Total	North Sikkim	Rest Sikkim	Bhutias Total										
		Mean±S.D.	Mean±S.D.	Mean±S.D.	Mean±S.D.	Mean±S.D.	Mean±S.D.	Mean±S.D.	Mean±S.D.	Mean±S.D.	Mean±S.D.	Mean±S.D.	Mean±S.D.	Mean±S.D.	Mean±S.D. M	ean±S.D.	Mean±S.D.
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
	13+	66.4±5.9	65.5±4.6	65.9±5.1	65.8±5.9	64.7±4.8	65.2±5.2	63.5±3.3	65.5±4.1	63.4±4.4	63.2±4.7	64.8±5.0	62.9±3.8	65.0±5.4	65.3±7.0	71.0±7.1	64.7 ±5.2
	14+	64.0±2.9	68.7±5.3	66.7±5.0	69.8±5.5	70.5±5.2	70.3±5.3	66.0±6.3	66.3±5.6	64.4±6.0	64.1±4.8	68.1±4.8	68.5±4.9	68.8±5.5	69.4±5.0	66.1±4.8	68.4 ±2.4
	15+	69.5±6.7	73.4±4.7	71.4±6.1	70.6±5.2	71.6±6.3	71.2±5.8	69.3±4.2	70.9±5.1	68.7±4.3	68.9±5.6	73.3±7.1	70.7±6.0	70.9±4.1	70.7±5.7	68.1±5.4	70.7 ±3.3
	16+	73.2±6.4	70.8±19.2	72.2±13.4	77.6±7.0	73.1±6.2	74.9±6.8	73.0±7.9	75.0±4.2	73.3±3.2	71.9±5.3	74.7±3.6	72.5±3.6	75.6±5.7	73.8±4.6	71.3±4.2	75 .2±7.1
	17+	76.9±5.0	75.6±4.3	76.2±4.6	78.3±3.2	77.6±4.6	77.8±4.1	76.2±4.7	74.5±5.9	74.0±4.9	73.9±4.8	76.6±3.0	75.5±3.1	76.4±4.8	77.3±6.1	74.6±5.8	78.7 ±1.7
	18+	78.9±3.7	79.2±5.4	79.0±4.4	80.3±6.4	77.8±6.8	79.0±6.5	75.6±5.5	75.3±4.0	75.7±4.9	75.8±4.2	76.6±2.5	76.9±4.2	78.2±3.8	74.7±6.2	79.6±0.0	82.5 ±3.5
	19+	79.3±2.9	79.6±5.0	79.4±3.8	80.6±3.5	79.4±3.5	80.0±35	78.1±6.1	75.7±6.1	76.2±2.7	76.5±3.7	78.1±3.5	77.3±3.5	78.7±3.4	79.8±4.6	79.0±0.0	81.4±5.5
	20+	83.3±4.6	84.2±5.4	83.6±5.0	87.2±5.5	83.4±5.8	85.3±6.0	83.1±4.5	80.5±4.7	80.6±4.9	79.2±6.0	82.4±4.7	80.5±4.8	82.0±4.2	80.2±4.3	78.7±4.5	83.4 ±5.3
18. Upper Arm Girth-Relaxed (UAGR) in cm																	
	8+	15.7±0.8	15.0±1.3	15.4±1.1	15.2±1.0	15.7±1.3	15.5±1.2	14.9±1.1	15.5±1.1	14.8±1.0	14.6±1.0	15.4±1.6	14.7±0.9	15.1±1.1	15.5±1.1	14.1±1.0	16.0± 1.4
	9+	15.7±1.0	15.9±1.1	15.8±1.1	15.3±0.7	16.1±1.3	15.8±1.2	15.4±1.1	15.4±0.9	15.1±1.0	15.6±1.2	14.9±1.3	14.9±1.1	15.1±1.0	14.9±0.8	15.3±1.8	17.6± 1.4
	10+	16.1±1.1	16.4±1.3	16.2±1.2	17.4±2.3	15.9±1.3	16.5±1.9	15.0±1.2	15.6±1.2	15.5±1.4	15.5±1.1	15.9±1.5	16.0±1.0	15.6±1.3	15.8±1.1	16.2±1.9	18.3 ±2.7
	11+	16.2±0.9	16.9±1.4	16.5±1.2	16.5±1.4	16.2±1.4	16.4±1.4	15.8±1.0	16.2±1.0	16.3±1.5	15.7±1.4	16.7±1.3	16.2±1.3	16.1±0.9	16.9±1.6	15.0±0.8	17.8 ±1.8
	12+	16.4±1.6	16.8±1.4	16.6±1.5	17.8±2.0	18.9±1.1	18.5±0.9	16.0±1.3	18.4±2.2	16.2±1.2	16.9±2.0	17.4±1.8	17.0±1.1	17.1±1.5	17.0±1.6	16.4±0.5	18.7 ±1.6
	13+	18.3±1.6	17.7±1.3	18.0±1.5	18.0±1.8	17.9±1.8	17.9±1.7	16.6±1.3	17.7±1.6	17.2±1.5	17.1±1.6	18.1±2.0	16.7±1.6	17.2±1.7	17.9±2.4	17.5±2.2	17.8 ±1.7
	14+	17.9±1.3	18.8±1.9	18.4±1.7	19.2±1.9	19.8±2.3	19.6±2.1	18.2±3.3	18.3±2.0	17.4±2.3	17.7±1.6	19.2±1.7	18.7±1.5	19.3±2.2	19.5±2.3	19.2±1.9	19.3 ±2.3
	15+	18.9±2.1	20.4±2.0	19.7±2.2	19.0±1.7	19.7±2.3	19.4±2.1	18.5±1.3	19.5±1.9	18.6±1.8	19.4±2.1	20.5±2.6	19.0±1.8	19.8±2.5	19.7±1.8	17.7±1.4	18.4 ±1.0
	16+	20.1±2.7	21.5±2.8	20.7±2.8	20.9±2.2	22.5±1.2	21.9±9.0	19.0±1.6	20.9±1.6	20.8±1.4	20.2±2.2	20.9±1.4	20.1±1.1	21.0±1.8	20.7±2.4	19.1±1.6	21.1 ±1.5
	17+	21.4±1.8	21.0±1.7	21.2±1.7	21.8±1.3	21.9±1.4	21.9±1.4	20.6±1.8	21.2±2.0	21.1±2.0	20.3±1.7	21.0±1.3	21.0±1.3	21.5±1.8	21.7±1.4	20.8±1.2	21.1 ±1.0
	18+	23.5±3.3	22.2±1.9	22.9±2.8	22.7±1.9	21.7±2.5	22.1±2.3	21.0±1.8	20.5±1.1	21.3±2.1	21.8±2.4	21.6±1.3	21.6±1.6	22.1±1.7	21.1±2.3	21.8±1.1	22.7 ±1.8
	19+	22.2±1.1	22.2±2.3	22.2±1.7	22.2±1.5	22.8±1.7	22.5±1.6	22.3±1.5	23.0±2.2	21.0±1.2	21.7±1.8	22.8±1.7	21.8±1.4	22.3±1.3	22.4±2.0	21.6±0.6	21.7 ±1.0
	20+	23.4±2.2	23.4±1.5	23.4±1.9	24.1±2.3	23.7±2.9	23.9±2.6	23.0±1.9	22.6±2.4	22.5±2.5	22.5±1.6	23.1±1.9	22.5±1.7	22.7±1.5	22.4±1.6	21.9±1.8	23.4 ±1.4
19. Upper Arm Girth-Contracted (UAGC) in cm																	
	8+	17.1±0.9	16.5±1.4	16.9±1.2	16.4±1.1	17.2±1.3	16.7±1.3	15.9±1.3	16.7±2.0	16.6±1.1	15.9±1.0	16.8±1.4	15.9±0.9	16.4±1.3	16.8±1.6	15.4±1.2	17.7± 1.9
	9+	17.1±1.2	17.1±1.2	17.1±1.2	17.4±1.1	17.6±1.5	17.5±1.3	16.7±1.1	16.7±1.0	16.3±1.2	16.7±1.4	16.3±1.3	16.1±1.3	16.5±1.1	16.3±0.9	16.9±2.8	18.7± 1.6
	10+	17.9±1.2	18.3±1.4	18.0±1.3	19.4±2.7	17.3±1.6	18.2±2.3	16.6±1.6	16.9±1.3	17.3±1.2	16.8±1.2	17.4±1.9	17.7±1.3	16.9±1.4	17.3±1.5	17.9±2.2	19.7 ±2.5
	11+	17.8±0.9	18.7±1.7	18.2±1.4	18.2±1.5	18.0±1.5	18.0±1.5	17.3±1.6	17.9±1.2	18.1±1.9	17.4±2.0	18.1±1.4	17.9±1.7	17.6±1.0	18.2±1.7	16.5±1.4	19.4 ±1.9
	12+	18.4±1.4	18.6±1.7	18.5±1.6	20.0±2.2	18.3±1.4	18.9±1.9	17.6±1.6	19.7±2.3	18.2±1.2	18.7±2.1	19.8±2.4	18.6±1.2	19.2±1.8	18.8±1.7	18.6±0.9	20.2 ±1.8
	13+	20.6±2.1	22.0±9.6	21.4±7.3	20.1±2.3	19.7±2.0	19.9±2.1	18.5±1.4	19.6±1.6	19.5±2.1	19.0±2.1	20.0±2.2	18.5±1.9	19.3±2.1	19.9±2.9	19.4±1.8	19.8 ±2.2
	14+	20.1±1.9	21.1±2.4	20.7±2.2	22.0±2.8	22.1±2.4	22.0±2.5	20.4±3.4	20.6±2.9	19.6±2.7	19.8±2.1	21.2±2.6	21.1±2.0	21.4±2.6	21.6±2.4	21.9±2.4	21.1 ±2.7
	15+	21.5±2.7	23.4±2.3	22.4±2.7	21.8±2.1	22.1±2.8	22.0±2.5	20.8±2.2	22.1±2.6	21.3±2.2	21.9±2.8	23.4±3.1	21.4±1.9	22.2±2.9	22.4±2.3	19.8±2.1	20.6 ±1.0
	16+	23.4±2.9	23.8±2.9	23.6±2.9	23.7±2.8	22.3±3.1	22.9±3.0	21.4±2.0	23.8±1.9	24.0±1.7	22.9±2.5	24.0±1.9	22.8±1.7	23.9±2.5	23.4±2.1	21.9±2.3	23.9 ±2.2
	17+	24.6±2.0	24.2±2.2	24.4±2.1	25.3±1.3	24.9±1.9	25.0±1.7	23.4±2.2	24.2±2.6	24.1±2.1	22.8±2.0	24.3±1.6	23.6±1.5	24.2±2.0	25.0±1.6	24.0±1.2	25.0 ±2.0
	18+	25.8±2.0	25.8±2.2	25.8±2.1	25.8±2.2	24.8±2.9	25.3±2.6	23.8±2.3	23.9±2.5	24.4±2.0	24.3±1.8	25.1±1.9	24.6±1.8	25.3±2.1	23.8±2.6	26.2±1.1	26.5 ±2.6
	19+	25.7±2.0	24.9±2.7	25.4±2.2	25.7±2.0	30.0±1.9	25.8±1.9	25.2±1.8	24.4±1.3	24.4±1.3	25.0±1.4	26.5±1.9	25.1±2.0	25.3±1.4	25.9±2.5	24.8±3.5	25.4 ±1.5
	20+	26.9±2.4	26.4±2.2	26.5±2.3	27.7±2.9	27.0±2.8	27.3±2.8	26.4±2.6	25.8±2.1	25.9±2.2	25.5±3.1	26.5±2.3	25.8±2.2	26.2±2.1	25.9±1.8	25.0±2.3	26.9±1.8

Table 3: Contd...

S. No.	Measurement Age (in Yrs.)	Population Groups: Lepchas – North Sikkim	Lepchas – Rest Sikkim	Lepchas – Lepchas Total	Bhutias – North Sikkim	Bhutias – Rest Sikkim	Bhutias – Bhutias Total	Sherpas	Tamangs	Brahmans	Chhetris	Pradhans	Rais	Limboos/ Subbas	Gurungs	Mangars	Scheduled Castes
		Mean±S.D.	Mean±S.D.	Mean±S.D.	Mean±S.D.	Mean±S.D.	Mean±S.D.	Mean±S.D.	Mean±S.D.	Mean±S.D.	Mean±S.D.	Mean±S.D.	Mean±S.D.	Mean±S.D.	Mean±S.D. M	ean±S.D.	Mean±S.D.
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
20. Calf Girth (CG) in cm																	
	8+	23.2±1.2	23.0±1.9	23.2±1.5	22.6±1.9	23.3±2.2	23.0±2.1	21.9±1.5	23.3±2.3	23.2±3.2	21.8±1.2	22.6±2.0	22.2±2.1	22.0±2.9	22.7±1.6	21.3±1.5	23.0± 1.8
	9+	23.1±1.8	23.8±3.2	23.4±2.4	23.1±1.9	24.1±1.6	23.7±1.8	22.9±1.7	23.3±1.6	23.3±2.5	22.4±1.9	22.4±1.9	22.9±1.9	22.6±2.0	22.4±1.2	23.2±2.9	25.0± 1.6
	10+	23.6±1.7	24.0±3.7	23.8±2.6	25.9±2.9	23.8±1.6	24.6±2.4	23.2±1.5	23.2±1.9	23.9±1.9	22.6±1.5	23.5±2.2	24.6±1.8	24.0±2.1	24.1±1.6	24.5±3.5	26.1 ±3.1
	11+	25.1±2.9	24.6±2.6	24.9±2.8	24.6±2.0	24.8±2.1	24.7±2.0	24.4±2.2	24.1±1.3	25.5±2.2	24.2±2.9	24.5±2.3	24.4±1.9	25.0±1.5	25.3±3.4	22.6±2.0	24.7 ±1.7
	12+	24.2±2.3	26.3±2.9	25.3±2.8	26.1±2.1	25.2±3.8	25.5±3.3	25.6±2.7	27.3±2.6	25.3±3.0	26.0±2.9	25.8±2.6	26.2±1.8	26.5±2.2	25.5±2.5	25.1±0.9	25.8 ±1.5
	13+	27.9±2.8	26.8±2.7	27.3±2.7	26.5±3.2	27.1±2.4	27.0±2.7	25.5±1.8	27.7±2.1	25.5±2.4	26.0±2.3	27.3±2.5	26.1±2.2	26.1±3.5	26.9±3.6	27.5±4.0	26.1 ±2.0
	14+	26.9±2.4	28.0±2.4	27.5±2.4	29.5±2.6	29.3±3.0	29.4±2.8	27.5±2.4	28.5±3.0	26.3±3.3	26.6±3.1	29.3±2.6	28.6±2.3	29.0±2.7	28.1±3.5	28.5±2.6	28.1 ±2.2
	15+	28.8±2.9	30.6±2.4	29.7±2.8	29.2±2.2	29.4±3.4	29.5±3.0	29.2±2.8	29.8±2.4	28.9±2.8	27.6±6.3	29.7±3.0	29.5±2.3	29.6±2.6	28.9±3.2	27.8±3.0	28.7 ±2.3
	16+	30.5±3.1	29.4±4.9	30.0±4.0	30.8±2.3	30.2±3.0	30.4±2.7	29.4±3.2	31.5±1.7	30.2±1.5	29.1±4.1	31.0±2.1	30.7±2.3	31.4±1.8	30.3±2.0	28.5±1.8	29.8 ±2.3
	17+	30.8±2.3	30.6±2.1	30.7±2.2	30.7±2.8	32.5±2.0	31.9±2.4	31.7±2.2	30.4±3.5	29.9±2.7	30.2±2.2	31.2±2.0	31.2±1.8	31.7±2.0	32.1±2.6	31.2±1.1	29.7 ±2.6
	18+	33.5±2.5	32.8±1.9	33.2±2.2	33.1±2.7	31.9±3.0	32.5±2.9	31.5±8.7	30.3±4.6	30.6±3.3	31.4±2.3	31.6±1.1	31.5±2.6	32.0±3.7	30.4±3.8	32.6±0.1	32.3 ±2.4
	19+	30.9±2.8	30.9±1.9	30.9±2.5	32.1±2.4	32.6±1.4	32.3±1.9	32.3±1.5	30.7±3.6	29.6±2.3	31.2±1.2	31.9±1.7	31.3±2.8	32.0±2.2	33.1±1.7	31.9±1.3	31.5 ±1.3
	20+	32.3±2.7	33.1±2.2	32.6±2.5	32.9±2.8	33.3±3.4	33.1±3.1	32.4±2.5	31.2±2.2	31.3±2.3	31.5±2.9	32.4±2.3	31.3±2.5	32.4±3.1	31.4±1.9	31.8±2.4	31.4 ±2.0
(e) Head and Face Measurement																	
21. Head Length (HL) in cm																	
	8+	17.4±0.5	17.2±1.2	17.3±0.9	17.3±0.5	17.9±1.8	17.7±1.4	17.2±1.1	16.9±1.5	17.7±1.5	17.9±1.7	17.2±1.2	17.3±2.0	17.2±1.2	17.3±1.6	16.7±0.8	17.4± 0.4
	9+	17.2±0.5	17.5±1.1	17.3±0.8	17.5±1.0	18.8±1.9	18.3±1.6	17.2±1.1	17.5±2.1	17.2±1.0	18.0±1.6	17.2++1.0	17.2±1.6	17.7±1.5	17.9±1.6	17.5±1.3	17.0±0.6
	10+	17.3±0.7	18.2±1.9	17.4±1.3	17.7±0.6	18.5±1.8	18.2±1.5	17.5±1.3	18.0±2.0	17.5±1.5	17.7±1.7	17.4±1.7	18.1±2.3	17.9±1.6	17.0±1.3	18.3±1.9	17.6 ±1.1
	11+	17.6±0.9	19.1±3.3	18.2±2.3	18.0±1.3	18.6±1.7	18.3±1.6	17.4±1.1	17.8±1.2	18.0±1.6	18.9±1.9	17.3±1.1	18.3±2.6	17.4±1.2	17.6±2.3	16.9±0.8	17.7 ±0.4
	12+	17.2±0.6	18.8±1.6	18.1±1.4	18.0±0.7	18.8±2.2	18.5±1.8	17.7±1.1	20.1±1.8	17.3±1.1	20.2±2.0	18.5±1.6	18.0±1.8	17.3±0.7	17.9±1.2	18.4±1.8	17.9 ±0.4
	13+	17.9±0.9	17.9±1.7	17.9±1.4	17.9±0.7	18.5±1.6	18.3±1.3	18.0±0.7	18.8±1.8	17.8±1.0	18.8±1.9	18.1±1.7	17.6±2.7	17.7±1.0	17.9±1.5	17.3±1.5	17.8 ±0.5
	14+	17.9±0.8	17.9±1.4	17.9±1.2	18.0±0.7	18.8±1.5	18.4±1.3	17.8±1.1	18.2±1.4	18.0±1.7	18.4±1.7	18.0±1.6	18.7±2.1	18.1±1.1	18.8±1.7	17.6±2.3	18.0 ±0.4
	15+	17.7±0.7	19.2±1.7	18.4±1.5	17.9±0.7	19.3±1.9	18.7±1.6	18.1±1.2	19.1±2.1	18.4±2.1	19.1±1.9	18.3±1.2	18.4±1.4	18.0±1.0	18.3±1.6	17.7±1.9	17.8 ±0.5
	16+	22.5±1.6	18.6±1.6	20.8±2.0	18.6±0.9	19.9±1.8	19.4±1.6	18.3±1.1	19.2±1.9	18.3±1.1	18.0±1.3	18.3±1.1	18.6±2.0	18.2±1.1	18.6±1.5	18.0±1.3	18.3 ±1.2
	17+	18.2±0.8	18.0±0.7	18.1±0.8	18.4±0.7	19.7±2.0	19.3±1.8	18.3±0.9	18.3±1.3	18.2±1.2	18.2±1.4	18.4±1.3	19.1±4.3	17.9±0.8	18.5±1.0	18.4±6.6	18.1 ±0.4
	18+	18.6±0.5	18.2±1.6	18.4±1.1	18.5±0.8	19.1±1.6	18.8±1.3	18.1±0.8	17.9±1.9	18.4±1.1	18.2±1.3	17.9±1.1	18.3±1.1	17.9±0.6	18.0±1.0	17.7±5.7	18.5 ±1.0
	19+	18.5±0.7	18.1±0.5	18.4±0.7	18.7±0.4	18.8±0.5	18.7±0.5	18.4±0.7	18.6±1.7	18.3±0.6	18.3±0.6	18.5±1.1	18.2±1.3	18.0±0.6	18.9±1.0	17.3±0.0	18.6 ±0.5
	20+	18.8±1.0	19.1±1.5	18.9±1.2	18.9±0.5	20.9±2.4	19.9±2.0	19.1±+1.2	19.6±1.9	19.4±0.2	20.2±2.0	19.1±1.8	19.6±2.1	18.9±1.5	19.8±2.0	18.3±1.2	18.4±0.6
22. Head Breadth (HB) in cm																	
	8+	13.9±0.6	14.2±1.3	14.0±0.9	13.9±0.6	15.1±2.0	14.6±1.6	14.2±1.4	14.4±0.8	14.2±1.5	14.2±1.4	13.9±1.1	15.2±2.0	14.3±1.1	14.1±1.7	13.8±0.6	13.3± 1.1
	9+	13.6±0.6	14.2±1.1	13.8±0.9	13.7±0.5	15.8±1.7	15.0±1.7	14.0+1.0	14.5±1.9	14.0+1.5	14.7±1.7	14.1±1.0	14.9±1.7	14.4±1.7	14.5±1.6	14.2±1.6	13.9± 0.3
	10+	13.7±0.7	15.2±1.7	14..3±1.4	13.8±0.5	15.7±1.9	14.9±1.8	14.1±1.3	15.3±1.8	14.7±2.0	14.3±1.6	14.5±1.4	15.3±1.6	14.7±2.0	14.0±1.2	14.6±2.0	13. 6±0.5
	11+	13.7±0.5	15.1±1.8	14.3±1.4	14.3±1.6	15.6±2.3	15.1±2.1	14.4±1.4	14.8±1.8	15.0±1.6	15.6±2.2	14.1±1.2	15.2±2.0	14.4±1.2	14.7±1.8	13.6±0.3	13.3 ±0.3

Table 3: Contd...

S. No.	Measurement Age (in Yrs.)	Lepchas			Bhutias			Sherpas	Tamangs	Brahmans	Chhetris	Pradhans	Rais	Limboos/ Subbas	Gurungs	Mangars	Scheduled Castes
		North Sikkim	Rest Sikkim	Lepchas Total	North Sikkim	Rest Sikkim	Bhutias Total										
		Mean±S.D.	Mean±S.D.	Mean±S.D.	Mean±S.D.	Mean±S.D.	Mean±S.D.	Mean±S.D.	Mean±S.D.	Mean±S.D.	Mean±S.D.	Mean±S.D.	Mean±S.D.	Mean±S.D.	Mean±S.D.	M ean±S.D.	Mean±S.D.
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
	12+	13.9±0.5	15.8±2.1	14.9±1.8	14.0±0.4	16.5±1.9	15.6±2.0	14.2±1.5	16.8±1.7	14.2±1.2	16.2±1.9	14.8±1.7	15.0±1.7	14.2±0.7	14.2±1.4	14.9±2.5	13.9 ±0.2
	13+	14.0±0.8	14.8±2.0	14.5±1.6	14.1±0.6	16.0±1.9	15.2±1.8	14.2±0.5	15.7±2.0	13.9±1.5	15.1±2.4	14.8±1.8	15.6±1.9	15.0±3.2	14.4±1.3	14.7±0.6	13.6 ±0.4
	14+	14.0±0.4	14.5±1.3	14.3±1.0	14.2±1.0	15.4±1.8	14.9±1.6	14.3±1.1	15.2±1.8	14.3±1.6	14.6±1.4	14.7±1.6	15.8±1.9	15.0±1.5	15.2±2.1	14.5±1.5	14.2 ±0.4
	15+	13.9±0.6	15.5±1.8	14.7±1.5	14.3±0.6	15.7±1.9	15.1±1.6	14.5±1.5	15.2±1.8	14.9±2.2	15.5±2.1	14.7±1.1	15.6±1.4	14.6±1.2	15.1±1.6	14.6±1.7	14.0 ±0.7
	16+	15.3±0.4	15.5±1.8	15.4±3.3	14.6±1.5	16.7±2.0	15.8±2.0	14.5±1.4	15.7±2.1	14.2±1.1	14.3±1.5	14.3±0.8	15.5±1.8	15.0±1.4	14.6±1.7	14.6±1.6	13.6 ±1.5
	17+	14.0±0.5	14.2±0.5	14.0±0.5	14.5±0.7	16.4±2.1	15.7±1.9	14.4±1.1	14.5±1.4	14.2±1.2	14.6±1.4	14.7±1.3	14.9±1.3	14.8±0.8	14.6±1.0	13.8±0.8	13.9 ±0.5
	18+	14.5±0.4	14.8±1.7	14.6±1.2	14.6±0.5	15.1±1.9	14.8±1.5	14.3±0.6	14.5±1.7	14.3±1.2	14.3±1.1	14.3±1.4	15.0±1.1	14.8±0.7	14.1±0.8	13.4±0.1	13.7 ±0.5
	19+	14.3±0.5	14.0±0.5	14.2±0.5	14.3±0.8	14.1±0.6	14.2±0.7	14.6±0.8	14.7±1.3	13.7±0.7	14.0±0.5	14.6±1.3	14.6±0.8	14.5±1.0	15.1±1.0	14.9±0.8	14.2 ±0.3
	20+	14.4±1.2	15.0±1.8	14.6±1.5	14.2±0.6	18.2±8.2	16.2±6.2	14.7±1.4	15.6±2.1	15.6±1.9	16.2±1.9	15.4±1.6	16.7±2.2	15.4±1.8	15.5±2.0	14.6±1.1	14.1 ±0.7
23. Minimum frontal breadth (M Fr) in cm																	
	8+	11.1±0.6	11.0±0.7	11.0±0.6	11.2±0.6	11.6±1.6	11.4±1.2	11.0±1.2	10.8±0.9	11.2±1.4	11.2±1.5	10.7±1.0	11.5±1.5	11.0±1.2	11.2±1.5	10.7±0.6	10.5± 0.7
	9+	10.8±0.7	11.1±0.9	10.9±0.8	10.9±0.5	12.2±1.7	11.7±1.5	11.0±1.1	11.4±1.5	10.7±0.8	11.2±1.6	10.8±0.9	11.4±1.7	11.2±1.4	11.5±1.5	11.0±1.4	11.3± 0.3
	10+	10.8±0.5	12.0±1.4	11.3±1.1	11.3±0.7	12.6±2.0	12.1±1.8	11.4±1.1	11.8±1.9	10.9±1.3	11.2±1.5	11.6±1.3	12.0±1.6	11.6±1.4	11.1±1.1	11.9±2.0	11.3 ±0.5
	11+	10.9±0.4	12.3±1.6	11.4±1.3	11.7±1.6	12.4±1.6	12.1±1.6	11.5±0.9	11.4±1.2	11.8±1.3	12.3±1.8	10.8±0.9	12.1±1.5	11.4±1.4	11.8±1.9	10.9±0.7	11.5 ±0.5
	12+	11.2±0.4	13.1±1.7	12.2±1.6	11.5±0.5	12.9±1.7	12.4±1.6	11.4±1.0	13.8±1.7	11.2±0.8	13.1±1.5	11.8±1.5	12.0±1.5	11.6±0.5	11.9±1.0	12.3±2.6	12.1 ±0.8
	13+	11.5±0.5	12.0±1.5	11.8±1.2	11.6±0.7	12.6±1.6	12.2±1.4	11.6±0.9	13.1±2.1	11.3±1.2	12.2±1.7	12.1±1.8	12.4±1.8	11.6±0.9	11.7±1.3	11.5±0.2	11.6 ±0.7
	14+	11.4±0.8	12.1±1.1	11.8±1.0	12.1±0.6	12.7±1.6	12.5±1.3	11.8±0.9	12.4±1.5	11.8±1.6	11.9±1.4	11.9±1.3	12.9±1.7	11.9±1.1	12.6±1.7	12.0±1.2	12.2 ±0.6
	15+	11.8±0.7	12.9±1.8	12.3±1.4	11.8±0.5	13.2±1.8	12.6±1.5	11.9±0.6	12.5±1.4	12.1±1.6	12.7±1.9	12.4±1.5	12.7±1.5	12.2±1.2	12.4±1.3	12.0±1.6	12.2 ±0.8
	16+	12.3±1.5	13.1±1.8	12.7±1.6	12.7±1.2	14.4±2.7	13.7±2.3	12.4±1.2	13.4±1.8	12.2±1.6	11.8±1.1	12.2±0.8	12.8±1.2	12.6±1.2	12.5±1.3	12.3±1.0	12.2 ±1.2
	17+	12.1±0.6	12.0±0.7	12.1±0.6	12.6±0.5	13.9±1.9	13.4±1.7	12.4±1.0	12.3±1.1	11.8±1.1	12.2±1.4	12.2±0.9	12.4±1.4	12.2±0.7	12.3±0.9	11.8±0.5	12.5 ±0.5
	18+	12.5±0.5	12.4±1.2	12.4±0.9	12.5±0.8	13.0±1.5	12.7±1.3	12.2±0.6	12.7±0.8	11.9±1.0	12.1±1.1	12.4±1.1	12.5±1.2	12.2±0.6	12.0±0.7	11.5±0.0	12.8 ±0.5
	19+	12.2±0.5	12.0±0.7	12.1±0.6	12.2±0.4	12.5±0.7	12.4±0.6	12.6±0.7	12.5±0.9	12.3±1.5	12.1±0.5	12.5±1.0	12.6±0.9	12.2±0.5	12.8±0.9	12.0±0.4	12.7 ±0.9
	20+	12.6±1.0	13.0±1.2	12.8±1.1	12.7±0.6	14.8±1.6	13.8±1.6	12.9±1.2	13.5±1.6	13.0±1.6	14.0±1.5	13.2±2.0	14.0±1.7	13.1±1.4	13.4±1.8	12.4±1.1	12.3 ±0.7
24. Maximum Bizygomatic Breadth (MBz) in cm																	
	8+	12.0±0.6	12.0±1.1	12.0±0.8	12.2±0.7	12.9±1.9	12.6±1.5	12.1±1.3	11.9±0.9	12.2±1.7	12.2±1.5	11.6±1.2	13.1±1.9	11.9±1.6	12.5±1.6	11.9±0.7	11.6± 0.7
	9+	11.8±0.8	12.6±1.9	12.1±1.4	11.5±0.5	13.4±1.9	12.6±1.8	12.1±1.0	12.5±1.9	11.7±1.1	12.5±1.6	11.8±1.2	12.4±1.7	12.3±1.6	12.8±1.8	12.1±1.5	12.2± 0.3
	10+	11.8±0.3	13.9±2.1	12.6±+1.7	12.3±0.6	13.9±2.0	13.2±1.8	12.4±1.3	13.3±2.2	12.1±1.6	12.2±1.5	12.8±1.6	13.4±1.7	12.9±1.7	12.2±1.0	11.9±1.0	12.6±1.2
	11+	11.9±0.6	14.0±2.2	12.8±1.8	12.5±1.7	13.6±2.0	13.2±1.9	12.6±1.2	12.5±1.4	12.8±1.4	13.6±2.0	11.8±1.2	13.4±2.1	12.7±1.4	13.0±1.9	11.8±0.7	12.4 ±0.7
	12+	11.9±0.6	14.2±2.0	13.2±1.9	12.5±0.8	14.3±2.2	13.7±2.0	12.5±1.4	15.2±1.9	12.3±1.0	14.7±1.9	13.1±1.7	13.4±1.7	12.5±0.6	13.0±1.4	12.1±0.5	13.2 ±0.6
	13+	12.2±0.6	13.2±1.7	12.8±1.4	12.5±0.8	14.1±1.8	13.5±1.7	12.6±1.1	14.0±2.0	12.2±1.5	15.5±1.9	12.6±2.1	13.6±2.0	12.9±1.0	13.0±1.5	12.9±0.4	12.7 ±0.9
	14+	12.3±0.7	13.1±1.2	12.8±1.1	12.9±0.7	13.9±1.9	13.5±1.6	12.7±0.6	13.8±1.6	12.7±1.8	13.1±1.5	13.1±1.5	14.0±2.0	13.5±1.3	14.0±1.9	13.1±1.5	13.4 ±0.8
	15+	12.8±0.7	14.3±2.0	13.5±1.6	12.8±0.6	14.4±1.9	13.7±1.7	12.8±0.7	14.1±1.7	13.5±2.0	13.7±1.9	13.3±1.3	13.8±1.6	13.3±1.0	13.6±1.5	12.7±1.6	13.4 ±0.9
	16+	13.1±1.5	14.2±1.8	13.6±1.7	13.6±1.6	15.2±2.0	14.5±2.0	13.7±1.9	14.6±1.9	13.0±1.0	12.9±1.1	13.2±0.8	14.2±1.5	14.0±1.2	13.6±1.6	13.1±1.2	13.3 ±1.1
	17+	13.1±0.8	13.2±0.6	13.1±0.7	13.7±0.5	15.3±1.9	14.8±1.7	13.5±1.0	13.8±1.2	12.9±1.2	13.4±1.4	13.6±1.1	13.7±1.3	13.4±0.7	13.6±0.9	13.0±0.4	13.3 ±0.4

Table 3: Contd...

S. No.	Measurement Age (in Yrs.)	Population Groups: Lepchas – North Sikkim	Lepchas – Rest Sikkim	Lepchas – Lepchas Total	Bhutias – North Sikkim	Bhutias – Rest Sikkim	Bhutias – Bhutias Total	Sherpas	Tamangs	Brahmans	Chhetris	Pradhans	Rais	Limboos/ Subbas	Gurungs	Mangars	Scheduled Castes
		Mean±S.D.	Mean±S.D.	Mean±S.D.	Mean±S.D.	Mean±S.D.	Mean±S.D.	Mean±S.D.	Mean±S.D.	Mean±S.D.	Mean±S.D.	Mean±S.D.	Mean±S.D.	Mean±S.D.	Mean±S.D. M	ean±S.D.	Mean±S.D.
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
	18+	13.6±0.4	13.4±1.7	13.5±1.1	13.6±0.7	14.3±1.8	14.0±1.4	13.2±0.8	13.6±1.6	13.1±1.1	13.1±1.0	13.3±1.0	13.8±1.1	13.5±0.3	13.2±0.7	13.0±0.4	13.9 ±0.5
	19+	13.4±0.5	13.2±0.6	13.4±0.5	13.4±0.6	13.7±0.6	13.5±0.6	13.6±0.6	13.8±1.2	12.9±0.5	13.0±0.4	13.7±1.2	13.7±0.8	13.3±0.5	13.9±1.0	13.7±0.6	13.7 ±0.9
	20+	13.7±1.0	14.3±1.5	13.9±1.2	13.8±0.5	16.2±1.9	15.1±1.9	14.1±1.2	14.8±1.8	14.3±1.8	15.2±1.8	14.4±1.5	15.5±2.0	14.4±1.5	14.9±2.0	13.7±1.2	13.3 ±0.6
25. Bigonial Breadth (Bg B) in cm																	
	8+	8.7±0.7	8.8±1.4	8.8±1.0	8.8±0.6	9.3±1.7	9.1±1.4	8.7±1.2	8.8±1.1	8.8±1.4	8.8±1.5	8.2±1.0	9.3±1.7	8.4±1.2	8.9±1.6	8.4±0.9	7.8±0.3
	9+	8.7±0.5	9.7±2.9	9.1±1.9	8.3±0.4	9.6±1.8	9.1±1.5	8.7±0.9	9.3±1.7	8.4±0.9	9.3±1.7	8.4±1.0	8.9±1.7	8.7±1.4	9.0±1.8	8.6±1.5	7.9±0.3
	10+	8.7±0.6	10.3±2.2	9.4±1.6	9.0±0.6	10.3±2.0	9.8±1.7	8.7±1.2	9.5±2.0	8.7±1.3	9.0±1.5	9.2±1.5	9.5±1.7	9.2±1.7	8.6±0.9	9.6±2.3	8.6±0.7
	11+	8.7±0.3	9.7±2.1	9.1±1.5	9.3±0.9	9.9±1.6	9.7±1.4	8.9±1.1	9.0±1.2	9.4±1.6	10.0±1.7	8.7±1.3	9.8±1.9	8.9±1.5	9.4±1.8	8.8±0.7	9.1±0.1
	12+	8.6±0.8	10.6±1.7	9.7±1.7	8.7±0.8	10.9±1.8	10.1±1.9	9.2±1.2	11.5±1.9	8.9±1.0	10.9±1.7	9.6±1.3	9.8±1.7	9.0±0.5	9.2±1.4	8.3±0.3	9.1±0.8
	13+	9.3±0.5	9.7±1.8	9.5±1.4	9.2±0.9	10.1±1.4	9.7±1.3	8.9±0.9	10.3±1.9	8.9±1.3	9.9±1.9	9.1±1.4	9.7±1.8	9.3±1.0	9.3±1.4	8.9±0.2	9.3±0.9
	14+	9.1±0.6	9.6±1.3	9.4±1.1	9.5±0.6	10.2±1.6	10.0±1.3	9.2±1.0	10.1±1.6	9.3±1.7	9.3±1.3	9.4±1.2	10.3±1.8	9.7±1.4	10.3±1.7	9.7±1.2	9.6±0.4
	15+	9.3±0.7	10.2±1.4	9.7±1.1	9.5±0.4	10.5±1.6	10.0±1.3	9.2±1.2	10.0±1.4	10.0±1.7	10.1±2.0	10.7±2.6	10.0±1.4	9.5±0.7	10.2±1.3	8.8±0.7	9.4±0.6
	16+	9.7±1.4	10.1±1.4	9.9±1.4	10.0±1.4	11.0±1.7	10.6±1.6	9.7±1.3	10.5±1.5	9.6±1.1	9.5±1.1	9.8±0.9	10.2±1.7	10.0±1.2	10.1±1.7	9.9±1.5	9.6±1.0
	17+	9.6±0.6	10.0±0.5	9.6±0.6	10.3±1.5	11.2±1.7	10.9±1.5	9.6±1.0	9.8±1.2	9.5±1.1	9.8±1.2	9.8±1.0	10.1±1.5	9.8±0.8	9.8±1.0	9.4±0.3	9.4±0.3
	18+	10.0±0.7	10.1±1.3	10.0±1.0	9.9±0.9	10.3±1.5	10.1±1.3	9.8±0.6	9.8±1.2	9.9±0.9	9.7±0.6	9.9±0.5	10.0±+0.6	9.9±0.9	9.9±0.7	9.7±0.8	9.7±0.5
	19+	10.0±0.6	9.8±0.6	9.9±0.6	9.8±1.0	10.2±0.9	10.0±0.9	10.2±0.6	10.0±1.0	9.3±0.5	9.9±0.5	10.3±1.1	9.9±1.2	9.8±0.8	10.7±0.9	9.8±0.5	9.7±0.9
	20+	10.0±1.1	11.0±1.3	10.4±1.3	10.2±0.9	12.6±1.8	11.4±1.9	10.3±1.5	11.2±1.9	10.9±1.8	11.8±1.8	11.1±1.6	11.7±2.1	10.8±1.7	11.0±2.1	10.2±1.2	9.7±0.7
26. Nasal Height (NH) in cm																	
	8+	3.9±0.3	3.9±0.3	3.9±0.3	4.0±0.3	3.9±0.5	3.9±0.4	3.7±0.2	3.7±0.3	3.7±0.5	3.7±0.4	3.7±0.4	3.7±0.3	3.6±0.3	3.7±0.3	3.8±0.4	3.9±0.3
	9+	3.9±0.4	4.0±0.4	3.9±0.4	4.0±0.3	4.0±0.6	4.0±0.5	3.7±0.3	4.0±0.3	3.9±0.3	3.8±0.4	3.8±0.3	3.7±0.3	3.6±0.3	3.6±0.3	3.5±0.4	3.9±0.3
	10+	4.1±0.3	4.1±0.3	4.1±0.3	4.2±0.4	4.1±0.3	4.1±0.4	3.8±0.4	3.8±0.3	3.9±0.4	3.8±0.4	4.1±0.5	4.0±0.4	3.8±0.2	3.9±0.4	3.8±0.4	4.4±0.5
	11+	4.1±0.3	3.8±0.4	4.0±0.4	4.2±0.3	4.1±0.4	4.2±0.4	3.9±0.4	3.8±0.4	4.3±0.3	4.0±0.4	3.9±0.2	3.9±0.4	3.8±0.3	4.0±0.4	3.4±0.3	4.2±0.1
	12+	4.3±0.3	4.2±0.4	4.2±0.3	4.3±0.4	4.4±1.0	4.4±0.8	3.8±0.4	4.4±0.5	4.1±0.3	4.1±0.5	4.1±0.5	4.0±0.4	4.1±1.2	4.1±0.3	3.9±0.6	4.4±0.4
	13+	4.4±0.3	4.2±0.3	4.3±0.3	4.3±0.5	4.3±0.5	4.3±0.5	4.0±0.3	4.3±0.4	4.3±0.4	4.2±0.4	4.0±0.9	4.2±0.6	4.1±0.3	4.1±0.4	4.3±0.0	4.6±0.5
	14+	4.3±0.2	4.3±0.3	4.3±0.3	4.5±0.4	4.5±0.4	4.5±0.4	4.1±0.4	4.2±0.3	4.2±0.3	4.1±0.3	4.3±0.4	4.9±1.6	4.2±0.5	4.5±0.5	4.1±0.3	4.7±0.5
	15+	4.5±0.5	4.5±0.4	4.5±0.4	4.5±0.4	4.8±0.4	4.7±0.4	4.3±0.5	4.4±0.4	4.5±0.4	4.5±0.4	4.6±0.4	4.4±0.4	4.3±0.4	4.3±0.5	4.4±0.6	4.5±0.6
	16+	4.6±0.3	4.7±0.5	4.7±0.4	4.7±0.4	4.8±0.6	4.7±0.5	4.3±0.4	4.7±0.5	4.6±0.4	4.5±0.3	4.5±0.4	4.5±0.4	4.4±0.5	4.5±0.3	4.2±0.3	4.6±03
	17+	4.9±0.3	4.5±0.4	4.7±0.4	5.0±0.2	4.9±0.5	4.9±0.4	4.5±0.4	4.6±0.4	4.6±0.4	4.5±0.4	4.7±0.3	4.4±0.3	4.4±0.3	4.7±0.4	4.4±0.2	4.5±0.4
	18+	4.8±0.4	4.7±0.4	4.8±0.4	4.9±0.3	4.9±0.4	4.9±0.4	4.4±0.4	4.4±0.4	4.7±0.3	4.7±0.4	4.8±0.4	4.6±0.4	4.5±0.3	4.4±0.3	4.4±0.5	4.9±0.3
	19+	4.9±0.3	4.7±0.5	4.8±0.4	4.9±0.4	4.8±0.4	4.8±0.4	4.6±0.4	4.6±0.3	4.5±0.3	4.8±0.3	4.8±0.4	4.6±0.3	4.4±0.3	4.7±0.4	4.7±0.5	5.0±0.5
	20+	5.1±0.4	5.0±0.4	5.0±0.4	5.2±0.4	4.9±0.4	5.1±0.5	4.8±0.7	4.8±0.3	4.8±0.5	4.7±0.5	4.8±0.3	4.7±0.4	4.5±0.3	4.7±0.4	4.6±0.4	4.6±0.4
27. Nasal Breadth (NB) in cm																	
	8+	2.8±0.3	2.8±0.4	2.8±0.4	2.7±0.3	3.0±0.9	2.9±0.7	2.7±0.3	2.8±0.2	2.6±0.2	2.6±0.2	2.6±0.3	2.8±0.3	2.6±0.2	2.6±0.4	2.7±0.4	2.8±0.2
	9+	2.8±0.2	3.1±1.2	2.9±0.8	2.6±0.3	2.8±0.4	2.7±0.4	2.6±0.3	2.7±0.3	2.6±0.2	2.8±0.4	2.7±0.3	2.8±0.3	2.8±0.3	2.7±0.3	2.7±0.3	3.0±0.2

Table 3: Contd...

S. No.	Measurement Age (in Yrs.)	Lepchas			Bhutias			Sherpas	Tamangs	Brahmans	Chhetris	Pradhans	Rais	Limboos/ Subbas	Gurungs	Mangars	Scheduled Castes
		North Sikkim	Rest Sikkim	Lepchas Total	North Sikkim	Rest Sikkim	Bhutias Total										
		Mean±S.D.	Mean±S.D.	Mean±S.D.	Mean±S.D.	Mean±S.D.	Mean±S.D.	Mean±S.D.	Mean±S.D.	Mean±S.D.	Mean±S.D.	Mean±S.D.	Mean±S.D.	Mean±S.D.	Mean±S.D. M	ean±S.D.	Mean±S.D.
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
	10+	2.7±0.2	2.8±0.4	2.7±0.3	2.8±0.4	2.9±0.3	2.9±0.4	2.7±0.2	2.9±0.3	2.7±0.3	2.7±0.3	2.9±0.4	2.9±0.3	2.7±0.4	2.8±0.2	2.9±0.4	3.2±0.5
	11+	2.8±0.3	2.8±0.3	2.8±0.3	2.7±0.3	2.7±0.3	2.7±0.3	2.6±0.2	2.7±0.4	2.8±0.2	2.8±0.4	2.7±0.3	2.8±0.4	2.8±0.2	2.8±04	2.8±0.3	3.4±0.3
	12+	2.7±0.3	2.9±0.2	2.8±0.3	2.9±0.2	2.9±0.4	2.9±0.4	2.8±0.3	3.1±0.4	2.9±0.3	2.9±0.5	3.0±0.4	3.0±0.4	2.9±0.4	3.0±0.4	2.9±0.2	3.6±0.4
	13+	2.9±0.3	2.9±0.4	2.9±0.3	3.0±0.2	3.0±0.4	3.0±0.3	2.7±0.3	3.2±0.4	2.7±0.4	3.1±0.3	2.8±0.4	3.0±0.4	2.9±0.4	2.9±0.4	3.2±0.6	3.3±0.6
	14+	2.9±0.3	2.9±0.3	2.9±2.9	3.0±0.4	3.1±0.3	3.1±0.3	3.0±0.4	3.2±0.4	2.8±0.4	2.9±0.3	3.1±0.6	3.1±0.4	30±0.4	3.2±0.3	3.2±0.3	3.8±0.5
	15+	3.1±0.3	3.2±0.3	3.1±0.3	3.1±0.4	3.1±0.3	3.1±0.3	2.9±0.4	3.3±0.3	3.1±0.3	3.1±0.4	3.4±0.8	3.2±0.4	3.2±0.4	3.2±0.3	3.0±0.4	3.5±0.3
	16+	3.2±0.5	3.3±0.3	3.3±0.4	3.4±0.3	3.4±0.4	3.4±0.4	3.0±0.4	3.5±0.3	3.0±0.4	3.0±0.3	3.2±0.3	3.2±0.3	3.2±0.4	3.2±0.3	3.1±0.5	3.6±0.3
	17+	3.5±1.1	3.1±0.2	3.3±0.8	3.2±0.2	3.4±0.3	3.3±0.3	3.1±0.3	3.3±0.3	3.0±0.4	3.3±0.3	3.1±0.4	3.2±0.3	3.2±0.3	3.3±0.3	3.3±0.2	3.4±0.2
	18+	3.3±0.3	3.3±0.4	3.3±0.3	3.2±0.4	3.2±0.4	3.2±0.4	3.2±0.4	3.6±0.9	3.2±0.2	3.1±0.3	3.2±0.3	3.1±0.4	3.3±0.3	3.4±0.2	3.0±0.2	3.6±0.5
	19+	3.3±0.3	3.3±0.4	3.3±0.3	3.4±0.5	3.2±0.3	3.3±0.4	3.3±0.4	3.4±0.4	3.0±0.2	3.2±0.4	3.4±0.4	3.5±0.9	3.2±0.3	3.3±0.2	3.4±0.1	3.6±0.5
	20+	3.3±0.3	3.5±0.3	3.4±0.3	3.5±0.4	3.4±0.3	3.4±0.3	3.3±0.3	3.5±0.3	3.3±0.3	3.3±0.3	3.5±0.3	3.4±0.4	3.3±0.3	3.3±0.3	3.4±0.3	3.6±0.2
28. Physiognomic Upper Facial Height (PUF Ht) in cm																	
	8+	5.9±0.3	5.9±0.4	5.9±0.3	6.1±0.4	5.8±0.5	6.0±0.5	5.9±0.3	5.6±0.5	5.9±0.3	5.5±0.8	5.7±0.4	5.7±0.3	5.9±0.4	5.7±0.4	5.8±0.5	5.6±0.3
	9+	5.8±0.4	6.0±0.3	5.9±0.4	6.2±0.5	6.0±0.4	6.0±0.5	5.9±0.4	6.0±0.4	5.9±0.4	5.8±0.4	5.6±0.3	5.7±0.5	5.7±0.4	5.7±0.4	5.7±0.4	5.8±0.3
	10+	6.1±0.4	6.0±0.4	6.1±0.4	6.4±0.4	5.9±0.3	6.1±0.4	6.0±0.3	5.9±0.2	6.0±0.5	5.6±0.3	6.0±0.4	5.9±0.3	5.9±0.5	6.0±0.5	5.6±0.3	6.4±0.4
	11+	6.1±0.4	6.0±0.3	6.1±0.3	6.4±0.4	6.2±0.5	6.3±0.5	6.0±0.5	6.1±0.4	6.2±03	6.0±0.4	5.9±0.3	6.1±0.4	6.0±0.3	5.9±0.7	5.6±0.4	6.4±0.2
	12+	6.2±0.6	6.2±0.4	6.2±0.5	6.5±0.4	6.2±0.9	6.3±0.8	6.1±0.4	6.4±0.6	5.9±0.6	6.1±0.5	6.1±0.4	6.0±0.4	6.2±0.4	6.1±0.4	5.9±0.6	6.2±0.3
	13+	6.2±0.4	6.3±0.5	6.2±0.4	6.3±0.6	6.4±0.4	6.4±0.5	6.3±0.3	6.4±0.5	6.2±0.4	6.2±0.5	6.3±0.4	6.2±0.4	6.3±0.4	6.4±0.4	6.3±0.4	6.4±0.4
	14+	6.5±03	6.5±0.6	6.5±0.5	6.8±0.4	6.7±0.4	6.7±0.4	6.3±0.4	6.3±0.5	6.2±0.3	6.2±0.4	6.3±0.4	6.5±0.6	6.5±0.4	6.5±0.3	6.3±0.5	6.7±0.3
	15+	6.8±0.4	6.6±0.4	6.7±0.4	6.6±0.5	7.0±0.5	6.8±0.5	6.5±0.8	6.3±0.4	6.4±0.4	6.4±0.5	6.6±0.5	6.7±0.5	6.5±0.8	6.4±0.5	6.7±0.7	5.9±0.2
	16+	6.8±0.9	7.0±0.7	6.9±0.8	7.0±0.5	6.8±0.7	6.9±0.6	6.7±0.5	7.0±0.5	6.7±0.4	6.5±0.4	6.6±0.4	6.7±0.4	6.7±0.4	6.7±0.4	6.4±0.4	6.7±0.5
	17+	7.0±0.4	6.8±0.5	6.9±0.5	7.1±0.3	7.0±0.6	7.1±0.6	6.8±0.2	6.8±0.4	6.6±0.5	6.6±0.5	6.8±0.3	6.7±0.4	6.8±0.3	6.7±0.5	6.4±0.4	6.8±0.5
	18+	7.0±0.5	6.9±0.4	6.9±0.5	7.2±0.4	7.2±0.4	7.2±0.4	6.6±0.4	6.9±0.7	6.8±0.3	6.9±0.4	6.8±0.3	6.8±0.5	6.8±0.3	6.7±0.5	6.3±0.8	7.2±0.3
	19+	6.8±0.3	6.9±0.5	6.8±0.4	7.0±0.4	7.1±0.4	7.1±0.4	6.9±0.5	6.9±0.4	6.6±0.3	6.9±0.2	6.8±0.5	6.7±0.5	6.8±0.4	7.0±0.4	6.3±0.5	7.0±0.5
	20+	7.3±0.5	7.1±0.5	7.2±0.5	7.6±0.6	7.2±0.5	7.4±0.6	7.1±0.7	7.1±0.5	6.8±0.6	6.8±0.5	6.9±0.5	6.9±0.5	6.9±0.5	6.9±0.5	6.9±0.5	7.0±0.4
29. Morphological Upper Facial Height (MUFHT) in cm																	
	8+	5.3±0.3	5.3±0.5	5.3±0.4	5.5±0.4	5.2±0.5	5.4±0.5	5.0±0.4	5.1±0.5	5.2±0.4	5.0±0.5	5.0±0.3	5.2±0.4	5.2±0.4	5.2±0.4	5.2±0.3	5.1±0.3
	9+	5.2±0.4	5.4±0.4	5.3±0.4	5.5±0.4	5.5±0.4	5.5±0.4	5.3±0.3	5.4±0.4	5.3±0.3	5.2±0.4	4.9±0.3	5.0±0.4	5.2±0.4	5.1±0.6	5.1±0.4	5.3±0.2
	10+	5.5±0.4	5.5±0.4	5.5±0.4	5.8±0.4	5.4±0.3	5.5±0.4	5.3±0.4	5.3±0.3	5.3±0.5	5.1±0.3	5.4±0.4	5.3±0.3	5.3±0.5	5.4±0.4	5.1±0.3	5.9±0.5
	11+	5.5±0.4	5.3±0.3	5.4±0.3	5.8±0.4	5.6±0.4	5.7±0.4	5.4±0.5	5.5±0.4	5.5±0.3	5.4±0.5	5.2±0.4	5.4±0.5	5.3±0.4	5.4±0.4	5.0±0.4	5.9±0.3
	12+	5.4±0.7	5.6±0.4	5.5±0.6	5.8±0.3	5.7±0.4	5.7±0.4	5.4±0.4	5.8±0.6	5.4±0.3	5.5±0.5	5.6±0.4	5.4±0.5	5.5±0.4	5.4±0.3	5.2±0.6	5.5±0.2
	13+	5.8±0.6	5.6±0.4	5.7±0.5	5.6±0.6	5.8±0.4	5.7±0.4	5.5±0.4	5.8±0.5	5.6±0.4	5.5±0.7	5.7±0.4	5.6±0.4	5.6±0.4	5.6±0.4	5.7±0.6	5.7±0.6
	14+	5.8±0.3	5.8±0.6	5.8±0.5	6.0±0.4	6.1±0.4	6.1±0.4	5.7±0.4	5.7±0.5	5.6±0.3	5.5±0.4	5.7±0.5	5.8±0.6	5.7±0.5	5.9±0.4	5.6±0.6	6.1±0.3
	15+	6.1±0.4	6.0±0.3	6.0±0.4	5.9±0.4	6.3±0.4	6.1±0.4	5.8±0.7	5.7±0.5	5.8±0.4	5.8±0.5	5.9±0.4	6.0±0.4	5.9±0.4	5.8±0.4	6.0±0.8	5.2±0.2

Table 3: Contd...

S. No.	Measurement Age (in Yrs.)	Population Groups: Lepchas – North Sikkim	Lepchas – Rest Sikkim	Lepchas – Lepchas Total	Bhutias – North Sikkim	Bhutias – Rest Sikkim	Bhutias – Bhutias Total	Sherpas	Tamangs	Brahmans	Chhetris	Pradhans	Rais	Limboos/ Subbas	Gurungs	Mangars	Scheduled Castes
		Mean±S.D.	Mean±S.D.	Mean±S.D.	Mean±S.D.	Mean±S.D.	Mean±S.D.	Mean±S.D.	Mean±S.D.	Mean±S.D.	Mean±S.D.	Mean±S.D.	Mean±S.D.	Mean±S.D.	Mean±S.D. M	ean±S.D.	Mean±S.D.
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
	16+	6.3±0.4	6.3±0.6	6.3±0.5	6.4±0.5	6.3±0.7	6.3±0.6	5.9±0.4	6.2±0.5	6.0±0.4	5.9±0.4	5.9±0.4	6.0±0.5	6.0±0.3	6.0±0.4	5.7±0.4	6.1±0.5
	17+	6.3±0.3	6.0±0.5	6.2±0.4	6.5±0.3	6.5±0.5	6.5±0.4	6.1±0.3	6.1±0.3	5.9±0.4	5.9±0.5	6.1±0.3	5.9±0.3	6.1±0.4	6.0±0.5	5.7±0.4	6.1±0.4
	18+	6.3±0.5	6.1±0.5	6.2±0.5	6.6±0.4	6.5±0.4	6.5±0.4	6.0±0.4	6.2±0.4	6.1±0.3	6.2±0.5	6.1±0.4	6.1±0.5	6.0±0.3	6.0±0.4	5.7±0.8	6.5±0.3
	19+	6.2±0.4	6.2±0.6	6.2±0.5	6.4±0.4	6.4±0.3	6.4±0.4	6.2±0.5	6.3±0.4	5.8±0.3	6.2±0.3	6.1±0.4	6.0±0.4	6.0±0.4	6.3±0.5	5.7±0.4	6.4±0.4
	20+	6.7±0.5	6.5±0.5	6.6±0.5	6.9±0.5	6.5±0.5	6.7±0.6	6.5±0.5	6.4±0.4	6.1±0.6	6.1±0.5	6.2±0.4	6.2±0.5	6.2±0.5	6.3±0.4	6.2±0.4	6.4±0.4
(f) Skinfold Measurements																	
30. Skinfold at Biceps (Sk Bi) in mm																	
	8+	2.72±1.7	2.92±0.8	2.81±1.4	2.72±0.9	3.23±1.3	3.00±1.1	2.61±1.3	3.08±2.3	2.34±1.2	2.44±1.3	3.07±1.2	3.23±1.5	2.57±1.3	2.88±1.4	2.62±1.4	2.40± 0.7
	9+	2.47±0.9	2.62±0.9	2.53±0.9	2.73±0.9	3.60±1.3	3.26±1.2	1.93±0.7	2.63±1.3	2.03±0.6	3.27±1.2	2.65±1.2	2.83±1.3	2.17±0.8	2.27±0.9	2.92±1.0	3.00± 2.0
	10+	2.15±0.9	3.46±2.7	2.67±1.9	3.36±1.3	3.12±1.2	3.21±1.2	1.92±0.9	3.21±1.0	2.19±1.0	2.78±1.0	2.73±1.0	3.21±1.4	2.15±1.0	2.71±1.0	2.68±1.3	2.30 ±0.3
	11+	2.09±0.8	3.58±1.8	2.71±1.5	2.69±1.3	3.13±1.6	2.95±1.5	2.10±0.8	2.61±0.9	3.50±2.2	2.92±1.2	3.36±1.6	2.73±1.2	2.52±1.1	3.17±1.3	2.33±0.9	2.30 ±0.4
	12+	2.10±0.9	3.32±2.4	2.75±1.9	3.18±1.1	3.54±1.3	3.41±1.2	2.43±1.7	3.45±2.1	2.84±2.0	3.50±1.7	2.91±0.9	2.97±1.4	2.38±1.6	2.91±1.8	3.25±2.3	2.90 ±1.0
	13+	2.65±1.2	3.09±2.2	2.88±1.9	3.11±1.6	3.83±1.7	3.53±1.7	2.45±1.2	3.18±1.8	2.16±1.1	2.69±1.0	3.45±2.3	2.95±1.5	2.23±0.8	2.70±1.0	3.00±0.0	2.70 ±0.8
	14+	3.00±2.6	2.92±1.4	2.95±1.9	3.00±1.2	3.50±1.3	3.31±1.3	1.91±0.8	2.93±1.0	2.02±0.7	2.80±1.0	2.95±1.1	2.58±0.8	3.04±1.9	3.27±1.5	3.85±2.4	2.08 ±0.5
	15+	2.38±0.6	4.00±2.1	3.17±1.7	2.53±0.7	3.27±1.4	2.95±1.2	1.95±0.5	3.33±1.2	2.21±0.9	3.47±1.6	3.41±1.7	2.54±0.8	2.82±1.4	2.90±0.9	2.71±2.1	3.80 ±1.3
	16+	2.40±0.9	3.04±1.1	2.69±1.0	2.58±0.8	3.88±1.8	3.36±1.6	2.37±1.4	2.90±1.0	2.27±0.6	3.29±2.3	3.06±0.9	3.02±1.1	2.64±1.0	2.95±1.2	2.18±0.6	2.50 ±0.6
	17+	3.08±1.5	2.50±0.9	2.79±1.2	2.46±0.7	3.29±1.3	3.01±1.2	2.29±0.6	3.09±0.9	2.64±0.8	2.43±0.6	2.77±1.2	2.65±1.0	2.83±0.9	2.92±1.0	2.25±0.5	2.30 ±1.0
	18+	2.85±1.2	2.91±1.4	2.88±1.3	2.43±0.7	3.02±2.0	2.74±1.6	2.38±0.8	2.23±0.7	2.61±1.0	2.54±0.6	2.8.0±0.5	3.54±2.1	2.56±0.7	2.82±0.8	3.50±1.4	2.3 0±1.0
	19+	2.59±1.2	2.55±0.8	2.58±1.0	2.24±0.6	2.80±±1.1	2.53±0.9	2.20±0.7	2.32±0.7	2.36±1.6	2.34±0.7	3.07±1.0	2.76±0.8	2.47±1.0	3.28±1.9	2.25±0.4	1.86±0.5
	20+	2.51±1.1	3.23±1.5	2.80±1.3	2.84±1.6	4.39±2.1	3.63±2.0	2.54±1.3	2.57±1.0	2.99±1.6	3.49±1.8	3.25±1.7	3.56±2.3	2.75±1.3	2.81±1.3	2.15±0.9	3.00 ±1.3
31. Skinfold at Triceps (Sk Ti) in mm																	
	8+	6.36±2.2	5.61±1.6	6.04±2.0	6.22±2.1	6.63±1.7	6.44±1.8	6.91±3.0	6.85±1.7	5.50±2.4	5.34±1.6	6.87±0.4	6.26±2.1	5.60±1.9	6.17±2.2	4.93±1.5	3.90± 1.9
	9+	6.03±2.1	6.29±1.8	6.13±2.0	6.12±1.5	7.45±2.1	6.92±2.0	5.41±1.8	5.75±1.9	4.57±1.4	5.79±2.0	6.00±3.0	6.19±1.6	4.92±1.4	5.78±1.5	5.92±2.4	4.40± 1.6
	10+	6.20±1.5	6.57±3.2	6.35±2.3	7.29±2.8	6.57±2.2	6.86±2.5	4.96±2.2	5.61±1.3	5.46±2.2	5.66±1.4	5.76±2.0	6.42±2.2	5.61±2.2	5.68±1.9	5.95±1.3	4.20 ±1.7
	11+	5.41±1.9	7.62±2.8	6.33±2.5	5.65±2.3	6.81±2.8	6.34±2.7	5.13±1.0	5.89±2.0	6.80±2.2	5.55±1.7	7.18±2.8	6.15±2.2	6.28±2.4	7.15±2.3	5.25±1.4	4.40 ±1.1
	12+	6.20±1.8	7.38±2.3	6.83±2.1	6.43±2.1	6.60±1.8	6.54±1.9	4.93±2.2	7.63±2.1	4.87±1.6	6.58±2.8	6.84±2.5	6.71±2.6	5.52±2.1	5.59±2.1	5.58±3.8	4.50 ±1.7
	13+	5.38±1.6	6.85±2.2	6.22±2.1	6.64±2.2	7.85±3.4	7.35±3.0	5.45±1.7	6.30±2.7	5.08±2.3	5.45±2.3	6.54±2.9	6.37±2.2	5.33±1.6	5.19±1.3	5.00±0.0	4.80 ±1.3
	14+	6.31±2.6	5.61±1.6	5.90±2.1	5.82±2.0	7.47±3.8	6.85±3.3	4.57±1.2	5.20±1.5	5.05±2.0	6.45±2.7	6.33±2.3	6.00±2.0	5.89±2.7	6.20±2.3	7.21±3.2	4.50 ±1.8
	15+	5.91±1.6	6.22±1.8	6.06±1.7	5.93±2.1	6.63±2.7	6.32±2.4	4.83±1.7	5.80±1.6	5.73±2.4	5.92±1.7	5.71±2.3	6..08±2.3	6.02±2.6	5.68±2.1	4.78±3.0	5.8 0±2.3
	16+	5.57±1.3	7.29±2.4	6.33±2.1	5.19±1.4	7.03±2.4	6.30±2.2	4.97±1.2	6.93±2.4	5.02±2.0	6.14±3.6	5.82±2.0	6.06±2.0	5.57±2.1	5.42±1.8	5.00±1.2	3.50 ±0.8
	17+	5.88±2.1	5.71±1.4	5.79±1.8	5.00±1.9	6.17±2.2	5.78±2.1	5.14±2.0	5.91±2.0	5.35±2.0	5.13±1.4	5.19±1.7	5.38±2.3	5.54±2.3	5.97±2.3	5.06±1.6	3.30 ±0.8
	18+	5.58±1.2	5.73±2.8	5.65±2.0	5.55±1.7	5.91±2.7	5.74±2.3	4.90±2.0	4.65±1.7	5.94±2.2	5.56±1.7	5.73±1.5	6.06±2.1	5.38±1.5	4.38±1.0	6.75±3.2	4.10 ±1.3
	19+	5.16±1.8	4.49±1.5	4.88±1.7	4.56±1.3	5.61±2.0	5.10±1.8	5.33±2.3	4.82±2.4	4.59±3.3	4.79±1.8	6.38±2.9	6.15±2.7	5.27±2.0	6.42±2.2	4.00±0.7	3.00 ±0.5
	20+	4.68±2.0	5.75±2.6	5.12±2.3	4.72±2.1	6.62±3.1	5.69±2.8	4.58±2.5	4.83±2.0	4.87±2.1	5.81±2.6	5.55±2.5	5.99±3.3	5.56±2.4	4.93±2.5	3.35±1.7	5.31 ±3.2

Table 3: Contd...

S. No.	Measurement Age (in Yrs.)	Population Groups: Lepchas – North Sikkim	Lepchas – Rest Sikkim	Lepchas – Lepchas Total	Bhutias – North Sikkim	Bhutias – Rest Sikkim	Bhutias – Bhutias Total	Sherpas	Tamangs	Brahmans	Chhetris	Pradhans	Rais	Limboos/ Subbas	Gurungs	Mangars	Scheduled Castes
		Mean±S.D.	Mean±S.D.	Mean±S.D.	Mean±S.D.	Mean±S.D.	Mean±S.D.	Mean±S.D.	Mean±S.D.	Mean±S.D.	Mean±S.D.	Mean±S.D.	Mean±S.D.	Mean±S.D.	Mean±S.D.	M ean±S.D.	Mean±S.D.
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
32. Forearm Skinfold-Radial (Sk FR) in mm																	
	8+	5.03±1.7	5.19±1.2	5.09±1.5	5.31±1.8	5.17±1.4	5.23±1.6	5.05±1.9	5.23±1.3	3.88±1.3	3.63±1.3	5.95±2.0	4.73±1.3	4.39±1.4	5.05±1.7	4.75±1.3	3.40± 1.3
	9+	5.08±1.8	5.75±2.4	5.35±2.1	4.38±0.9	5.75±1.6	5.21±1.5	4.05±1.2	4.34±2.1	3.73±1.3	4.79±1.2	5.03±2.5	4.23+±1.7	3.82±1.1	4.86±1.4	4.64±2.2	4.10±1.4
	10+	5.03±1.2	5.07±1.7	5.05±1.4	5.32±1.6	5.19±1.4	5.25±1.5	3.73±1.4	4.39±1.1	3.73±1.0	4.40±1.2	5.67±1.7	4.78±2.4	4.45±1.3	4.59±1.3	4.25±0.6	2.90 ±1.0
	11+	4.79±1.3	6.08±2.7	5.33±2.1	4.27±1.6	5.00±2.0	4.70±1.9	4.03±1.4	4.89±1.8	4.80±1.5	4.35±1.3	5.31±2.3	4.60±1.6	5.02±2.3	5.62±2.4	4.00±1.3	3.90 ±1.4
	12+	4.30±1.2	5.68±2.1	5.03±1.8	5.25±2.3	5.06±1.7	5.13±1.9	3.73±1.7	5.45±2.4	3.69±1.2	4.58±1.7	5.02±1.4	4.80±1.4	4.28±1.8	4.69±1.9	5.08±2.6	3.20 ±1.6
	13+	4.42±1.6	5.47±1.8	5.02±1.8	4.75±1.6	5.93±2.4	5.44±2.2	3.70±1.0	5.21±1.8	3.88±1.5	4.38±2.2	5.38±2.7	4.52±1.3	4.14±1.5	4.15±1.0	4.00±2.8	4.70 ±2.0
	14+	4.92±1.6	4.42±1.4	4.63±1.5	4.57±1.6	4.85±1.9	4.74±1.8	3.27±0.7	4.33±1.0	3.31±1.3	4.43±1.4	4.61±1.5	4.71±1.0	5.21±2.0	5.13±2.3	5.14±2.8	4.33 ±1.5
	15+	4.44±1.2	5.28±2.2	4.85±1.8	4.57±1.8	5.03±2.3	4.83±2.1	3.63±1.0	5.05±1.5	4.10±1.3	4.66±1.5	5.11±2.9	4.08±1.0	4.60±2.1	4.63±1.5	3.07±0.9	3.40 ±1.6
	16+	4.03±1.7	5.67±2.7	4.76±2.4	3.54±0.9	5.60±2.3	4.78±2.1	3.89±1.3	4.63±1.7	3.55±0.9	4.41±2.4	4.73±1.9	4.47±1.6	4.60±1.5	4.15±1.3	4.45±1.2	2.70 ±0.6
	17+	3.95±1.3	4.46±1.4	4.21±1.3	3.88±1.2	4.98±1.7	4.61±1.6	3.86±1.3	5.27±3.0	3.69±1.3	4.21±1.3	4.11±1.2	4.27±1.7	4.38±1.4	4.39±1.5	3.62±0.8	3.70 ±0.7
	18+	3.96±1.01	5.14±3.1	4.50±2.3	3.45±0.9	4.34±1.9	3.93±1.5	4.000±1.4	3.61±1.2	4.22±1.4	4.06±1.3	4.76±1.3	4.88±1.6	4.06±1.1	3.73±0.8	5.75±3.2	3.60±1.2
	19+	4.38±1.8	3.55±1.4	4.06±1.7	3.26±0.6	4.36±1.3	3.83±1.1	4.05±1.4	3.91±1.6	3.77±2.2	3.45±1.0	5.15±2.5	4.32±1.5	3.87±1.2	4.78±2.7	3.50±0.0	3.33 ±0.8
	20+	3.89±1.5	4.87±2.0	4.29±1.8	4.03±1.9	4.84±2.2	4.44±2.1	3.95±2.1	3.93±1.4	4.30±2.0	4.63±1.9	4.87±2.1	4.74±2.3	4.18±1.5	4.12±2.2	3.43±1.2	4.18 ±1.5
33. Forearm Skinfold-Ulnare (Sk FU) in mm																	
	8+	3.17±1.1	4.07±0.7	3.55±1.1	3.44±1.1	4.19±1.0	3.86±1.1	4.29±2.0	3.96±1.1	3.03±1.4	3.21±1.1	4.45±1.4	3.88±1.3	3.78±1.1	3.73±1.7	3.62±1.4	2.9.0 ±0.8
	9+	3.80±1.3	4.17±1.0	3.95±1.2	3.42±0.8	4.98±1.7	4.36±1.6	3.27±1.2	3.72±1.0	3.23±0.9	4.63±1.7	4.06±2.3	3.14±0.8	3.30+±1.0	3.16±1.2	3.00±1.0	3.50±1.0
	10+	3.50±1.0	4.15±2.4	3.76±1.7	4.14±1.5	4.45±1.3	4.33±1.4	3.02±1.1	3.95±1.4	3.19±1.0	3.59±1.1	3.97±1.7	3.83±1.5	3.34±1.1	3.87±1.1	4.06±1.2	3.10 ±1.2
	11+	3.41±1.4	4.87±2.3	4.02±1.9	3.65±1.1	4.60±1.9	4.22±1.7	3.15±1.0	3.53±1.2	4.40±1.3	4.05±1.6	4.05±1.6	3.86±1.5	3.52±1.4	4.27±1.4	3.00±1.4	3.20 ±0.8
	12+	3.30±0.8	4.88±2.2	4.14±1.9	4.17±1.5	4.18±1.5	4.18±1.5	3.18±1.5	4.30±2.1	2.90±1.1	3.86±1.6	4.21±1.6	4.00±1.7	3.16±1.5	3.23±1.4	3.16±1.4	3.40 ±1.6
	13+	3.38±1.2	3.71±1.2	3.57±1.2	4.04±1.4	5.33±1.5	4.79±1.6	2.58±1.0	3.95±1.5	2.97±1.2	3.80±2.0	4.72±3.3	3.15±1.1	2.97±1.1	3.30±1.0	3.50±0.7	3.10 ±0.7
	14+	3.85±1.5	3.44±1.4	3.61±1.4	3.71±1.4	3.78±1.5	3.76±1.4	2.48±0.8	3.30±1.1	2.71±1.0	3.43±1.5	3.38±1.1	3.44±1.0	3.41±1.6	3.72±1.9	3.35±1.8	3.91 ±1.0
	15+	2.85±0.9	3.72±1.5	3.27±1.3	3.33±1.4	3.56±1.4	3.47±1.3	2.50±0.7	3.68±1.0	3.10±1.0	3.87±1.5	3.73±2.3	3.21±0.9	3.20±1.3	3.47±1.2	2.64±1.1	3.20 ±1.0
	16+	3.30±0.8	3.50±1.3	3.39±1.0	2.88±0.7	3.78±1.3	3.42±1.2	2.61±0.8	3.87±2.1	2.90±0.7	3.47±1.9	3.32±1.2	3.22±1.2	3.18±1.0	3.37±1.0	2.95±0.7	2.60 ±1.1
	17+	2.91±0.7	2.75±0.9	2.83±0.8	2.96±1.1	3.60±1.4	3.39±1.3	2.70±1.1	3.64±1.7	2.95±1.3	3.08±1.1	2.66±0.9	2.63±0.7	3.23±1.1	3.44±1.2	2.68±0.9	2.00 ±0.4
	18+	3.08±0.8	3.54±1.7	3.29±1.3	2.82±0.8	3.14±1.1	2.99±1.0	2.81±1.0	2.73±0.9	2.90±0.9	2.79±0.7	3.42±2.1	3.26±1.0	2.97±1.0	3.55±2.3	3.50±2.1	2.40 ±0.7
	19+	2.47±0.7	2.50±0.3	2.48±0.8	2.44±0.8	2.89±0.8	2.57±0.8	3.00±0.9	2.73±1.0	2.49±0.8	2.70±0.8	3.34±1.5	2.93±0.7	2.87±0.9	3.21±1.0	3.25±0.4	2.16 ±0.7
	20+	2.77±1.0	2.96±1.2	2.84±1.1	2.94±1.8	3.66±1.8	3.31±1.8	2.61±1.0	2.59±1.0	2.81±1.2	2.87±1.0	2.80±1.1	3.15±1.6	2.64±0.9	2.78±1.2	2.45±0.9	2.81 ±1.2
34. Subscapular Skinfold (SK SS) in mm																	
	8+	6.11±1.8	5.61±1.7	5.90±1.7	6.00±1.6	5.75±1.4	5.86±1.5	5.66±1.7	5.77±1.7	5.80±2.4	5.00±1.7	6.35±2.1	5.45±1.4	5.02±1.8	5.38±1.6	5.62±1.6	5.50± 1.2
	9+	5.42±1.9	5.8±1.3	5.57±1.6	5.96±1.7	5.70±2.6	5.80±2.3	5.70±1.8	5.00±1.7	5.46±1.6	5.20±1.8	5.90±2.2	5.59±2.3	4.70±1.3	5.83±1.7	5.71±1.6	5.70±1.6
	10+	5.43±1.6	6.3±2.1	5.76±1.8	7.57±2.1	5.62±2.5	6.40±2.5	5.77±2.1	5.71±1.6	5.96±2.8	5.64±2.1	6.00±1.5	5.76±1.9	5.45±2.0	5.68±1.4	5.81±1.6	6.00±3.1
	11+	6.38±2.8	7.3±2.0	6.78±2.5	6.54±2.1	5.24±1.6	5.77±1.9	5.78±1.6	6.36±1.5	5.25±2.1	4.90±1.6	5.86±2.0	5.81±2.8	5.76±2.1	5.90±1.4	4.33±0.8	5.10±0.5
	12+	6.77±2.1	6.26±2.4	6.50±2.2	7.71±1.8	5.58±1.6	6.37±2.0	5.48±1.9	6.00±2.0	4.96±1.8	5.50±1.9	6.18±2.2	5.88±2.0	6.52±2.9	6.09±1.1	4.83±1.6	6.10 ±1.6

Table 3: Contd...

S. No.	Age (in Yrs.)	Lepchas			Bhutias			Sherpas	Tamangs	Brahmans	Chhetris	Pradhans	Rais	Limboos/ Subbas	Gurungs	Mangars	Scheduled Castes
		North Sikkim	Rest Sikkim	Lepchas Total	North Sikkim	Rest Sikkim	Bhutias Total										
		Mean±S.D.	Mean±S.D.	Mean±S.D.	Mean±S.D.	Mean±S.D.	Mean±S.D.	Mean±S.D.	Mean±S.D.	Mean±S.D.	Mean±S.D.	Mean±S.D.	Mean±S.D.	Mean±S.D.	Mean±S.D. M	ean±S.D.	Mean±S.D.
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
	13+	6.27±2.0	6.29±1.0	6.28±1.5	6.89±1.5	6.70±2.8	6.78±2.3	5.48±1.1	6.08±2.2	6.02±1.7	5.61±1.9	7.72±4.7	6.37±2.5	6.23±1.8	6.60±1.6	6.50±0.7	5.40 ±1.8
	14+	7.00±2.5	6.56±1.8	6.74±2.1	6.75±1.2	7.37±2.1	7.14±1.8	5.57±1.5	6.90±2.0	5.47±1.8	6.17±2.6	7.02±1.9	6.28±1.7	6.47±2.3	6.52±1.5	6.85±1.2	7.08 ±0.7
	15+	7.03±1.7	8.22±2.9	7.61±2.4	7.07±2.0	7.07±1.9	7.07±1.9	6.40±1.9	7.28±3.0	6.36±2.6	6.64±2.1	7.97±3.3	6.71±1.9	7.40±2.4	7.22±1.6	7.21±1.2	7.90 ±2.0
	16+	7.40±1.3	8.83±3.8	8.07±2.7	8.76±3.8	7.65±2.1	8.09±2.9	6.16±1.9	7.13±1.6	7.70±2.1	7.87±3.8	8.10±2.9	7.62±2.3	7.93±2.7	7.62±1.8	7.13±2.2	7.80 ±2.3
	17+	8.29±1.4	8.04±1.5	8..17±1.5	7.38±1.7	7.77±2.3	7.64±2.1	7.50±1.8	7.64±2.4	8.76±2.7	4.47±1.7	8.58±2.5	7.94±2.6	7.83±2.6	9.28±3.2	9.18±2.6	10. 3±1.8
	18+	7.69±1.5	9.09±2.9	8.33±2.3	9.40±2.2	9.26±3.4	9.33±29	8.24±3.0	7.04±1.5	8.58±3.4	8.52±2.5	8.92±2.0	8.86±2.5	8.52±2.3	8.64±3.0	10.0±0.0	9.80±1.9
	19+	8.38±1.7	8.15±3.2	8.29±2.4	8.70±1.8	8.47±2.6	8.58±2.2	8.40±2.3	7.41±1.7	9.04±4.3	8.64±2.3	8.80±2.3	9.91±4.0	9.00±1.8	9.46±3.7	8.50±0.7	8.83 ±2.3
	20+	9.48±3.3	10.2±3.4	9.78±3.3	10.86±4.4	10.08±3.9	10.46±4.2	9.70±4.6	10.2±4.1	9.81±4.6	10.38±4.5	11.54±5.2	9.99±3.9	9.84±3.4	9.24±4.0	6.98±2.1	12.04±5.6
B. Physiological Measurements																	
35. Pulse Rate (PR)																	
	8+	80.0±8.4	78.5±6.8	79.4±7.7	77.0±7.5	80.0±10.1	78.7±9.1	79.8±7.7	81.0±8.5	75.1±6.6	81.5±10.6	78.4±7.5	81.0±7.7	80.6±7.3	78.8±8.0	80.0±7.7	73.6±2.2
	9+	78.9±9.1	76.3±6.0	77.9±8.0	77.5±4.8	76.0±6.7	76.6±6.0	77.6±6.6	79.5±10.0	76.3±6.4	80.6±9.1	78.0±7.3	74.8±14.0	81.2±7.2	77.6±7.2	83.4±11.6	75.2±3.3
	10+	78.2±6.9	75.4±7.6	77.1±7.2	78.0±7.0	80.0±6.9	79.2±6.9	81.0±7.0	80.2±7.6	79.4±6.7	80.6±7.6	79.5±6.5	81.9±7.9	80.2±7.9	79.5±10.8	79.0±10.2	73.6±2.2
	11+	76.2±5.6	76.0±3.4	76.1±4.7	78.2±6.9	76.0±5.2	76.9±5.9	81.8±6.9	79.3±7.2	78.0±7.6	79.4±7.8	76.8±6.5	80.8±8.8	77.7±6.4	77.4±5.8	88.0±9.1	78.4 ±14.3
	12+	79.2±8.3	83.1±7.6	81.3±8.0	75.7±3.7	81.7±7.8	79.5±7.2	81.8±8.2	85.2±9.2	75.3±7.3	80.9±7.2	82.5±7.6	83.2±8.9	80.2±9.1	77.7±6.3	88.7±8.2	75.2 ±3.3
	13+	74.8±3.4	78.6±5.7	76.9±5.1	76.9±8.5	81.2±8.8	79.4±8.8	80.4±7.7	78.5±8.6	78.4±8.7	80.4±8.8	81.5±8.3	81.4±7.3	79.6±5.0	80.4±8.8	70.0±8.5	75.2 ±3.3
	14+	75.6±3.5	76.7±5.5	76.3±4.7	78.9±8.7	82.7±9.5	81.2±9.2	80.7±6.3	82.6±9.0	77.9±5.7	81.4±10.8	83.3±8.9	81.2±7.9	79.3±8.3	78.2±6.5	84.6±12.1	72.0±5.1
	15+	75.8±4.6	78.0±8.4	76.9±6.7	76.0±5.9	80.4±8.3	78.5±7.6	79.2±7.2	80.8±8.3	82.5±7.9	78.9±8.0	81.4±9.6	77.9±7.8	76.6±8.5	79.6±8.6	82.3±12.6	76.0±6.9
	16+	78.7±9.3	82.7±7.9	80.4±8.8	80.3±6.4	84.6±10.0	82.9±8.9	76.2±6.3	78.1±9.2	78.4±6.5	80.2±10.8	79.8±8.6	79.3±9.0	76.8±7.4	75.6±4.9	81.5±9.0	75.2±4.4
	17+	73.3±5.2	80.0±9.2	76.7±8.1	79.7±10.0	80.5±9.5	80.2±9.5	78.2±7.5	76.4±6.3	75.2±6.5	76.7±8.9	79.1±6.5	76.9±7.5	79.0±8.8	77.1±6.1	73.5±6.0	72. 0±5.7
	18+	80.3±12.3	76.7±6.9	78.7±10.1	77.4±6.7	77.0±5.0	77.0±5.8	78.9±8.4	77.2±6.0	79.3±9.1	76.7±6.9	75.1±7.0	79.2±9.9	76.5±6.0	79.1±7.1	84.0±17.0	74.4±2.2
	19+	76.5±5.6	80.8±9.2	78.2±7.4	76.0±4.9	81.1±7.5	78.6±6.8	74.5±9.0	78.2±7.5	74.5±9.8	78.7±9.7	77.5±6.4	77.3±5.6	74.8±7.9	75.4±4.9	102.0±8.5	73.3±4.1
	20+	74.6±7.3	79.0±7.8	76.4±7.8	75.4±5.2	79.6±7.5	77.6±6.8	77.9±6.2	78.0±8.4	79.0±8.3	76.8±7.5	79.4±6.8	77.6±8.0	78.7±7.0	79.0±7.6	84.6±9.9	76.7 ±5.3
36. Buccal Temperature (BT) in ^0F																	
	8+	98.6±0.5	98.3±0.5	98.5±0.5	98.9±0.7	93.7±2.2	96.0±1.6	97.9±0.6	98.5±0.6	98.6±0.5	98.7±0.7	98.4±0.4	98.7±0.7	98.3±0.8	98.2±0.6	98.5±1.0	98.5± 0.3
	9+	98.6±0.5	98.4±0.6	98.5±0.5	98.8±0.7	98.4±0.6	98.6±0.6	97.8±0.5	98.6±0.5	98.5±0.6	98.8±0.5	98.6±0.7	98.3±0.5	98.1±0.7	98.2±0.5	98.6±0.7	98.4± 0.2
	10+	98.5±0.3	98.8±0.8	98.6±0.6	98.6±0.5	98.6±0.4	98.6±0.4	97.7±0.6	98.5±0.5	98.6±0.4	98.5±0.7	98.6±0.7	98.6±0.7	97.9±0.8	98.4±0.4	99.0±1.4	98.5 ±0.2
	11+	98.7±0.6	98.2±0.5	98.5±0.6	98.3±0.4	98.5±0.6	98.4±0.5	97.7±0.8	98.5±0.6	98.1±0.7	98.5±0.5	98.3±1.1	98.2±1.0	98.3±0.7	98.1±0.6	98.7±0.5	98.4 ±0.2
	12+	98.3±0.4	98.3±0.6	98.3±0.5	98.1±0.3	98.9±0.5	98.5±0.6	97.7±0.8	98.8±0.7	98.1±0.6	98.8±0.5	98.2±0.8	98.3±0.5	98.0±1.0	98.2±0.7	98.5±0.6	98.7 ±0.3
	13+	98.6±0.7	98.0±0.7	98.2±0.8	98.6±0.6	98.6±0.5	98.6±0.6	97.8±0.5	98.6±0.7	98.1±0.8	98.5±0.8	93.0±22.5	98.1±0.6	98.3±0.7	98.5±0.8	98.1±0.1	98.7±0.3
	14+	93.6±1.7	98.1±0.8	96.2±1.1	98.4±0.6	98.4±0.3	98.4±0.5	97.4±0.7	98.1±0.5	98.0±0.9	98.8±0.6	97.9±0.7	98.2±0.7	97.9±1.0	98.5±0.5	98.1±0.6	98.3 ±0.3
	15+	98.5±0.6	98.4±0.9	98.5±0.8	98.2±0.5	98.4±0.8	98.3±0.6	97.6±0.8	98.4±0.8	97.9±0.9	98.2±0.7	98.0±0.7	97.9±0.1	97.7±0.9	98.1±0.5	98.1±0.3	98.4 ±0.1
	16+	98.2±0.5	98.5±0.7	98.3±0.6	98.2±0.6	98.6±0.7	98.4±0.7	97.7±1.0	97.9±0.6	98.0±0.5	98.4±1.0	98.1±0.6	97.9±0.1	97.7±0.5	98.3±0.7	98.3±1.4	98.1 ±0.3
	17+	98.3±0.6	98.3±0.7	98.3±0.6	98.3±0.3	98.4±0.7	98.3±0.5	92.7±0.6	98.3±0.7	97.9±0.5	98.1±0.8	98.0±0.7	98.2±0.2	98.3±1.1	98.1±0.5	97.8±0.3	98.2 ±0.3

Table 3: Contd...

S. No.	Measurement Age (in Yrs.)	Population Groups: Lepchas – North Sikkim	Lepchas – Rest Sikkim	Lepchas – Lepchas Total	Bhutias – North Sikkim	Bhutias – Rest Sikkim	Bhutias – Bhutias Total	Sherpas	Tamangs	Brahmans	Chhetris	Pradhans	Rais	Limboos/ Subbas	Gurungs	Mangars	Scheduled Castes
		Mean±S.D.	Mean±S.D.	Mean±S.D.	Mean±S.D.	Mean±S.D.	Mean±S.D.	Mean±S.D.	Mean±S.D.	Mean±S.D.	Mean±S.D.	Mean±S.D.	Mean±S.D.	Mean±S.D.	Mean±S.D.	ean±S.D.	Mean±S.D.
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
	18+	98.1±0.6	98.3±0.6	98.2±0.6	98.1±0.3	98.2±0.9	98.1±0.7	97.9±0.6	98.2±0.6	98.3±0.7	98.2±0.6	98.0±0.6	98.2±0.2	97.9±0.8	98.1±0.4	98.3±0.4	97.9 ±0.2
	19+	98.2±0.4	98.2±0.2	98.2±0.3	98.0±0.3	98.1±0.6	98.1±0.5	97.7±0.5	98.2±0.5	98.5±0.7	98.1±0.4	98.3±0.6	97.9±0.1	98.0±0.5	97.9±0.5	98.1±1.0	98.5 ±0.6
	20+	98.2±0.7	98.3±0.4	98.3±0.6	98.2±0.5	98.1±0.6	98.2±0.5	97.6±0.4	98.2±0.5	97.9±0.5	98.0±0.7	98.1±0.5	97.9±0.1	98.2±0.5	98.0±0.7	98.0±0.8	98.4 ±0.3
37. Diastolic Blood Pressure (DBP)																	
	8+	43.6±7.3	40.2±5.1	42.1±6.6	43.4±6.0	41.1±7.3	42.1±6.8	39.6±4.7	40.8±6.3	45.4±4.3	40.3±6.8	41.8±6.2	38.6±7.8	41.3±6.9	39.4±5.1	37.3±8.8	46.0± 4.0
	9+	47.6±11.2	45.2±13.3	46.6±11.9	38.8±6.3	43.2±8.9	41.5±8.2	39.0±5.8	43.5±10.6	44.6±6.9	39.5±5.2	44.6±12.5	40.3±7.2	38.7±7.3	38.9±3.9	41.7±7.8	44.4±4.6
	10+	48.5±8.2	49.4±15.7	48.9±11.5	47.4±8.2	41.0±6.7	43.6±7.8	44.9±9.8	41.3±8.2	46.2±9.3	41.5±4.8	39.8±15.9	43.2±6.0	42.2±7.8	41.6±5.8	44.3±9.6	51.2±4.4
	11+	49.3±9.6	42.8±4.9	46.6±8.5	43.9±4.8	50.5±11.9	47.8±10.1	43.8±6.2	43.6±6.6	45.0±14.7	39.7±8.3	44.4±5.8	48.1±11.4	46.2±6.5	44.1±12.1	37.0±4.1	46.0±4.0
	12+	50.4±4.4	44.4±6.6	47.2±6.5	50.0±11.2	46.3±11.2	47.6±11.2	46.4±9.7	46.8±8.0	47.6±11.3	45.6±11.4	45.7±7.2	48.1±9.8	46.8±10.1	47.2±7.9	45.3±8.7	47.2±4.6
	13+	57.5±9.5	48.4±8.0	52.3±9.7	52.6±11.9	48.9±8.9	50.4±10.3	52.2±10.7	47.6±9.5	49.4±9.3	45.9±13.9	45.9±9.7	45.2±12.8	44.9±9.2	53.7±10.9	55.0±21.2	44.4±4.3
	14+	53.7±9.9	52.1±13.6	52.8±12.0	57.4±11.3	53.5±12.5	55.0±12.0	51.7±10.8	50.7±9.2	49.5±14.1	45.0±8.5	55.5±11.8	56.6±12.1	55.2±14.3	52.8±13.2	52.9±9.5	63.0±11.8
	15+	63.8±11.9	53.6±14.0	58.9±13.7	56.9±12.4	53.7±10.1	55.1±11.1	54.3±10.0	55.4±16.1	55.5±12.6	53.8±12.0	60.1±9.1	55.0±11.2	59.3±10.2	52.0±6.2	48.5±6.5	68.4±9.8
	16+	67.2±8.0	60.3±8.6	64.2±8.8	59.2±8.4	56.5±14.5	57.6±12.4	57.4±9.3	58.5±11.4	63.3±6.9	56.8±11.6	63.5±8.9	60.1±11.2	59.8±10.7	61.9±10.1	63.3±12.2	68.4±13.0
	17+	67.5±9.2	63.0±10.0	65.3±9.7	63.7±11.0	62.6±10.9	62.9±10.8	61.9±10.0	54.7±10.4	63.9±12.4	56.3±9.2	64.1±11.8	62.1±11.1	61.3±13.2	61.7±10.4	54.5±7.2	76.0±29.6
	18+	64.5±8.3	70.4±9.6	67.2±9.2	68.7±11.5	62.7±8.8	65.5±10.5	64.1±8.7	68.0±15.0	62.2±7.7	58.5±11.3	62.9±11.0	59.0±8.7	64.6±9.2	61.5±9.8	60.0±0.0	79.6±22.7
	19+	64.3±9.4	70.4±14.4	66.6±11.7	72.4±11.0	63.3±11.2	67.7±11.8	66.2±10.2	61.1±12.6	66.7±8.8	65.1±9.0	69.7±6.7	60.0±13.0	69.5±9.5	64.1±8.5	66.0±8.5	75.7±12.9
	20+	76.7±11.9	77.8±14.7	77.1±13.1	78.4±11.1	65.2±12.7	71.6±13.6	73.1±10.7	69.5±11.0	62.3±9.2	63.4±12.0	72.1±11.8	63.8±9.0	66.0±10.7	65.8±11.9	66.1±9.7	73.6±6.9
38. Systolic Blood Pressure (SBP)																	
	8+	83.9±6.5	79.5±7.8	82.1±7.3	83.5±6.9	76.9±7.0	79.8±7.6	79.3±5.5	76.9±7.4	83.2±8.1	80.5±8.2	79.9±6.1	75.4±8.9	79.9±9.4	79.4±7.6	76.8±9.7	84.0± 3.2
	9+	86.1±9.5	80.2±7.2	83.7±9.0	80.3±6.3	83.5±9.7	82.2±8.5	80.4±6.5	79.8±11.1	84.5±7.5	77.1±8.2	75.6±13.0	81.4±9.3	79.6±8.1	78.9±4.8	81.4±6.1	84.8±5.8
	10+	88.6±7.8	88.2±11.2	88.4±9.1	87.3±6.8	82.9±9.1	84.6±8.5	86.0±8.9	80.6±10.2	85.7±9.0	80.5±6.8	80.7±6.4	84.0±8.7	87.3±10.6	84.4±5.9	85.5±11.6	90.8±5.9
	11+	88.4±8.1	83.7±5.2	87.0±7.5	87.2±5.1	92.8±14.1	90.6±11.5	87.0±8.9	85.3±8.8	86.2±15.1	78.7±9.6	85.4±10.2	89.5±11.8	88.4±5.8	86.2±11.1	75.3±9.3	87.2±5.2
	12+	90.4±5.6	86.0±7.6	88.1±7.0	89.1±8.9	87.0±9.4	87.8±9.2	90.0±11.1	88.0±8.3	87.6±10.0	84.9±12.2	86.9±9.2	88.3±9.7	90.6±13.2	89.2±8.3	81.3±7.8	86.8±4.1
	13+	98.3±10.4	89.8±9.0	93.5±10.4	94.4±11.2	90.3±9.5	92.0±10.3	93.3±10.9	90.6±7.9	92.1±11.0	87.4±15.7	88.4±11.3	86.1±10.7	86.1±10.0	93.8±11.7	98.0±17.0	86.8±5.2
	14+	93.7±10.6	99.9±16.9	95.0±14.5	99.7±13.3	94.3±12.4	96.3±12.9	95.1±10.8	91.6±9.5	87.8±13.6	85.0±9.8	96.9±11.9	95.6±14.4	98.1±13.7	92.5±13.1	95.7±10.4	102.7±11.8
	15+	103.9±11.5	96.1±12.9	100.1±12.6	97.5±13.4	95.8±10.1	96.5±11.5	96.2±11.0	97.9±16.6	95.3±12.1	96.2±12.2	101.9±10.2	97.2±11.3	103.5±11.3	95.2±7.8	94.0±12.2	107.2±10.1
	16+	108.1±9.3	101.2±8.0	105.0±9.3	103.8±10.0	97.8±13.3	100.2±12.3	99.6±12.0	100.5±10.5	106.2±8.4	95.8±10.8	107.6±7.5	100.8±10.2	103.7±11.4	104.0±10.4	106.2±15.7	110.4±14.8
	17+	109.2±10.4	107.0±11.9	108.1±11.0	106.2±11.7	103.7±11.1	104.5±11.2	105.3±11.9	97.6±11.3	105.4±13.4	100.9±10.4	107.7±11.6	106.3±12.8	103.5±14.0	105.2±10.6	98.0±6.0	120.4±30.3
	18+	108.3±10.3	110.9±8.3	109.5±9.3	108.6±11.6	106.0±7.7	107.2±9.7	108.1±7.6	110.0±16.8	104.1±9.3	100.9±10.5	106.3±13.1	102.1±9.7	105.9±9.5	106.7±11.0	108.0±2.8	124.8±29.2
	19+	106.6±9.8	113.8±18.1	109.4±13.7	116.1±12.4	104.0±10.5	109.9±12.9	113.5±11.1	102.4±12.9	109.6±10.7	108.0±11.8	110.5±7.7	101.7±10.9	113.1±10.0	108.7±10.4	111.0±15.6	116.7±13.4
	20+	121.0±15.1	120.7±16.9	120.9±15.8	121.0±14.3	107.0±11.5	113.8±14.7	116.1±12.6	111.2±12.1	105.4±10.3	103.4±11.2	113.4±12.0	106.0±10.2	107. 5±11.9	106.6±12.6	108.3±10.1	114.2±8.0
39. Vital Capacity (VC) in ml																	
	8+	1391.7± 358.2	1322.2± 540.8	1362.9± 435.2	114.4± 357.4	1490.0± 391.0	1287.8 412.5	976.1± 275.9	1242.5± 516.0	1407.3± 248.1	1253.42± 333.5	1248.1± 276.9	1231.4± 231.9	1169.7± 442.6	1211.38± 421.42	1544.2± 765.4	810.0

Table 3: Contd...

S. No.	Measurement Age (in Yrs.)	Population Groups															
		Lepchas			Bhutias			Sherpas	Tamangs	Brahmans	Chhetris	Pradhans	Rais	Limboos/ Subbas	Gurungs	Mangars	Scheduled Castes
		North Sikkim	Rest Sikkim	Lepchas Total	North Sikkim	Rest Sikkim	Bhutias Total										
		Mean±S.D.	Mean±S.D.	Mean±S.D.	Mean±S.D.	Mean±S.D.	Mean±S.D.	Mean±S.D.	Mean±S.D.	Mean±S.D.	Mean±S.D.	Mean±S.D.	Mean±S.D.	Mean±S.D.	Mean±S.D. M	ean±S.D.	Mean±S.D.
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
	9+	1283.7± 261.5	1444.4± 302.0	1341.1± 282.2	1333.2± 392.7	1559.3± 347.5	1451.2± 379.3	1437..9± 371.9	1482.7 334.7	1442.2 328.2	1440.2 227.2	1325.6 201.7	1240.7 356.8	1417.8 358.4	1155.64 282.8	1370.4 558.0	1160.3± 271.5
	10+	1408.9± 373.2	1698.7± 248.4	1498.8± 361.6	1814.6± 576.5	1511.0± 290.3	1657.2± 468.4	1529.2± 436.5	1450.9± 305.7	1542.7± 203.1	1429.4± 305.9	1534.3± 214.7	1697.8± 168.7	1438.0± 330.4	1582.4± 195.7	1652.1± 372.0	1285.5± 590.3
	11+	1669.9± 392.1	1570.1± 290.7	1635.4± 357.4	1718.1± 292.1	1852.1± 340.0	1782.4± 316.7	1858.0± 642.8	1731.1± 251.5	1684.8± 289.7	1470.3± 433.1	1790.9± 323.4	1903.8± 541.3	1542.6± 276.6	1738.1± 483.2	1393.5± 441.8	1650.8± 285.9
	12+	1675.7± 323.1	1851.2± 424.3	1745.9± 371.1	2070.3± 509.4	2046.2± 542.1	2058.3± 514.6	2112.7± 714.2	1908.6± 321.8	1828.0± 405.7	2091.4± 595.2	2039.4± 895.1	2034.4± 550.5	2074.2± 452.2	1822.0± 526.3	1968.5± 59.1	1735.0± 595.6
	13+	2420.9± 574.7	2147.8± 711.8	2284.3± 648.9	2076.2± 530.0	2098.6± 616.5	2086.9± 561.0	2091.6± 372.5	2072.0± 366.9	1944.0± 486.0	2115.2± 644.0	2041.1± 368.8	1911.3± 392.2	2282.0± 436.1	2025.2± 580.1	2250.6± 856.8	1554.4± 350.8
	14+	2164.1± 395.2	2645.0± 697.6	2429.5± 622.2	2453.7± 713.5	2814.1± 549.8	2669.9± 636.1	2496.4± 591.7	2429.6± 739.4	2153.3± 575.9	2274.4± 542.3	2540.5± 454.6	2475.6± 423.6	2726.5± 678.4	2676.4± 614.5	2547.9± 543.4	2495.2± 428.4
	15+	2646.20± 867.5	3156.2± 603.7	2854.0± 799.7	2711.2± 669.0	3047.6± 1037.0	2879.4± 874.4	2684.2± 614.2	2997.5± 597.5	2559.7± 515.0	2617.5± 675.8	3260.0± 769.0	2868.7± 638.2	2919.1± 800.1	3195.7± 815.8	2390.8± 724.0	2825.3± 549.5
	16+	3030.4± 731.1	3384.0± 557.1	3180.0± 674.8	3498.4± 897.4	3518.8± 930.6	3506.7± 888.9	2889.2± 924.1	3348.7± 390.6	3158.9± 384.3	3167.8± 537.8	3285.9± 530.3	3012.4± 554.5	3264.4± 675.0	3131.3± 622.0	3365.7± 791.6	2927.3± 831.8
	17+	3188.0± 950.3	3611.4± 1015.7	3419.0± 986.9	3679.2± 394.1	3761.0± 714.2	3727.0± 595.1	3314.1± 658.8	3085.3± 643.1	3364.0± 512.8	3387.3± 507.5	3487.3± 567.8	3344.9± 604.7	3628.6± 618.6	3599.7± 901.4	3219.0± 48.7	3460.2± 374.1
	18+	3724.7± 702.4	3358.8± 603.2	3549.7± 668.6	3618.8± 751.4	3738.5± 968.2	3677.1± 854.4	3532.5± 685.2	3514.5± 751.6	3307.3± 784.3	3427.7± 554.1	3658.2± 340.9	3488.3± 771.1	3808.2± 762.7	3339.0± 721.7	3363.5± 1062.5	3842.2± 661.7
	19+	3595.5± 436.9	3353.8± 907.4	3494.8± 669.0	4033.5± 783.4	3953.6± 562.4	3993.5± 672.7	3808.6± 568.5	3540.1± 698.6	3490.1± 315.3	3583.3± 633.2	3658.4± 553.2	3542.2± 474.2	3784.2± 473.1	3893.1± 547.0	2998.4± 227.2	3323.9± 387.4
	20+	3516.3± 756.8	3690.9± 614.5	3585.5± 705.3	3608.1± 834.3	3954.9± 665.4	3700.1± 804.0	3885.6± 840.3	3437.9± 565.8	3202.1± 709.4	3454.8± 807.7	3527.9± 700.5	3525.5± 525.1	3896.1± 552.2	3578.9± 631.9	3519.3± 677.7	3300.2± 638.5
40. Forced Capacity (FVC) in ml																	
	8+	1327.9± 319.4	1294.8± 571.2	1314.2± 432.1	1102.5± 308.7	1488.2± 420.71	1280.5± 407.3	1042.9± 285.3	1204.8± 526.1	1335.2± 272.1	1176.7± 342.5	1291.3± 278.5	1165.0± 277.9	1135.8± 388.9	1202.5± 449.2	1513.0± 787.1	978.8
	9+	1283.6± 275.7	1434.5± 287.2	1337.5± 284.2	1336.3± 390.3	1463.3± 377.7	1402.6± 380.5	1422.0± 465.8	1445.4± 325.2	1453.4± 354.9	1422.4± 178.0	1342.2± 212.6	1259.8± 417.2	1347.5± 378.8	1106.7± 247.8	1461.8± 551.4	1185.3± 259.7
	10+	1445.5± 376.2	1674.0± 196.8	1516.4± 344.5	1809.5± 509.3	1406.8± 292.7	1600.7± 452.3	1521.9± 506.7	1363.5± 374.9	1531.1± 200.9	1383.5± 369.4	1534.5± 230.3	1718.1± 151.9	1459.8± 359.3	1597.1± 293.4	1611.6± 375.1	1227.1± 554.8
	11+	1667.2± 375.7	1534.8± 336.2	1621.4± 361.5	1663.9± 363.6	1776.6± 418.1	1718.0± 386.7	1881.8± 583.8	1667.1± 212.5	1691.8± 342.6	1405.6± 482.4	1762.8± 296.1	1907.2± 551.9	1590.7± 307.1	1771.8± 541.5	1335.3± 479.1	1448.7± 619.4
	12+	1639.2± 364.7	188.0± 475.6	1738.8± 421.7	2047.9± 324.6	2090.0± 498.5	2009.0± 435.4	1980.5± 709.8	1898.7± 287.7	1856.4± 339.4	2127.5± 505.7	2024.8± 908.9	2003.3± 510.7	2027.2± 457.6	1820.1± 531.0	2000.8± 77.6	1810.8± 631.3

Table 3: Contd...

S. No.	Measurement Age (in Yrs.)	Population Groups: Lepchas – North Sikkim	Lepchas – Rest Sikkim	Lepchas – Lepchas Total	Bhutias – North Sikkim	Bhutias – Rest Sikkim	Bhutias – Bhutias Total	Sherpas	Tamangs	Brahmans	Chhetris	Pradhans	Rais	Limboos/ Subbas	Gurungs	Mangars	Scheduled Castes
		Mean±S.D.	Mean±S.D.	Mean±S.D.	Mean±S.D.	Mean±S.D.	Mean±S.D.	Mean±S.D.	Mean±S.D.	Mean±S.D.	Mean±S.D.	Mean±S.D.	Mean±S.D.	Mean±S.D.	Mean±S.D. M	ean±S.D.	Mean±S.D.
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
	13+	2423.7± 595.2	2172.1± 674.4	2297.9± 636.2	2082.5± 552.1	2017.7± 690.1	2051.4± 609.7	2044.2± 365.5	2053.2± 350.6	1953.0± 489.2	2104.1± 672.8	2082.4± 392.8	1902.6± 420.7	2351.4± 497.5	1994.1± 567.7	2194.2± 936.6	1728.0± 189.1
	14+	2149.9± 344.2	2736.3± 670.7	2473.4± 616.3	2421.1± 651.3	2724.7± 552.0	2603.2± 603.5	2470.6± 517.9	2333.2± 849.0	2162.9± 461.6	2244.1± 517.5	2605.7± 528.0	2434.1± 404.2	2739.5± 713.6	2723.6± 646.4	2513.3± 474.1	2587.9± 504.1
	15+	2621.8± 836.8	3013.99± 484.8	2781.6± 730.0	2703.9± 660.7	2814.9± 809.4	2759.4± 728.1	2695.4± 710.8	2961.3± 652.0	2587.6± 452.3	2633.9± 642.5	3337.9± 790.6	2911.5± 620.8	2881.9± 846.1	3178.9± 766.1	2466.5± 596.3	2710.7± 503.4
	16+	3049.3± 796.8	3319.8± 677.6	3163.8± 746.9	3481.2± 803.1	3493.6± 845.5	3486.3± 800.6	2782.7± 953.4	3418.4± 315.7	3265.5± 398.7	3186.4± 557.8	3330.1± 530.9	3092.2± 602.5	3241.1± 619.2	3153.6± 651.4	3450.6± 834.5	3197.1± 795.5
	17+	3173.2± 978.9	3496.5± 932.0	3349.5± 944.9	3715.0± 385.8	3886.2± 540.6	3815.4± 482.1	3407.3± 701.2	3087.1± 658.2	3459.5± 542.0	3442.3± 515.1	3595.9± 565.8	3395.5± 672.2	3703.2± 564.2	3770.8± 853.9	3189.5± 620.0	3210.6± 459.9
	18+	3767.6± 698.4	3320.6± 693.4	3506.3± 703.9	3636.5± 796.2	3917.8± 790.3	3773.6± 795.6	3465.4± 703.7	3563.6± 692.4	3333.2± 803.7	3479.7± 599.5	3690.6± 365.0	3552.0± 776.2	3688.5± 740.6	3468.8± 696.6	3265.0± 102.1	3850.4± 360.5
	19+	3551.6± 459.9	3375.9± 867.0	3478.8± 649.3	3911.1± 687.2	3901.0± 598.4	3906.1± 634.5	3776.5± 474.4	3426.3± 708.0	3541.7± 336.0	3703.2± 611.4	3821.4± 548.7	3587.8± 475.7	3792.5± 430.4	3978.6± 648.0	3030.3± 227.8	3200.5± 326.9
	20+	3491.3± 714.4	3517.6± 661.1	3501.8± 690.2	3549.8± 761.7	4083.0± 639.0	3691.1± 765.0	3891.8± 874.3	3516.1± 557.2	3217.8± 688.7	3453.9± 471.4	3531.9± 670.8	3542.5± 565.2	3966.8± 6331.5	3590.1± 705.2	3470.6± 649.3	3177.7± 633.2
41. Forced Expiratory Volume in one second ($F.E.V_1$) in ml																	
	8+	1144.2± 302.7	1142.7± 504.7	1143.3± 390.4	954.8± 282.0	1357.9± 407.9	1140.9± 395.6	891.6± 278.2	1095.5± 468.4	1177.9± 290.8	1047.8± 318.0	1153.1± 261.5	1012.1± 265.6	983.0± 370.6	1040.7± 426.5	1298.9± 787.1	843.8±
	9+	1162.4± 263.0	1253.8± 313.1	1195.0± 279.7	1090.0± 406.6	1298.8± 368.2	1198.9± 392.8	1275.6± 406.4	1276.3± 326.2	1273.9± 329.2	1262.7± 200.0	1214.5± 208.7	1127.7± 393.6	1170.9± 361.3	980.0± 244.9	1274.2± 544.7	843.1± 629.9
	10+	1276.0± 338.0	1484.0± 170.4	1340.5± 308.9	1604.5± 391.2	1226.5± 276.8	1408.5± 382.1	1380.0± 492.2	1270.5± 366.5	1381.7± 188.4	1300.1± 333.9	1267.9± 307.2	1569.4± 156.7	1297.2± 361.2	1460.9± 226.3	1443.9± 329.5	1146.2± 629.4
	11+	1516.8± 379.6	1333.7± 275.1	1453.4± 352.6	1477.3± 376.7	1599.8± 379.0	1536.1± 375.1	1672.9± 548.7	1491.9± 275.5	1470.8± 344.2	1287.2± 417.0	1501.1± 270.4	1733.9± 459.6	1421.0± 296.6	1532.6± 429.0	1149.5± 495.5	1305.5± 536.0
	12+	1409.0± 305.4	1670.2± 425.0	1513.5± 373.1	1782.6± 324.6	1851.8± 474.5	1817.2± 399.2	1643.3± 480.5	1621.3± 321.0	1644.7± 337.7	1858.7± 499.0	1819.8± 762.9	1735.3± 562.2	1832.9± 450.7	1618.3± 480.8	1826.8± 109.9	1667.7± 500.3
	13+	2087.6± 450.1	2010.5± 601.5	2049.1± 522.1	1685.8± 390.1	1793.0± 664.5	1737.3± 530.5	1764.3± 362.7	1896.2± 295.6	1719.2± 409.3	1871.5± 589.2	1853.4± 328.6	1715.9± 368.7	2067.4± 450.1	1736.3± 465.3	1975.7± 901.3	1589.5± 168.7
	14+	1841.0± 355.0	2493.0± 638.7	2200.7± 617.6	2007.1± 483.7	2439.0± 478.5	2266.3± 519.8	2214.6± 486.5	2065.8± 783.5	1873.1± 384.1	1965.0± 475.0	2225.5± 431.1	2158.1± 382.3	2358.9± 577.5	2501.3± 628.2	2326.2± 512.7	2292.9± 417.6
	15+	2191.5± 628.2	2700.1± 504.1	2398.7± 624.7	2361.0± 626.0	2484.9± 774.2	2423.0± 694.6	2365.1± 656.3	2563.4± 546.9	2275.4± 513.8	2437.4± 646.4	2858.4± 760.7	2459.6± 462.4	2567.7± 704.9	2688.5± 747.9	2238.1± 514.9	2376.9± 455.3
	16+	2611.6± 837.0	3027.5± 570.0	2787.5± 752.5	3038.4± 656.7	3042.5± 647.6	3040.1± 637.4	2344.5± 661.5	3080.9± 331.3	2894.7± 384.2	2855.6± 510.1	2912.3± 547.9	2658.0± 548.5	2809.2± 594.0	2894.9± 651.1	3070.3± 754.3	2657.4± 709.8

Table 3: Contd...

S. No.	Age (in Yrs.)	Population Groups: Lepchas – North Sikkim	Lepchas – Rest Sikkim	Lepchas – Lepchas Total	Bhutias – North Sikkim	Bhutias – Rest Sikkim	Bhutias – Bhutias Total	Sherpas	Tamangs	Brahmans	Chhetris	Pradhans	Rais	Limboos/ Subbas	Gurungs	Mangars	Scheduled Castes
		Mean±S.D.	Mean±S.D.	Mean±S.D.	Mean±S.D.	Mean±S.D.	Mean±S.D.	Mean±S.D.	Mean±S.D.	Mean±S.D.	Mean±S.D.	Mean±S.D.	Mean±S.D.	Mean±S.D.	Mean±S.D. M	ean±S.D.	Mean±S.D.
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
	17+	2602.6± 737.8	2994.2± 747.7	2816.2± 752.3	3143.3± 508.9	3473.4± 536.8	3336.8± 542.0	2882.6± 622.7	2872.3± 452.7	2912.8± 586.8	3033.4± 415.9	3005.3± 729.6	2775.6± 685.4	3103.3± 580.8	3105.0± 702.1	2639.0± 646.3	2775.7± 522.9
	18+	3164.6± 620.1	2878.3± 686.9	3027.7± 654.2	3014.7± 629.5	3394.8± 748.3	3199.8± 707.4	2968.1± 604.7	2892.4± 627.0	2851.0± 658.2	2994.0± 522.8	3111.2± 429.8	3088.5± 734.5	3180.2± 673.5	2914.5± 662.6	2828.3± 59.3	2872.0± 95.2
	19+	2877.0± 576.1	2707.2± 745.7	2806.3± 612.7	3143.9± 507.1	3339.4± 746.2	3241.7± 636.0	3141.6± 600.8	2972.6± 642.7	3199.7± 434.8	3183.2± 675.5	3326.1± 582.8	2973.3± 491.4	3046.4± 604.5	3263.9± 840.1	2708.9± 40.8	2732.9± 411.0
	20+	2909.4± 635.7	2738.2± 656.2	2841.3± 645.9	2997.3± 695.6	3421.8± 645.8	3109.8± 706.6	3042.6± 789.1	2877.7± 599.1	2670.7± 727.9	2990.9± 741.4	2932.2± 683.8	3011.5± 625.9	3392.0± 650.4	2915.2± 702.0	2990.4± 673.6	2529.4± 513.4
42. Maximum Breathing Capacity (MBC) in ml																	
	8+	48295.0± 12219.0	46607.3± 16410.0	47596.6± 13850.2	38981.9± 10961.0	55345.2± 14864.5	46534.2± 15129.4	38823.8± 10296.1	46171.8± 19008.3	49280.5± 12030.9	49183.6± 7833.7	46791.6± 9349.2	43897.3± 12168.5	41964.8± 12706.6	43259.6± 14253.0	50135.3± 25097.1	34171 .9±
	9+	45590.5± 16213.5	49964.8± 17296.0	47152.8± 14580.9	49096.4± 8847.9	55891.9± 11064.8	52641.9± 10432.9	50317.1± 15985.3	51134.7± 7208.8	48426.6± 11301.2	50874.6± 13300.0	44013.3± 5243.4	49815.1± 14768.0	50152.7± 12629.8	40123.6± 15044.8	59073.2± 22559.3	37301 .4± 9579.0
	10+	51970.7± 13123.0	60352.9± 6639.2	54572.0± 12042.7	65724.2± 19061.6	61275.8± 16556.9	63417.6± 17603.7	56957.4± 20283.7	53015.4± 20602.7	54128.9± 10377.1	53936.6± 14509.1	56858.3± 12827.7	63382.9± 13837.7	50887.2± 12980.4	54855.8± 10389.7	55115.0± 9403.2	3881 5.9± 13339.8
	11+	60325.4± 1688.6	52753.0± 15974.4	57704.2± 16664.3	60525.3± 14939.6	61851.0± 14739.0	61161.6± 14546.8	67716.8± 21601.0	59696.0± 14950.2	62871.4± 18735.5	55399.6± 16916.3	63870.0± 14357.0	67346.4± 19866.2	53722.8± 9337.0	56620.8± 22076.5	52883.7± 16929.4	5839 9.9± 4653.0
	12+	58379.6± 7242.1	67596.7± 22350.3	62066.5± 15465.0	67894.0± 15479.2	70413.9± 15581.9	69153.9± 15243.7	72729.6± 27326.7	64715.9± 11506.6	66621.9± 16699.9	75934.1± 25737.7	79217.1± 27638.0	70991.3± 22274.0	73335.4± 20811.4	65108.9± 19982.9	76080.9 11595.1	72579 .9± 22424.2
	13+	77974.4± 25184.4	73172.9± 24226.5	75573.6± 24334.3	66055.3± 19743.9	74868.8± 23788.5	70285.8± 21782.4	73494.5± 21096.6	72479.9± 18658.1	72155.9± 19281.2	77330.0± 21160.0	74335.8± 18238.3	65727.9± 15445.9	75777.7± 19659.5	69300.2± 21077.7	73167.8± 10594.1	6357 6.2± 2129.1
	14+	76713.3± 12141.3	104088.7± 33130.9	91816.9± 29037.4	89774.7± 26190.0	92877.6± 22033.0	90836.4± 23542.6	86880.2± 16939.0	90705.6± 29352.1	74470.7± 17355.7	81709.3 19567.5	90370.3± 18861.4	85062.4+± 14635.6	86254.7± 28597.9	93219.0± 22824.0	95171.6± 27334.1	90896.7± 15738.5
	15+	84019.4± 23104.6	97404.1± 31199.9	89472.4± 26968.3	91000.4± 22539.0	95334.1± 19768.3	93167.3± 20946.5	86706.4± 31056.2	96995.6± 7522.5	96469.3± 20191.6	94072.3± 25467.3	114265.3± 42743.3	88964.0± 18445.3	97608.9± 25702.1	100954.9± 29682.5	81110.9± 17097.5	100083.7± 27842.8
	16+	94454.7± 33096.3	124805.2± 25053.2	107295.3± 33140.6	106503.2± 25455.1	106578.6± 29135.8	106534.0± 26337.3	88897.0± 19927.9	111933.2± 5457.1	112709.7± 24888.5	100619.9± 23686.9	113433.8± 27077.4	104244.4± 31012.0	98002.4± 20417.8	103192.8± 20639.8	107763.0± 34274.2	95319.4± 16831.4
	17+	92717.7± 20721.7	99301.7± 28274.2	96309.0± 24780.0	126904.2± 24571.2	114577.7± 24266.6	119678.3± 24735.7	105488.1± 22218.6	106601.14± 7374.7	103443.2± 25116.9	99660.3± 29603.5	109305.5± 25136.2	95336.9± 26265.8	110817.5± 21398.7	112648.4± 26567.6	90120.1± 32634.2	116188.7± 20992.3
	18+	123338.2± 29798.7	106139.3± 27173.5	115112.6± 29270.6	109766.3± 27981.1	121857.9± 25760.5	115657.1± 27263.5	103754.8± 23132.5	96888.9± 6097.7	102688.5± 24908.2	104809.4± 23425.9	120203.9± 28248.8	107686.9± 23888.8	103496.4± 23641.3	98612.1± 19218.1	112774.7± 9588.9	124434.2± 22732.8
	19+	105677.4± 22913.7	102573.6± 35060.9	104384.1± 27932.4	116381.8± 29810.2	125210.8± 35679.0	120796.3± 32682.5	114059.4± 35304.2	111878.8± 4252.5	120078.4± 9445.0	121373.5± 23191.1	128472.6± 21511.2	112072.1± 20549.6	114862.7± 21894.0	128311. 4± 35251.7	123734.0± 31822.8	100410.5± 24042.5
	20+	101912.5± 27561.0	100539.7± 22009.6	101366.3± 25379.7	115190.8± 29115.4	107341.6± 28865.1	113110.3± 29082.7	107511.1± 25510.8	101963.8± 4037.6	102496.5± 20055.5	98903.8± 26331.8	110908.4± 30789.5	106490.9± 25816.0	107160.8± 22674.1	105474.3± 29324.2	122471.2± 26829.1	97480.8± 21988.3

Sherpas, Lepchas, N) at the age of 19+ years. The adolescent growth spurt showing more than one peak generally occurred between 9 to 17 years.

Among Hindu population groups, trunk breadths show a rise up to adult group with the mean values ranging for Transverse and Antero-posterior diameters of chest in 8+ years from 17.6 cm (Chhetris) to 19.6 cm (Scheduled Castes) and 13.0 cm (Chhetris) to 15.8 cm (Sceduled Castes), whereas in 20+ years age group, in these measurements the mean values varies from 24.7 cm (Mangars) to 25.9 cm (Pradhans) and 18.7 cm, (Chhetris) to 20.0 cm (Scheduled castes), respectively. These trunk measurements are nearly 66 to 79 per cent matured in early age groups. Velocity curves show adolescent spurt in between 11+ to 16+ years. Condylar breadths also show a rise up to adult group among Hindu populations. Nearly 65 to 72 per cent growth is attained in early age groups. The adolescent spurt ranges from 9+ to 15+ years, in general.

It has been observed that 8 year old Sherpas showed narrowest chests and Bhutias (N) the broadest and the chest dimensions increased gradually till adulthood when the broadest chest were displayed by Bhutias and Lepchas (Rest) and narrowest by Tamangs. In Hindu groups, Chhetris and Mangars displayed narrowest chest at 8 years as well as during adulthood and Pradhans and Scheduled castes showed the broadest chests.

(d) Girth Measurements

Girth measurements show a rise up to 20 years. Among Buddhist population groups the mean value of Head circumference, Chest circumference-normal and - at maximum inspiration and Upper arm girth 'relaxed' ranges from 50.0 cm (Sherpas) to 52.2 cm (Bhutias, N); 57.5 cm (Sherpas) to 62.0 cm (Lepchas, N); 61.1 cm (Sherpas) to 65.5 cm (Bhutias, N); 14.9 cm (Sherpas) to 15.7 cm (Bhutias, Rest) at 8+ years, whereas, in the 20+ years age group, for these measurements the mean values vaires from 55.4 cm (Tamangs) to 57.2 cm (Bhutias, N); 84.3 cm (Tamangs) to 81.0 cm (Bhutias, N); 88.8 cm (Tamangs) to 96.8 cm (Bhutias, N) and 22.3 cm (Sherpas) to 23.0 cm (Tamangs), respectively. The values of growth gradient in general ranges between 59 (Bhutias, N) to 92 per cent (Lepchas, N) at 8+ years, whereas from 91 (Bhutias, N) to 100 per cent (Tamangs) at 19+ years. Head circumference is showing maximum growth achieved at 8+ years which ranges from 88 (Sherpas) to 92 per cent (Lepcha, N) thus indicating an early but not complete maturation of this variable during early stages. After the age of 8+ years, the growth in Head circumference becomes slower. The adolescence growth spurt (maximum growth) has been observed between 13 to 19 years.

The Girth measurements among Hindu population groups show the mean values of Head circumference, Chest-normal, Chest-inspired and Upper arm girth 'relaxed' ranges from 50.3 cm (Gurungs) to 51.5 cm (Scheduled Castes), 57.6 cm Rais to 60.8 cm (Scheduled Castes), 60.7 cm (Chhhetris) to 64.9 cm (Scheduled Castes) and 14.1 cm (Mangars) to 16.0 cm (Scheduled Castes) at 8+ years age group whereas in 20+ years age group, in these measurements the mean vlaues varies from 54.5 cm (Rais) to 55.6 cm (Gurungs), 81.9 cm (Mangars) to 87.4 cm (Scheduled Castes), 86.4 cm (Chhetris) to 93.3 cm (Schduled Castes) and 21.9 cm (Mangars) to 23.4 cm (Scheduled Castes), respectively. Head circumference shows early maturation i.e., 90 to 93 per cent growth in 8+ and 9+ years age group whereas other girths showed only 61 to 74 per cent maturation in early age groups. The adolescent spurt ranges from 12+ to 18+ years, in general.

(e) Head and Face Measurements

Among Head and Face measurements, Head length, Head breadth, Minimum frontal breadth, Maximum bizygomatic breadth and Bigonial breadth are showing variation with age among the Buddhist population groups, the mean values fo Head length ranges from 17.2 cm (Lepchas, Rest) to 179.35 cm (Bhutias, Rest) at 8+ years, from 18.8 cm (Lepchas, N) to 20.9 cm (Bhutias, Rest) at 20+ years; Head breadth from 13.9 cm (Lepchas, N) to 15.1 cm (Bhutias, Rest) at 8+ years, from 14.3 cm (Bhutias, N) to 18.2 cm (Butias Rest) at 20+ years; Nasal height from 3.7 cm (Sherpa to 4.0 cm (Bhutias, N) at 8+ years, from 4.8 cm (Sherpas) to 5.2 cm (Bhutias, N) at 20+ years; Nasal breadth from 2.7 cm (Sherpa to 3.0 cm (Bhutias, Rest) at 8+ years, from 3.3 cm (Lepchas, N to Lepchas, Rest) at 20+ years; Physiognomic upper facial height from 5.6 cm (Tamangs) to 6.1 cm (Bhutias, N) at 8+ years. from 7.1 cm (Tamangs) to 7.6 cm (Bhutias, N) at 20+ years; and of Morphological upper facial height from 5.3 cm (Lepchas, N) to 5.5 cm (Bhutias, N) at

8+ years and from 6.4 cm (Tamangs) to 6.9 cm (Bhutias, N) at 20+ years. All the Head and Face measurements are showing early maturation, as revealed by 73 (Bhutias, Rest) to 97 per cent (Bhutias, N) of growth achieved at the age of 8 years. The growth achieved at 19+ years ranges from 77 (Bhutias, Rest) to 100 per cent (Bhutias, N). In general Head and Face Measurements show appearance of growth spurt between 14 to 19 years.

Among the Hindu population groups, the mean values of Head length, Head breadth, Nasal height and breadth, Physiognomic and Morphological upper facial heights in 8+ years of age group ranges from 16.7 cm (Mangars) to 17.9 cm (Rais); 3.6 cm (Limboos) to 8.9 cm (Scheduled Castes); 2.6 cm (Brahmans) to 2.8 cm (Scheduled Castes), 5.5 cm (Chhetris) to 5.9 cm (Brahmans) and 5.0 cm (Chhetris) to 5.2 cm (Brahmans and Rais), respectively, whereas in 20+ years age group for these measurements, the mean value varies from 18.2 cm (Mangars) to 21.1 cm (Chhetris; 14.1 cm (Scheduled Castes to 16.7 cm (Rais); 4.5 cm (Limboos to 5.6 cm (Scheduled Castes), 6.8 cm (Chhetris) to 7.0 cm (Scheduled Castes); 6.1 cm (Brahmans) to 63.4 (Scheduled Castes), respectively. All the Head and Face measurements show early maturation (75 to 94 per cent growth in 8+ years). Nearly 6 to 15 per cent growth of adult remains to be completed from 9+ to adult age group. The adolescent spurt among Hindu population groups ranges from 10+ to 15+ years.

(f) Skinfold Measurements

Skinfold at biceps, triceps, Forearn 'Radial' and Forearn 'Ulnar' are showing variation in growth among all the population groups studied. Among the Buddhist population groups the mean value of skinfold at Triceps ranges from 5.61 mm (Lepchas Rest) to 6.91 mm (Sherpas), from 4.58 mm (Sherpas) to 6.62 mm (Bhutias, Rest) and of Subscapular skinfold ranges from 5.61 mm (Lepchas, Rest) to 6.11 mm (Lepchas, N) and from 9.84 mm (Lepchas, N) to 10.86 mm (Bhutias, N) at 8+ and 20+ years, respectivaly. Skinfold at biceps, triceps, Forearm 'Radial' and Forearm 'Ulnar' show in general 100 per cent growth at 8+ years. Value of growth achieved at 8+ years for Subscapular skinfold ranges from 54 (Lepchas, Rest) to 64 per cent (Lepchas, N) and at 19+ years from 72 (Tamangs) to 88 per cent (Lepchas, N). In general, these measurements show late appearance of adolescence growth spurt particularly Subscapular skinfold, thus indicating depostiton of more fat during adulthood.

Among Hindu population groups the mean values of Skinfolds at tricpes and subscapular site in 8+ years ranges from 3.90 mm (Scheduled Castes) to 6.87 mm (Pradhans) and 5.00 mm (Chhetris) to 6.35 mm (Pradhans), respectively whereas in 20+ years age group, these vary from 3.55 mm (Mangars) to 5.49 mm (Rais) and 6.98 mm in Mangars to 12.04 mm (Scheduled caste), respectively. Subscapular skinfold gradually rises with age in all the population groups with 48 to 62 per cent growth in early age groups. Other skinfolds at Biceps, Triceps and Forearm show very slow increase with age. The adolescent spurt ranges from 10+ to 18+ years, in general.

(B) Physiological Measurements

(a) Pulse Rate, Buccal Temperature and Blood Pressures

Pulse rate shows variation in growth whereas, Buccal temperature is showing almost stationary values i.e., it is showing minimum changes with the age from 8 to 20 years. Among the Buddhist population groups Buccal temperature show 100 per cent growth at 8 years. Blood pressures are showing graudal rise from 8 to 20 years. Blood pressure shows 51 (Lepchas, Rest) to 71 per cent (Bhutias, Rest) growth at the age of 8 years, and 83 (Lepchas, N) to 97 per cent (Sherpas) at the age of 19 years. Pulse rate and Blood pressure show occurrence of adolescence growth spurt between 9 to 19 years, thus showing a wide range for the occurrence of adolescence growth spurt.

Pulse rate and Buccal temperature show very slow decrease in almost all the Hindu population groups. Velocity curves show the adolescent spurt in between 11+ to 18+ years, generally. Blood pressure shows a rise with age up to adult age groups. Blood pressure matures nearly 56 to 78 per cent in early age groups and the adolescent spurt in general is observed in between 13+ to 16+ years.

Among the Buddhist adult groups, the Pulse rate ranges from 74.63 beats/min (Lepchas, N) to 79.6 beats/min (Bhutias, Rest); Buccal temperature from 97.6^{0}F (Sherpas) to 98.3^{0}F (Lepchas, Rest); Diastolic blood pressure from 65.17 mm Hg (Bhutias, Rest) to 78.4 mm Hg (Bhutias, N) and Systolic blood pressure from 107.0 mm Hg

(Bhutias, Rest) to 121.0 mm Hg (Lepchas, N.), and among the Hindu adult groups the mean values of Pulse rate, Buccal temperature, D.B.P. and S.B.P. ranges from 76.5 beats/min (Chhetris) to 84.6 beats/min (Mangars); 97.8^{0}F (Brahmans) to 98.4^{0}F (Scheduled Castes); 62.3 mm Hg (Brahamans) to 73.6 mmHg (Scheduled Castes) and 103.4 mmHg (Chhetris) to 114.2 mmHg (Scheduled Castes), respectively.

(b) Respiratory Functions

Respiratory functions are showing gradual rise and it has been observed that among Buddhist population groups the Vital capacity ranges from 976.1 ml (Sherpas) to 1490.0 ml (Bhutias, Rest) at 8+ years, from 3437.84 ml (Tamangs) to 3954.9 ml (Bhutias, Rest) at 20+ years; Forced vital capacity from 1042.9 ml (Sherpas) to 1488.2 ml (Bhutias, Rest) at 8+ years, from 3491.8 ml (Lepchas, N) to 4083.0 ml (Bhutias, Rest) at 20+ years; Forced expiratory volume in one second from 891.6 ml (Sherpas) to 1357.9 ml (Bhutias, Rest) at 8+ years, from 2738.2 ml (Lepchas, Rest) to 3421.8 ml (Bhutias, Rest) at 20+ years; and of Maximum breathing capacity from 38823.8 ml/min (Sherpas) to 55345.2 ml (Bhutias, Rest) at 8+ years and from 106539.7 ml/min. (Lepchas, Rest) to 115490.8 ml/min (Bhutias, N) at 20+ years. Bhutias (Rest) are ahead of all other groups for all the respiratory functions. Growth achieved at 8+ years varies from 25 (Sherpas) to 51 per cent (Bhutias Rest) and at 19+ years from 90 (Lepchas, Rest) to 100 per cent (Bhutias, N). These variables show the range of maximum growth (occurrence of adolescence growth spurt) between 12 to 17 years.

The mean values of V.C., F.V.C., F.E.V_1, and M.B.C. in 8+ years age group ranges from 810 ml to 1544.2 ml, 978.8 ml to 1513.0 ml; 843.8 ml to 1298.9 ml and 34171.9 ml to 50135.30 ml in Scheduled Castes and Mangars, respectively, whereas in 20+ years age group, the mean value varies from 3202.1 ml (Brahmans) to 3896.1 ml (Limboos); 3177.2 ml (Scheduled Castes) to 3966.5 ml (Limboos); 2529.4 ml (Scheduled Castes) to 3392.0 ml (Limboos) and 97480.8 ml (Scheduled Castes) to 122471.2 ml (Mangars), respectively. Respiratory functions show late maturation which is apparent for growth rates varying from 24 to 47 per cent growth in 8+ and 9+ years age group. The valocity curves show adolescent spurt, in general, in between 11+ to 16+ years age group. It has been observed that in general the Hindu population groups have lower values for most of the respiratory functions as compared to Buddhist population groups at all the ages.

Statistical Analysis

(a) Percentiles

Percentiles are useful to represent the standards or norms of a particular population. In the present study, 5th, 10th, 25th, 50th, 75th, 90th and 95 th centile at each age level for five skinfold measurements are calculated. The percentage frequencies distribution of the individuals among various population groups (8+ years to 20+ years) below 50th centile, at 50th centile and above 50th centile are summerised in the tables 4 and 5. It is evident from the tables that 30 to 50 per cent of the present population in general comes below the 50th centile thereby indicating less energy stores. These less fat values may be due to their poor socio-economic status, as reported earlier by Barry and Mac-vean (1981) and Malina et al. (1981). In the present study, it is difficult to assess the exact nutritional status of the populations under study from skinfold measurements due to unavailability of normal fat standards for the population groups of Sikkim.

Table 4: Percentage frequencies distribution of population groups of Sikkim below 50th, at 50th and above 50th centile.

S. No.	*Population*	*Percent (Boys 8+ to 19+ years)*		
		Below 50th centile	*At 50th centile*	*Above 50th centile*
I. Buddhist Groups				
1.	Lepchas of North District	37.1	23.3	39.6
2.	Lepchas of East, South & West Districts	40.6	18.5	40.9
3.	Lepchas (Total)	38.5	20.9	40.5
4.	Bhutias of North District	39.0	20.0	40.9
5.	Bhutias of East, South & West Districts	39.9	17.9	42.2
6.	Bhutias (Total)	39.4	18.8	41.8
7.	Sherpas	37.0	24.5	38.5
8.	Tamangs	40.0	19.8	40.2
II. Hindus Groups				
9.	Brahmans	42.8	19.4	37.7
10.	Chhetris	41.7	18.5	39.7
11.	Pradhans (Newars)	41.3	19.4	39.3
12.	Rais	40.4	18.1	41.4
13.	Limboos/Subbas	40.5	18.9	40.6
14.	Gurungs	41.1	18.1	40.7
15.	Mangars	37.3	22.3	40.3
16.	Scheduled Castes	32.4	33.2	34.4

Table 5: Percentage frequencies distribution of population groups of Sikkim below 50th, at 50th and above 50th centile.

S. No.	Population	Percent (Adult Males 20+ years)		
		Below 50th centile	At 50th centile	Above 50th centile
I. Buddhist Groups				
1.	Lepchas of North District	38.2	18.5	43.3
2.	Lepchas of East, South & West Districts	48.0	8.3	43.7
3.	Lepchas (Total)	41.8	14.3	43.9
4.	Bhutias of North District	24.3	30.5	45.2
5.	Bhutias of East, South & West Districts	43.4	9.1	47.5
6.	Bhutias (Total)	34.2	19.5	46.2
7.	Sherpas	34.9	31.1	34.0
8.	Tamangs	38.3	21.2	40.4
II. Hindus Groups				
9.	Brahmans	45.2	10.2	44.6
10.	Chhetris	41.7	15.5	42.8
11.	Pradhans (Newars)	46.8	10.4	42.7
12.	Rais	45.1	13.1	41.9
13.	Limboos/Subbas	35.4	22.7	41.8
14.	Gurungs	42.9	15.2	41.9
15.	Mangars	31.2	35.0	33.8
16.	Scheduled Castes	45.4	12.7	41.8

Relationship Between Anthropometry and Physiological Variables

a) Coefficients of Correlation

The linear relationship between two variables has been calculated by applying Pearson's product-moment correlation method. In the present study, the coefficients of correlations have been divided into three main categories, category 'A', 'B' and 'C' for the sake explanatory convenience. The category 'A' includes values of 'r' close to + and up to +0.149 (almost no relationship), categroy 'B' includes values of 'r' between + 0.150 to +0.499 (moderate degree of relationship), and category 'C' includes values of 'r' between +0.500 to 1.000 (high degree of relationship.

It hs been observed that, in general, Skinfold at biceps, Skinfold at triceps, forearm Skinfold radial, Forearm skinfold ulnar, Pulse rate and Buccal temperature Breadth, Minimum frontal breadth, Maximum bizygomatic breadth, Biogonial breadth, Nasal height and Head circumference are showing correlations of category 'B'. Body weight, Projective height measurements, Breadth and Depth measurements, Girth measurements and Respiratory functions are showing correlations of category 'C' (Table 6 & 7).

(B) Simple Linear Regression Equations

For the simplicity of procedure in fields, simple linear regression equations have been formulated for predicting the Respiratory functions from Anthropometric variables taken individually. Among boys it has been observed that the Body weight, Stature, Height acromion, Height suprasternale, Height tragus (among anthropometric measurements), Vital capcity and Forced vital capacity (among Respiratory Functions) may be predicted best from age. From the simple linear regression equations calculated for boys it has been observed that for all the population groups studied for the present investigation, respiratory functions in general can best be predicted from Body weight, Stature, Heigth acronion, Height suprasternale, Height tragus, Chest circumference-normal and - at maximum inspiration (Table 8). Similar obersvations are reported by Firsancho et al. (1973); Bhasin et al. (2008a, b).

Among adult males also the Respiratory functions can best be predicted from Body weight, Projective height mesurements (Stature, Height acromion, Height suprasternale, Height tragus), and Chest circumferences (normal and -at maximum inspiration) (Table 9).

(C) Multilinear Regression Equations

In order to facilitate greater accuracy to the prediction of respiratory functions, new multilinear regression equations have been formulated by keeping physiologial variables as dependent ones and anthropometric variables as independent ones. Age is taken as forced variable.

It can be pointed out that the respiratory functions, among the boys under study can be predicted best from Body weight, Projective height measurements (Stature, Height acromion, Height suprasternale, Height tragus, Sitting height vertex and Height illiospinale) and Chest circumferences (Normal, at maximum inspiration and at maximum expiration). The results observed for the multinear regression equations are almost similar to that observed for simple linear regression equations (Table 10). The findings of this study are similar to the observations reported by Frisancho (1969), Harrison et al. (1969), Kopetzky et al. (1974), Cotes (1975), Mueller et al. (1978),

Tabel 6: Coefficient at correlations between different biological variables

Category'A'	*Categroy 'B'*	*Category 'C'*
BOYS (8+ TO 19+ YEARS)		
I. Buddhist Groups		
1. Lepchas of North District		
Skinfold measurements (SkTi) Pulse rate, Buccal temperature.	Skinfold measurements (SkBi, SkFR, SkFU, SkSS), Head and Face measurements (HL, BH)	Body weight, Projective height measurements, Breadth and Depth measurements, Girth measurements.
2. Lepchas of East, South and West Districts		
Skinfold measurements (SkBi, SkTi, SkFR & SkFU), Pulse rate and Buccal temperature.	Subscapular skinfold, Head and Face measurements (HL, HB, MFr, MBz, BgB, NB)	Body weight, Projective height measurements, Breadth and Depth measurements, Girth measurements and Respiratory functions.
3. Lepchas (Total)		
Skinfold mesurements (SkBI, SkTi, SkFR). Pulse rate and Buccal temperature.	Skinfold measurements (SkFu, SkSS). Head and Face measurements (HL, HB, MFr,MBz, BgB)	Body weight, Projective height measurements, Breadth and Depth measurements, Girth measurements and Respiratory functions.
4. Bhutias of North District		
Skinfold measurements (SkBi), Pulse rate.	Skinfold measurements (SkTi, SkFR, SkFU,SkSS) Buccal temperature and Head and Face measurements (HB).	Body weight, Projective height measurements, Breadth and Depth measurements, Girth Measurements Head and Face Measuements (HL., MFr, MBz, Bgb, NH, NB, PUFHt, MUFHt) and Respiratory functions.
5. Bhutias of East, South and West Districts		
Skinfold measurements (SkBi, SkTi, SkFR, SkFU). Head and Face measurements (HB), Pulse rate and Buccal temperature	Head circumference, Head and Face measurements (MFr, MBz, BgB, NB)	Body weight, Projective Height measurements, Breadth and Depth measuremens, Grith measurements and Respiratory functions.
6. Bhutias (Total)		
Skinfold measurements (SkBi, SkTi), Head and Face measurements (HB), Pulse rate and Buccal temperature.	Head circumference, Head and Face measurements (HL, MFr, MBz, BgB, NB) Skinfold measurements (SkFR, SkFU, SkSS).	Body weight, Projective height measurements, Breadth and Depth measurements, Girth measurements and Respiratory Fucntions.
7. Sherpas		
Skinfold measurements (SkBi, SkTi, SkFR, SkFU), and Buccal temperature, Pulse Rate.	Breadth and Depth measurements (APDC), Head and Face measurements (HL, HB, MBz, BgB), Skinfold measurements (SkSS)	Body weight, Projective height measurements, Breadth and Depth measurements (BiAcB), Girth measurements (BiCrB, TDC) and Respirtaroy fucntions.
8. Tamangs		
Skinfold measurements (SkBi, SkTi, SkFR, SkFU). Head and Face measurements (HB). Pulse rate.	Buccal temperture, Head circumference, Head and Face measurements (HL, MFr. MBz, Bgb)	Body weight, Projective height measurements, Breadth and Depth measurements, Grith measurements (except HC) and Respiratory functions
II. Hindu Groups		
9. Brahmans		
Head and Face Measurements (HB), Skinfold measurements (SkBi, SkTi, SkFR, SkFu) Buccal temperature and Pulse rate.	Head and Face measurements (HL, M Fr, Mbz, BgB) and subscapular skinfold.	Body weight, Projective height measurements, Breadth and depth measurements, Girth measurements, Head and Face measurements, (NH, NB, PUFHt and MuFHt) Blood pressure and Respiratory functions.
10. Chhetris		
Head and Face measurements (HL, HB) Skinfold measurements (SkBi, SkTi, SkFR) and Pulse rate.	Head and Face measurements (MFr, MBz, BgB, NB). Skinfolds measurements (SkFU, SkSS) and Buccal temperature	Body weight, Projective height measurements, Breadth and Depth measurements, Girth measuremets, Head measurements, (NH, NB, :UFHt and MUFHt) Blood pressure and Respiratory fucntions.

Table 6: Contd...

Category'A'	*Categroy 'B'*	*Category 'C'*
11. Pradhans (Newars) Skinfold measurements (SkBi, SkTi, SkFr, SkFU) Pulse rate and Buccal temperature	Head and Face Measurements, (HL, HB, MFr, MBz and Bgb) Subscapular skinfold	Body weight, Projective height measurements, Breadth and Depth measuremens, Girths measurements, Blood pressure and Respiratory functions.
12 Rais Head and Face measurements (HB), Skinfold msearueements (SkBi, SkTi, SkFR, SkFU) and Pulse rate	Breadth and Depth mesaruements (APDC), Head and Face measure-ments (HL, MFr, MBz, BgB, NB, NH), Subscapular skinfold and Buccal temperature	Body weight, Projective height measurements, Breadth and Depth measurements, Girth measurements Blood pressure and Respiratory functions.
13. Limboos/Subbas Skinfold measurements (SkTi, SkFr,SkFU), Pulse rate and Buccal temperature.	Head and Face measurememts (HL, HB, MFr, MBz, Bgb), Skinfold measuremnts (SkBi, SkSS)	Body weight, Projective height measurements; Breadth depth and girth measuements, Head and Face measurements (NH, NB, MUFHt, PUFHT), Blood pressure and Respiratory functions.
14. Gurungs Skinfold measurements (SkBi SkTi, SkFR, SkFU), Pulse rate and Buccal temperature	Head and Face measurements (HL, HB, MFr, MBz, BgB) and subscapular skinfold	Body weight, Projective height measurements; Breadth, Depth and girth measuremnts; Blood pressure and Respiratory functions.
15. Mangars Skinfold measurements (SkBi SkTi, SkFR, SkFU) and Pulse rate	Head and Face measurements (HL, HB, MFr, MBz, BgB), Subscapular skinfold and Buccal temperature.	Body weight; Projective height measurements, Breadth, depth and girth measurements; Blood pressure and Respiratory functions.
16. Scheduled Castes Skinfold measurements, (SkBi SkTi, SkFR) and Pulse rate	Head and Face measurements (HB, NB), Skinfold measurements (SkFU, SkSS) and Buccal temperature	Body weight, Projective height measurements, Breadth, depth and girth measurements, Head and Face measurements (MFr, MBz, MBFHt, PUFHt) Blood pressure and Respiratroy functions.

(Bhasin et al., 2008a, b). Among the adults the Respiratory functions can be predicted best from Projective height measurements (Height tragus, Sitting height vertex), Antero-posterior diameter of chest, Body weight among various population groups of Sikkim (Table 11).

(D) Stepwise Multilinear Regression Equations:

In the present study, new stepwise multilinear regression equations have been formulated by keeping one of the physiological varibles as dependent and anthropometric measurements as independent, in order to assess the extent to which of the body measurement is contributing significantly in the prediction of repiratory functions. The stepwise multilinear regression equations have been formulated at 0.05 per cent level of significance. In the case of the stepwise multilinear regression equations, variables are added stepwise in order of their correlation coefficient values in the regression equations. Further adding of the varibles is stopped, as soon as, it is found that there is no further increase in the value of muliple coefficient of correlation.

It has been observed that among boys either Body weight or Height tragus are entering into the equations at first step or second step, among almost all the population groups of the present study, for the prediction of most of the Respiratory functions.

It has been observed that among boys, generally, Respiratory functions can be predicted best from a combination of Body weight, Projective height measurements (Stature, Height acromion, Height suprasternale, Height tragus, Height illiospinale and sitting height vertex), Breadth and Depth measurements (Biacromial breadth, Bicristal breadth, Transverse diameter of chest and Antero-posterior diameters of chest)

Table. 7: Coefficient of correlations between different biological variables.

Category 'A'	*Category 'B'*	*Category'C'*
ADULTS MALE 20+ YEARS		
I. Buddhist Groups		
1. *Lepchas of North District.* Head and Face measurements (HL, MFr, MBz), Skinfold at biceps, Buccal temperature.	Breadth and Depth measurements, Grith measurements and Respiratory functions.	Body weight, Projective Height measurements.
2. *Lepchas of East, South and West Districts.* Pulse rate, Buccal temperature	Head and Face measurements, Skinfold measuremnts, Respiratory functions.	Body weight, Projective height measurements, Breadth and Depth Measurements, Girth measuremnts.
3. *Lepchas (Total)* Head and Face measurements (HL, BgB), Bicondylar breadth left and right, Pulse rate, Buccal temperature and Respiratory functions.	Girth measurements (HC, UAGR, UAGC, CG), Head and Face measurements (HB, MFr, MBz, NH, NB, PUFHt, MUFHt), Skinfold measurements	Body weight, Projective height measurements, Breadth and Depth measurements and Chest circumferences.
4. *Bhutias of North District.* Head and Face measurements (HB, NH), Pulse rate, Buccal temperature and Blood pressure	Breadth and Depth measurements, Girth measurements (HC, UAGR, UAGC, CG), Head and Face measurements (HL, MFr, MBz, BgB, NB, PUFHt, MUFHt Skinfold measurements and Respiratory functions.	Body weight, Projective height measurements, Grith measurements (CCN, CCL, CCE)
5. *Bhutias of East, South and West Disricts.* Head and Face Measurements (HL, HB, MFr, MBz, BgB), Pulse Rate, Skinfold measurements, Respiratory functions.	Girth measurements (HC, UAGR, UAGC, CG) Blood pressure	Body weight, Projective height measurements, Beadth and Depth measurements of trunk.
6. *Bhutias (Total)* Head and Face measurements (HL, HB, MBz), Pulse rate, Skinfold measurements.	Head and Face measurements (MFr, BgB, NH, NB, PUFHt, MUFHt) Breadth and Depth measurements (except BiAcB) and Girth measurements.	Body weight, Projective height measurements, Biacromial breadth
7. *Sherpas* Head and Face measurements (HL, HB, BgB, NB), Pulse Rate, Buccal temperature, skinfold measurements,	Breadth and Depth measurements (BiCrB, TDC, APDC) Girth measurements, Respiratory functions.	Body weight, Projective height measurements, Biacromial breadth,
8. *Tamangs* Head and Face Measurements (HL, HB, MFr, MBz, BgB)	Breadth and Depth measurements (BiCrB, TDC, APDC), Girth measurements, Skinfold measurements, Respiratory functions.	Body weigtht, Projective height measurements, Biacromial breadth.
II. Hindu Groups		
9. *Brahmans* Pulse rate and Buccal temperature	Breadth and Depth measurements, Girth measurements, Head and Face measurements, Blood pressure, Respiratory functions.	Body weight and Projective height measurements.

Table 7: Contd...

Category 'A'	*Category 'B'*	*Category'C'*
10. Chhetris Head and Face measurements: (HL, HB, MBz, BgB, MFr), Buccal temperature	Breadth measurements, Depth measurements and Girths measurements, Head and Face measurements Blood pressure and Respiratory funcitons.	Body weight and Projective height measurements.
11. Pradhans (Newars) Head and Face measurements: (HL, HB, MFr. MBz, BgB), Pulse rate and Buccal temperature.	Breadth and Depth measurements, Girths, Skinfold measurements, Blood pressure and Respiratory Functions.	Body weight and Projective height measurements.
12. Rais Head and Face measurements (MFr, MBz, BgB), Pulse rate, Buccal temperature and Blood pressure	Breadth and Depth measurements (BiAcB; TDC; APDC); Griths, Head and Face measurements (HL, HB, NH, NB, PUFHt, MUFHt), Skinfold measurements and Respiratory functions.	Body weight and Projective height measurements.
13. Limboos / Subbas Pulse rate, Buccal temperature Blood pressure	Breadth and Depth measurements, Girth measurements, Head and Face measurements; Skinfold measurements and Respiratory functions.	Body weight and Projective height measurements.
14. Gurungs Pulse rate; Head and Face measurements (MUFHt)	Breadth, Depth and Girth measurements, Head and Face measurements, Skinfold measurements, Buccal temperature, Blood pressure and Respiratory functions.	Body weight and Projective height measurements.
15. Mangars Pulse rate and Buccal temperature	Breadth and Depth measurements, Girth measurements, Head and Face measurements, Skinfold measurements, Blood pressure and Respiratory functions.	Body weight and Projective height measurements.
16. Scheduled Castes Pulse rate	Breadth, Depth and Girth measurements, Head and Face measurements, Skinfold measurements, Pulse rate, Buccal temperature, Blood pressure and Respiratory functions.	Body weight, Projective height measurements, Breadth and Depth measurements (BIAcB and BiCrB).

and Circumferences (Table 12). Similar findings have been reported in literature (Bhasin et al., 2008 a, b).

Among adult population Respiratory functions can be best predicted from a combination of Age, Body weight, Chest depth, Chest breadth, and Chest circumference and Projective height measurements in all the populations studied (Table 13).

(e) Dendrogram

The dendrogram showing the genetic closeness of population was generated and indicates two distinct clusters; first consisting of tribal groups only with the exception of Sherpas and second consisting of non-tribal groups, Limboos, Rais and Gurungs. Rest of the

Table 8. Simple Linear Regression Equation for estimating different respiratroy functions from various anthropometric variables.

Regression Equations	*Value of 'R'*
BOYS (8+ to 19+ YEARS)	
I. Buddhits Groups	
1. Lepchas of North District	
VC = -315.27 + 77.29 BWt	0.94
FVC = -301.72 + 76.45 BWt	0.93
FEV_1 = -100.19 + 60.63 BWt	0.89
MBC = -114173.00 + 151.56 HtTr	0.83
2. Lepcahs of East, South and West Districts	
VC = -4629.37 + 5.51 HtTr	0.90
FVC = -5054.03 + 5.33 StHtV	0.89
FEV_1 = -3786.32 + 4.61 HtTr.	0.89
MBC = -125569.00 + 161.59 HtTr.	0.77
3. Lepchas (Total)	
VC = -253.15 + 75.35 BWt	0.92
FVC = -228.61 + 74.11 BWt	0.91
FEV_1 = -3627.75 + 4.47 HtTr	0.88
MBC = -119563.00 + 156.35 HtTr	0.81
4. Bhutias of North District	
VC = -5511.63 + 10.34 CCI	0.91
FVC = -5450.80 + 10.24 CCI	0.92
FEV_1 = -3698.87 + 4.45 HtTr	0.89
MBC = -124262.00 + 177.58 HtSu	0.83
5. Bhutias of East, South and West District	
VC = -159.31 + 75.20 BWt	0.89
PVC = -284.18 + 77.94 BWt	0.93
FEV_1 = -170.15 + 66.42 BWt	0.89
MBC = 101217.12 +2082.16 BWt	0.81
6. Bhutias (Total)	
VC = -4662.30 + 5.51 HtTr	0.90
FVC = -4740.94 + 5.51 HtTr	0.91
FEV_1 = -3844.21 + 4.60 HtTr	0.89
MBC = -119410.00 + 174.89 HtSu	0.82
7. Sherpas	
VC = -212.42 + 78.12 BWt	0.90
FVC = -231.95 + 78.45 BWt	0.90
FEV_1 = -65.29 + 63.46 BWt	0.87
MBC = -112467.00 + 137.18 StHtV	0.77
8. Tamangs	
VC = -257.51 + 76.28 BWt	0.93
FVC = 418.56 + 60.01 BWt	0.94
FEV_1 = 245.66 + 66.96 BWt	0.92
MBC = -95513.00 + 564.17 BIAcB	0.82
II. Hindu Groups	
9. Brahmans	
VC = -81.26 + 70.35 BWT	0.88
FVC = -144.24 + 72.92 BWt.	0.89
FEV_1 = -117.11 + 63.86 BWt	0.87
MBC = -106872.00 + 899.55 TDC	0.79
10. Chhetris	
VC = -4396.97 + 9.26 CCI	0.93
FVC = -368.43 + 81.64 BWt	0.94
FEV_1 = 249.17 + 69.87 BWt	0.92
MBC = 7182.16 +2228.01 B.Wt	0.85
11. Pradhans (Newars)	
VC = -179.48 + 74.66 BWt	0.91
FVC = -269.72 + 78.38 BWt	0392
FEV_1 = -160.85 + 65.54 BWt	0.88
MBC = -626.85 +2435.36 BWt	0.82
12. Rais	
VC = -118.60 + 72.73 BWt	0.90
FVC = -181.81 + 75.14 BWt	0.90
FEV_1 = 11.96 + 59.97 BWt	0.86
MBC = -104717.00 + 248.34 CCI	0.79
13. Limboos / Subbas	
VC = -4406.44 + 9.15 CCI	0.89
FVC = -4384.49 + 9.73 CCN	0.88
FEV_1 = -89.67 + 63.09 BWt	0.87
MBC = -122667.00 + 273.41 StHtV	0.79
14. Gurungs	
VC = -426.48 + 81.14 BWt	0.93
FVC = -530.35 + 85.09 BWt	0.94
FEV_1 = -253.30 + 67.78 BWt	0.88
MBC = -1802.46 +2345.97 BWt	0.83
15. Mangars	
VC = -3896.47 + 8.52 CCI	0.86
FVC = -4064.72 + 8.76 CCI	0.87
FEV_1 = -3269.77 + 3.88 StHtV	0.85
MBC = -91043.70 + 124.06 StHtV	0.73
16. Scheduled Castes	
VC = -3945.42 + 9.21 CCE	0.88
FVC = -3742.52 + 8.92 CCE	0.89
FEV_1 = -2629.12 + 6.79 CCE	0.85
MBC = -99498.80 + 264.00 CCE	0.79

population groups, i.e., Pradhans, Mangars, Brahmans, Scheduled Castes, Chhetris and Bhutias (Rest) are seprated from the two principle clusters by a fairly good margin (Fig. 3, Table 14). From the dendrogram it has been observed that the tribal groups with the exception of Bhutias (Rest) and non-tribal groups Limboos, Rais and Gurungs are nearer to one another. The reasons may be due to their geographical isolation (relatively speaking) which they enjoy and their conservative attitude towards migration. The other non-tribal groups, i.e., Pradhans, Mangars, Brahmans, Scheduled Castes, Chhetris who are separated from the rest of the two principle clusters, have been known historically to be quite receptive to migration and miscegenation, and therefore, are comparatively more heterogenous with regard to their genetic diversity. However, Bhutias (Rest) in both the set of analysis present interesting situation. At both the places, they emerge out distinctly from the rest of the population groups, which is quite intriguing. It should, therefore, be premature to comment on their position, they have acquired, at this stage

Table 9: Simple Linear Regression Equation for estimating different respiratory functions from various anthropometric variables.

Regression Equations						*Value of 'R'*
ADULT MALES (8+ to 19+ YEARS)						
I. Buddhist Groups						
1. Lepchas of North District						
VC	=	-5926.28	+	6.42	HtTr	0.53
FVC	=	-4993.14	+	5.57	HtTr	0.51
FEV_1	=	-3591.78	+	7.65	SiHtV	0.45
MBC	=	-160510.00	+	175.55	HtTr	0.41
2. Lepchas of East, South and West Districts						
VC	=	-3963.80	+	4.84	StHtV	0.32
FVC	=	-5081.06	+	5.44	StHtV	0.39
FEV_1	=	-3743.06	+	4.08	StHtV	0.29
MBC	=	-235036.00	+	403.02	SiHtV	0.30
3. Lepchas (Total)						
VC	=	-5149.74	+	5.49	StHtV	0.43
FVC	=	-5109.85	+	5.42	StHtV	0.45
FEV_1	=	-3498.07	+	7.49	SiHtV	0.39
MBC	=	-154661.00	+	303.61	SiHtV	0.37
4. Bhutias of North District						
VC	=	-8258.50	+	7.78	HtTr	0.60
FVC	=	-6883.36	+	6.84	HtTr	0.58
FEV_1	=	-4458.30	+	5.51	HtAc	0.48
MBC	=	-187612.00	+	224.19	HtSu	0.47
5. Bhutias of East, South and West Districts						
VC	=	-4608.32	+	9.51	SiHtV	0.55
FVC	=	-4055.65	+	9.02	SiHtV	0.56
FEV_1	=	-1517.96	+	2.87	StHtV	0.33
MBC	=	-1874.56	+	114.38	SiHtV	0.33
6. Bhutias (Total)						
VC	=	-8292.34	+	7.84	HtTr	0.53
FVC	=	-6974.28	+	6.92	HtTR	0.50
FEV_1	=	-4802.87	+	4.76	StHtV	0.42
MBC	=	-180887.00	+	217.32	HtSU	0.35
7. Sherpas						
VC	=	-6631.50	+	7.99	HtSu	0.31
FVC	=	1532.14	+	43.28	BWt	0.35
FEV_1	=	1377.03	+	31.39	BWt	0.28
MBC	=	176195.00	+	78.79	HtIl	-0.14
8. Tamangs						
VC	=	179.14	+	18.79	APDC	0.59
FVC	=	303.49	+	19.70	APDC	0.61
FEV_1	=	345.49	+	49.13	BWt	0.61
MBC	=	-5720.05	+	74.17	HtTR	0.34
II. Hindu Groups						
9. Brahmans						
VC	=	-2745.12	+	6.59	CCI	0.51
FVC	=	-3809.37	+	18.31	BiAcB	0.38
FEV_1	=	-2625.46	+	5.82	CCI	0.45
MBC	=	-37248.30	+	106.27	HtAc	0.33
10. Chhetris						
VC	=	-81.91	+	71.64	BWt	0.70
FVC	=	-4997.11	+	6.38	HtSu	0.76
FEV_1	=	-4533.11	+	5.77	HtSu	0.70
MBC	=	-50690.50	+	832.88	APDC	0.57
11. Pradhans (Newars)						
VC	=	-10307.30	+	3.41	StHtV	0.72
FVC	=	-8286.62	+	7.17	StHtV	0.61
FEV_1	=	-6439.94	+	6.17	HtTr	0.57
MBC	=	-232301.00	+	401.51	SiHtV	0.41
12. Rais						
VC	=	-1844.25	+	22.07	TDC	0.59
FVC	=	241.56	+	13.35	TDC	0.48
FEV_1	=	-791.11	+	15.73	TDC	0.46
MBC	=	-371038.00	+	571.70	SiHtV	0.60
13. Limboos/Subbas						
VC	=	-7507.64	+	7.75	HtTr	0.54
FVC	=	-3960.34	+	4.89	StHtV	0.56
FEV_1	=	3006.87	+	0.35	HtIl	0.41
MBC	=	-120258.00	+	154.63	HtTr	0.22
14. Gurungs						
VC	=	-7977.62	+	13.75	SiHtV	0.74
FVC	=	-9101.22	+	8.15	StHtV	0.75
FEV_1	=	-7834.86	+	12.77	SiHtV	0.67
MBC	=	-176892.00	+	222.70	HtAc	0.45
15. Mangars						
VC	=	-7345.74	+	7.01	StHtV	0.66
FVC	=	-6586.61	+	6.48	StHtV	0.64
FEV_1	=	-5417.41	+	23.00	BiAcB	0.55
MBC	=	-220215.00	+	220.70	StHtV	0.53
16. Scheduled Castes						
VC	=	-9277.95	+	8.54	HtTr	0.64
FVC	=	-6472.07	+	7.40	HtAc	0.56
FEV_1	=	-6776.58	+	6.32	HtTr	0.59
MBC	=	-70085.20	+	567.67	BiCrB	0.56

except what has been stated earlier.

It has been observed that all the morpho-physiological variables except pulse rate in the two groups of Buddhist and Hindu population show a gradual increase form 8+ years till adult stage (20+ years) as stated by Tanner (1962) Krogman (1970) Eiben et al. (1971). Pulse rate is showing the well establishing trend of decline with age.

It is clearly evident from the results that most of the anthropometric and pysiological measurements have more than one peak in their velocity curves indicating a depressed bimodal spurt. This strend is relatively better marked in the population groups of middle and inner Himalyas. A similar finding has been reported for stature and weight of highland populaions (Baker, 1969, 1971; Frisancho, 1969; Frisancho and Baker, 1970; Bhasin et al., 2008 a,b).

The poorly defined adolescent spurt, or multimodal growth curves among the present population groups could probably be due to several factors of which the most important is

Table 10: Multilinear Regression Equation for predicting different respiratory functions from various anthropometric variables

Regression Equations	*Value of 'R'*
BOYS (8+ to 19+ YEARS)	
I. Buddhist Groups	
1. Lepchas of North District	
VC = -422.24 + 72.30 BWt + 20.53 Age	0.94
FVC = -435.53 + 70.21 BWt + 25.69 Age	0.93
FEV_1 = -216.61 + 55.19 BWt + 22.35 Age	0.89
MBC = 359.14 +1816.09 BWt +1052.37 Age	0.82
2. Lepchas of East, South and West Districts	
VC = -4461.84 + 5.15 HtTr + 21.27 Age	0.90
FVC = -4190.16 + 4.82 HtTr + 31.08 Age	0.89
FEV_1 = -3758.11 + 4.55 HtTr + 3.57 Age	0.88
MBC = -127558.00 + 165.83 HtTr + 252.53 Age	0.77
3. Lepchas (Total)	
VC = -379.09 + 69.77 BWt + 23.63 Age	0.92
FVC = -382.63 + 67.29 BWt + 28.89 Age	0.91
FEV_1 = -176.49 + 56.10 BWt + 19.09 Age	0.88
MBC = -117652.00 + 152.37 HtTr + 231.33 Age	0.81
4. Bhutias of North District	
VC = -4838.77 + 8.17 CCI + 73.06 Age	0.92
FVC = -4774.02 + 8.06 CCI + 73.49 Age	0.93
FEV_1 = -3545.34 + 6.04 CCI + 70.09 Age	0.90
MBC = -113739.00 + 137.01 HtTr +1210.51 Age	0.84
5. Bhutias of East, North and West Districts	
VC = -353.15 + 67.38 BWt + 34.62 Age	0.89
FVC = -488.26 + 69.71 BWt + 36.45 Age	0.93
FEV_1 = -299.81 + 61.19 BWt + 23.15 Age	0.89
MBC = 3077.38 +1791.29 BWt +1287.71 Age	0.82
6. Bhutias (Total)	
VC = -4382.95 + 7.65 CCI + 76.86 Age	0.90
FVC = -4430.07 + 7.61 CCI + 81.03 Age	0.92
FEV_1 = -3537.81 + 3.96 HtTr + 38.22 Age	0.89
MBC = -106345.00 + 132.02 HtTr +1264.67 Age	0.82
7. Sherpas	
VC = -3696.16 + 7.15 CCI + 58.38 Age	0.91
FVC = -421.83 + 68.40 BWt + 38.53 Age	0.91
FEV_1 = -2829.91 + 5.60 CCI + 53.91 Age	0.07
MBC = 4616.42 +1680.74 BWt +1338.38 Age	0.77
8. Tamangs	
VC = -4216.43 + 8.13 CCI + 40.65 Age	0.92
FVC = -420.64 + 79.89 BWt + 0.43 Age	0.94
FEV_1 = -231.61 + 67.70 BWt - 2.91 Age	0.92
MBC = -116420.00 + 252.42 SiHtV + 603.11 Age	0.82
II. Hindu Groups	
10. Brahmans	
VC = -391.53 + 56.05 BWt + 57.82 Age	0.90
FVC = -493.70 + 56.81 BWt + 65.12 Age	0.91
FEV_1 = -3089.43 + 6.30 CCN + 59.62 Age	0.88
MBC = -90905.30 + 643.96 TDC +2698.47 Age	0.83
11. Chhetris	
VC = -3930.37 + 7.59 CCI + 54.33 Age	0.93
FVC = -4291.47 + 8.08 CCI + 55.93 Age	0.95
FEV_1 = -317.23 + 66.14 BWt + 14.03 Age	0.92
MBC = -3010.65 +1669.57 BWt +2101.58 Age	0.85
12. Rais	
VC = -3575.52 + 6.60 CCI + 82.31 Age	0.92
FVC = -3928.10 + 7.32 CCI + 71.91 Age	0.93
FEV_1 = -397.95 + 53.60 BWt + 48.74 Age	0.88
MBC = -7833.58 +2072.43 BWt +1481.51 Age	0.82
13. Limboos/Subbas	
VC = -3714.01 + 6.72 CCI + 82.17 Age	0.90
FVC = -3813.61 + 6.81 CCi + 85.28 Age	0.90
FEV_1 = -3170.80 + 6.11 CCI + 51.54 Age	0.87
MBC = -94620.80 + 184.45 SiHtV +2739.03 Age	0.81
14. Gurungs	
VC = -538.34 + 76.43 BWt + 20.20 Age	0.93
FVC = -643.98 + 80.27 BWt + 20.52 Age	0.94
FEV_1 = -445.04 + 59.71 BWt + 34.63 Age	0.87
MBC = -9376.48 +2026.55 BWt +1368.11 Age	0.83
15. Mangars	
VC = -3949.77 + 8.69 CCI - 5.47 Age	0.86
FVC = -4263.14 + 9.40 CCI - 20.39 Age	0.87
FEV_1 = -3344.66 + 4.02 StHtV - 8.78 Age	0.85
MBC = -85742.50 + 114.14 StHtV + 621.80 Age	0.73
16. Scheduled Castes	
VC = -3562.88 + 7.30 CCE + 65.64 Age	0.88
FVC = -3520.64 + 7.81 CCE + 38.07 Age	0.89
FEV_1 = -2274.92 + 14.62 APDC + 131.25 Age	0.86
MBC = -117664.00 + 117.21 HtTr +3074.96 Age	0.80

"environmental components". It seems that the environment of the population groups studied restricts the achievement of full growth potential at least as far as a clear adolescent spurt is concerned. Here the natives might have been adapted well to the extent of survivial and normal functioning but the increased demand of oxygen at the time of puberty are not adequately met. The hypoxia seems to play a vital role in preventing a single adolescent spurt. However, the effect of nutrition, diseases and poor socio-economic conditions cannot be ruled out which also produces similar disturbances during the growing period. When the stature of the present subjects are compared with ICMR (1968) data, it became evident that the present subjects in general grow relatively slower as stated by Malcolm (1970) and Pawson (1976, 1977).

The present study also confirms the findings of Tanner (1962) that head measurements mature earlier than the other anthropometric measurements.

Bhutias are showing broader chests at 8+ years and remains so till adulthood. Lepchas (E, S & W) also possess relatively bigger chests as compred to other populations when compared with the subjects from plains (ICMR, 1968), it was

Table 11: Multinear Regression Equation for predicting different respiratory functions from various anthropometric variables

Regression Equations	*Value of 'R'*
ADULT MALES (20+ YEARS)	
I. Buddhist Groups	
1. Lepchas of North District	
VC = -5329.35 + 6.88 HtTr - 32.84 Age	0.82
FVC = -4422.80 + 6.20 HtTr - 31.40 Age	0.81
FEV_1 = -3071.83 + 4.73 HtTr - 25.37 Age	0.72
MBC = -144363.00 + 190.86 HtTr - 889.02 Age	0.61
2. Lepchas of East, South and West Districts	
VC = -2856.07 + 4.58 StHtV - 18.13 Age	0.50
FVC = -3729.21 + 5.12 StHtV - 22.13 Age	0.51
FEV_1 = -2327.50 + 3.74 StHtV - 23.17 Age	0.53
MBC = -177320.00 + 196.73 StHtV - 807.50 Age	0.58
3. Lepchas (Total)	
VC = -4022.43 + 5.93 HtTr - 28.61 Age	0.71
FVC = -4193.30 + 5.54 StHtV - 28.59 Age	0.73
FEV_1 = -2910.33 + 4.56 HtTr - 24.54 Age	0.65
MBC = -135648.00 + 184.55 HtTr - 861.83 Age	0.59
4. Bhutias of North District	
VC = -6339.15 + 7.09 HtTr - 21.79 Age	0.69
FVC = -4149.13 + 6.43 HtSu - 24.95 Age	0.70
FEV_1 = 885.06 + 5.19 CCI - 28.94 Age	0.58
MBC = -87682.60 + 252.57 CCI - 1051.32 Age	0.59
5. Bhutias of East, South and West Districts	
VC = -4619.57 + 9.71 HtIl - 19.54 Age	0.90
FVC = -6224.55 + 6.39 StHtV - 17.10 Age	0.81
FEV_1 = 2025.34 + 2.16 CCI - 27.06 Age	0.56
MBC = -56013.50 + 197.70 HtIl - 914.29 Age	0.65
6. Bhutias of North, East, South and West Districts	
VC = -5918.52 + 7.69 HtAc - 22.45 Age	0.71
FVC = -4790.98 + 6.05 HtTr - 22.46 Age	0.71
FEV_1 = -3238.22 + 4.24 StHtV - 18.64 Age	0.57
MBC = -69506.50 + 229.80 CCI - 1029.43 Age	0.53
7. Sherpas	
VC = 2352.91 + 44.06 BWt - 22.45 Age	0.51
FVC = 2174.70 + 45.58 BWt - 19.85 Age	0.48
FEV_1 = 2195.09 + 34.32 BWt - 25.26 Age	0.51
MBC = 230747.60 - 105.80 HtIl - 801.15 Age	0.41
8. Tamangs	
VC = -37.29 + 21.48 APDC - 18.97 Age	0.72
FVC = -113.32 + 23.32 APDC - 25.44 Age	0.81
FEV_1 = -746.87 + 23.47 APDC - 26.87 Age	0.79
MBC = 27178.58 + 574.05 APDC - 1012.98 Age	0.61
II. Hindu Groups	
9. Brahmans	
VC = -2612.65 + 6.74 CCI - 7.44 Age	0.52
FVC = -1223.55 + 5.32 CCI - 12.11 Age	0.48
FEV_1 = -2355.07 + 6.12 CCI - 15.19 Age	0.50
MBC = -73700.99 + 84.98 TDC + 249.39 Age	0.71
10. Chhetris	
VC = -1456.03 + 10.18 CCE - 123.32 Age	0.97
FVC = -2517.39 + 9.80 CCI - 104.39 Age	0.94
FEV_1 = -2401.26 + 20.56 BiAcB - 95.70 Age	0.95
MBC = 1484.54 + 983.19 APDC - 3559.18 Age	0.81
11. Pradhans (Newars)	
VC = -4840.30 + 5.53 StHtV - 20.02 Age	0.84
FVC = -1431.83 + 4.34 HtSu - 24.05 Age	0.81
FEV_1 = -2067.97 + 3.86 HtTr - 23.86 Age	0.80
MBC = 2536.18 + 171.63 SiHtV - 1029.72 Age	0.65
12. Rais	
VC = -1337.28 + 22.24 TDC - 17.02 Age	0.73
FVC = -716.60 + 6.21 CCN - 31.34 Age	0.78
FEV_1 = 210.46 + 16.06 TDC - 33.63 Age	0.80
MBC = -200850.00 + 408.60 SiHtV - 1061.87 Age	0.85
13. Limboos / Subbas	
VC = -3715.84 + 10.26 CCN - 38.11 Age	0.74
FVC = -3770.05 + 10.34 CCN - 40.70 Age	0.78
FEV_1 = -43.65 + 5.19 CCN - 34.72 Age	0.65
MBC = -117409.00 + 308.09 CCN - 1264.15 Age	0.55
14. Gurungs	
VC = -8849.96 + 7.77 StHtV + 8.93 Age	0.77
FVC = -6791.55 + 13.32 SiHtV - 21.97 Age	0.82
FEV_1 = -2461.68 + 23.87 BiCrB - 34.30 Age	0.68
MBC = -222516.00 + 418.76 SiHtV - 628.80 Age	0.63
15. Mangars	
VC = -7013.34 + 7.72 HtTr - 14.12 Age	0.72
FVC = -5921.32 + 7.02 HtTr - 18.15 Age	0.71
FEV_1 = -4430.45 + 21.59 BiAcB- 13.57 Age	0.66
MBC = -188541.00 + 215.16 StHtV - 662.50 Age	0.60
16. Scheduled Castes	
VC = -7789.58 + 8.86 HtTr - 45.97 Age	0.77
FVC = 179.45 + 19.00 BiCrB - 60.99 Age	0.75
FEV_1 = -1488.15 + 7.22 CCN - 53.61 Age	0.72
MBC = -21304.00 + 702.45 BiCrB - 2068.44 Age	0.78

found that the present subjects have bigger chest circumferences. Most of the groups (Bhutias, N, E,S.&W); even shows bigger chest circumference values as also reported among Bodh males of Ladhakh (Bhasin et al., 2008a). Bhutias are also found to have bigger vital capacity and forced vital capacity values indicating the association of bigger lungs with bigger chests. The Buddhist populations show superior lung capacities as compared to Hindu populations. It is widely held that high altitude population groups have larger chest development (Monge, 1948; Baker, 1969, 1971; Frisancho, 1969; Frisancho and Baker, 1970, Pawson, 1971, 1974b., 1976, Hoff, 1972. Frisancho et al., 1973, 1975; Mueller et al., 1980; Stinson, 1980; Gupta and Basu, 1981; Eckhardt and Eckhardt, 1983; Weitz, 1984; Bhasin et al., 2008a, b) which may be a morpho-logical trait associated with the pulumonary structural adptation to high altitude hypoxia. Relatively large lung volume in highlanders is also viewed as adaptation to high altitude hypoxia. Although this remains to be demonstrated if all the high altitude populations

Table 12: Stepwise Multilinear Regression Equations for Predicting Physiological Variables From Anthropometric Variables and Age.

Regression Equations	*Value of 'R'*
BOYS (8+ TO 19+ YEARS)	
I. Buddhist Groups	
1. Lepchas of North District	
VC = -978.35 + 63.15 BWt + 1.20 HtIl -10.42 BgB + 22.91 NH + 28.80 SkSS	0.95
FVC = -1074.64 + 47.35 BWt + 2.45 HtTr -6.63 BiCrb + 6.54 UAGC - 14.74 +BgB + 33.89 SkSS	0.94
FEV_1 = -3051.04 + 2.26 HtTr + 10.38 UAGC+ 12.89 MFr - 14.15 BgB - 13.77 NB + 38.27 SkSS	0.91
MBC = -97980.27 + 110.83 HtTr + 238.34 UAGR - 923.91 NB	0.85
2. Lepchas of East, South and West Districts	
VC = -4970.42 + 4.01 StHtV + 9.60 UAGR	0.91
FVC = -4992.06 + 2.27 StHtV + 3.09 SiHtV + 12.09 UAGR - 44.936 SkSS	0.92
FEV_1 = -3755.29 + 3.66 HtTr + 6.42 UAGR	0.89
MBC = -151583.18 + 202.68 HtTr -406.16 BiCrB + 419.48 APDC	0.79
3. Lepchas (Total)	
VC = -2475.68 + 31.54 BWt + 2.67 HtTrt +5.35 UAGR - 6.64 BgB	0.93
FVC = -2941.87 + 23.77 BWt + 3.15 HtTr -6.12 BiCrB +1.98 CCI + 5.63 UAGR - 5.32 BgB - 25.17 SkFR	0.93
FEV_1 = -1496.04+36.28 BWt+3.04 HtTr -4.69 BiCrB - 5.15 BgB	0.89
MBC = -115996.74+120.18 HtTr +163.16 APDC + 188.12 UAGR -655.50 NB	0.82
4. Bhutias of North District	
VC = -4953.61-5.39 HtAc + 4.68 HtSu +2.99 HtTr + 6.95 BiAcB - 5.43 BiCrB + 4.88 CCI - 66.54 SkFR	0.94
FVC = -4661.44 - 4.55 HtAc+5.97 HtTr +5.13 BiAcB - 5.29 BiCrB +4.43 CCI + 4.82 CG - 66.35 SkFR	0.95
FEV_1 = -3448.05 + 2.07 HtTr - 4.00 CCN + 6.34 CCI +5.12 UAGC - 53.87 SkFR	0.92
MBC = -103065.87 + 100.33 HtSu +254.15 BiAcB - 2689.44 SkFR	0.85
5. Bhutias of East, South and West Districts	
VC = -5345.96 + 4.86 StHtV-3.20 HtIl + 5.16 CCE	0.91
FVC = -3913.49+22.96 BWt+2.60 HtSu +3.83 CCE	0.94
FEV_1 = -3944.73 + 2.58 StHtV + 10.07 UAGC - 5.99 MFr + 25.63 NH	0.91
MBC = -27718.48 + 1459.00 BWt + 10054.01 BcBR	0.82
6. Bhutias (Total)	
VC = -5678.85 - 6.91 HtAc + 5.79 HtSu +3.69 HtTr + 4.79 CCI - 12.52 MFr + 9.78 MBz+8.02 BgB + 16.49 NB	0.93
FVC = -5305.86 - 6.21 HtAc + 4.69 HtSU +4.09 HtTr + 4.08 BiAcB-3.31 BiCrB + 4.22 CCI + 2.62 UAGR	0.94
FEV_1= -3643.88 - 4.25 HtAc + 3.16 HtSU + 3.39 HtTr + 3.89 BiAcB - 4.42 TDC - 2.88 CCN + 4.84 CCI + 4.82 UAGC +17.57 NH - 15.96 PUFHt	0.91
MBC = -118703.83-217.09 HtAc +266.15 HtSu + 94.41 SiHtV +157.08 BiAcB - 476.24 PUFHt +960.84 BcBL	0.84
7. Sherpas	
VC = -2893.67+26.29 BWt + 1.50 HtTr +3.61 CCI - 58.70 SkFU	0.92
FVC = -3565.23 + 20.61 BWt + 1.44 StHtV +3.70 CCN + 2.47 CG	0.92
FEV_1 = -4661.69 + 1.37 StHtV + 3.99 CCN +2.92 CG + 10.46 HB - 46.14 SkTi	0.89
MBC = -93827.08 + 74.46 StHtV + 272.31 BiCrB + 165.83 CG - 974.85 NH	0.81
8. Tamangs	
VC = -3479.76 + 23.99BWT + 1.81 HtSU +0.94 8.16 APDC + 2.65 CCI - 47.91 SkSS	
FVC = -4002.99 + 32.27 Age +29.88 BWt +1.69 HtSu + 3.25 SiHtV+3.98 CCI +10.22 MBz + 21.77 PUFHt +28.78 BcBL	0.96
FEV_1 = -2843.36 + 24.23 BWt + 1.65 HtSu +2.94 CCI	0.93
MBC = -117532.94 + 337.85 BiAcB +1608.43 BcBR	0.84
II. Hindu Groups	
9. Brahmans	
VC = -4283.77 + 2.00 HtTr + 6.62 TDC +3.77 CCI - 33.63 SkTi	0.91
FVC = -3351.21 + 20.79 BWt + 1.11 SkHtV +5.49 TDC + 3.35 CCI - 38.56 SkTi	0.91
FEV_1 = -4198.00 + 1.40 StHtV + 7.98 TDC +5.35 CCN -4.78 UAGC - 59.76 SkBi	0.90
MBC = -123479.66 + 7285 HtTr + 515.84 TDC	0.81
10. Chhetris	
VC = -1329.46 + 38.94 BWt - 4.28 HC + 5.31 CCI + 7.01 HB - 39.28 SkTi	0.94
FVC = -2495.83+48.61 BWt + 5.70 CCI - 5.17 UAGR	0.95
FEV_1 = -1584.26 + 48.20 BWt +3.88 CCI - 2.93 CG	0.93
MBC = -19010.50 + 1377.46 BWt +347.97 UAGC - 2496.67 SkSS.	0.81

Table 12: Contd....

Regression Equations	*Value of 'R'*
11. Pradhans (Newars)	
VC = -4593.94 + 1.20 StHtV + 2.36 HtSU -2.99 HtIl + 2.36 SiHtV + 4.62 CCI -7.03 BgB + 21.27 NB - 80.07 SkBi	0.93
FVC = -3467.61 + 24.09 BWt + 3.10 SiHtV +4.00 CCI - 4.94 BgB + 15.61 NB - 71.21 SkBi	0.94
FEV_1 = -2808.84 + 26.14 BWt + 3.96 SiHtsV + 2.33 CCI + 29.61 NB -23.65 BcBL - 67.50 SkBi	0.90
MBC = 45107.06 + 1734.45 BWT + 178.79 SiHtV + 1172.98 NB - 1516.49 BcBL - 2573.28 SkTR	0.85
12. Rais	
VC = -2572.21 + 28.91 BWt + 1.84 HtIl + 3.71 CCI - 36.46 SkTi	0.91
FVC = -3236.72 + 19.39 BWt + 2.67 HtIl + 4.25 CCI - 81.24 SkFU	0.92
FEV_1 = -3306.82 + 2.51 HtIl + 4.94 CCI -75.24 SkFu	0.88
MBC = -99792.42 + 83.08 StHtV +125.99 APDC + 143.90 CCI - 3204.62 SkFU	0.82
13. Limboos / Subbas	
VC = -5643.13 + 39.60 Age + 2.76 SiHtV +6.55 TDC - 4.23 CCN + 5.50 CCI +9.73 UAGR + 8.21 HL - 38.48 SkSS	0.91
FVC = -4464.59 + 49.19 Age+ 3.89 SiHtV -3.90 CCN + 6.54 CCI + 6.72 UAGR	0.92
FEV_1 = -4730.64 + 1.57 StHtV + 7.40 CCI -5.48 CCE + 6.04 UAGR + 9.84 MFr + 13.24 NH	0.89
MBC = -172806.26 + 1693.27 Age +143.52 SiHtV - 185.48 CCN +227.30 CCI + 473.53 HL	0.82
14. Gurungs	
VC = -3726.29 + 29.50 BWt + 1.64 HtSu +4.46 CCI	0.94
FVC = -3848.87 + 31.31 BWt + 1.35 StHtV + 4.38 CCI	0.94
FEV_1 = -3830.57 + 3.49 StHtV + 4.74 CCI - 9.25 MBz - 24.05 BcBR	0.90
MBC = -158387.57 + 135.89 SiHtV +221.33 APDC + 148.79 CCI -1794.02 SkSS	0.85
15. Mangars	
VC = -3730.30 + 11.25 BiCrB + 4.75 CCI	0.87
FVC = -7484.54 + 7.95 HtAc - 4.93 HtTr + 5.50 CCI - 7.84 CG + 24.00 MFr + 46.93 MUFHt	0.92
FEV_1 = -4900.14 + 1.47 StHtV + 3.48 CCI + 44.09 MUFHt	0.88
MBC = -53167.46 + 665.17 UAGC	0.75
16. Scheduled Castes	
VC = -4382.08 + 5.93 CCE + 52.74 BcBR -104.39 SkFR	0.91
FVC = -4408.42 + 13.36 APDC + 6.60 CCE	0.91
FEV_1 = -3576.38 + 4.02 CCE + 48.66 BcBR	0.87
MBC = -216543.28-406.22 BiCrB +171.49 HC + 194.21 CCE -3682.43 BcBL + 6632.15 BcBR	0.88

Table 13: Stepwise Multilinear Regression Equations for predicting physiological variables from anthropometric variables and age.

Regression Equations	*Value of 'R'*
ADULT MALES (20+ YEARS)	
I. Buddhist Groups	
1. Lepchas of North District	
VC = -6866.17-32.52 Age + 7.06 HtTr + 8.00 CCN - 579.00 CCE - 41.27 SkSS	0.88
FVC = -6029.92 - 31.06 Age + 6.38 HtTr + 7.96 CCN - 5.59 CCI - 48.17 SkSS	0.88
FEV_1 = -2004.55 - 24.04 Age + 3.39 HtTr +2.23 BiAcB	0.75
MBC = -189698.63 - 849.69 Age +148.76 HtTr + 1090.14 BgB	0.68
2. Lepchas of East, South and West Districts	
VC = -331.75-27.90 Age + 3.64 StHtV -114.74 SkTi	0.67
FVC = -1701.01-20.61 Age+14.40 StHtv -12.85 HtSu	0.69
FEV_1 = 5671.87-23.80 Age + 11.55 StHtV -10.40 HtAc - 11.98 HC	0.75
MBC = -10175.33-795.40 Age +2096.73 BcBR	0.52
3. Lepchas (Total)	
VC = -4874.45-29.12 Age + 5.03 StHtV +19.56 BgB - 127.78 SkFU	0.75
FVC = -3818.05-30.04 Age + 5.35 StHtV	0.73
FEV_1 = -2256.56-25.23 Age +3.36 StHtV +1.93 BiAcB	0.66
MBC = -75621.24-831.04 Age +120.13 HtTr + 87.16 BiAcB	0.59
4. Bhutias of North District	
VC = -7718.63-24.93 Age +6.14 HtTR +6.31 APDC - 39.47 SkSS	0.75
FVC = -1613.24-24.80 Age + 4.09 HtTr +10.24 APDC - 8.96 HC +3.58 CCI - 51.67 SkSS	0.80
FEV_1 = 122.45 - 24.15 Age + 3.52 HtAc -12.86 BiAcB - 7.41 HC +6.87 CCN + 26.23 BgB -48.42 SkSS	0.75
MBC = -171177.08 - 866.38 Age +1119.92 HtSu - 654.23 BiAcB +272.31 CCI +1551.47 Bgb -5666.95 SkFU	0.77
5. Bhutias of East, South and West Districts	
VC = -1514.41 - 46.97 Age + 23.07 BiCrB	0.75
FVC = -861.06 - 42.40 Age + 11.86 CCN +17.82 CCI	0.86
FEV_1 = None of the varibale entered into the equation model	
MBC = -184283.45 - 3104.21 Age +1120.91 HC + 1032.85 UAGC -3635.19 MBz - 3010.76 SkSS	0.92
6. Bhutias (Total)	
VC = -3845.29 - 25.94 Age + 3.98 HtTr +5.57 CCI - 32.26 PUFHt - 45.23 SkSS	0.76
FVC = -4200.47 - 35.79 Age + 5.27 HtSu +0.19 APDC	0.73

Table 13: Contd....

Regression Equations	*Value of 'R'*
FEV_1 = 2513.69 - 29.47 Age + 2.90 HtSu + 2.91 CCI	0.61
MBC = 33363.07 - 939.89 Age - 537.84 BiAcB - 266.22 CCE + 518.37 CCI + 1421.94 BgB - 5644.33 SkFu	0.71
7. Sherpas	
VC = -2278.99+130.77 BWt + 3.41 HC -14.66 CCE + 32.05 HB - 89.22 SkSS	0.72
FVC = -10122.15 - 31.28 Age + 20.41 HC + 56.05 MUFHt	0.59
FEV_1 = -7525.05-24.60 Age + 24.08 HC +11.65CG -42.97 MBz	0.65
MBC = -65857.71 - 484.91 Age +343.15 UAGC + 296.18 CG +1646.36 HB - 3179.65 BcBL - 2341.57 SkSS	0.71
8. Tamangs	
VC = -3687.32 + 3.30 HtAc + 14.85 APDC	0.67
FVC = -3684.51+19.57 Age + 3.51 HtAc +17.31 APDC	0.82
FEV_1 = -3789.57 + 4.25 HtTr -423.71 SkBi + 373.85 SkFU +45.65 SkSS	0.86
MBC = -111531.68 + 3249.07 BcBR	0.55
II. Hindu Groups	
9. Brahmans	
VC = -3775.20 + 14.68 CCI - 11.82 CCE +52.78 BcBR	0.77
FVC = -4758.73 + 21.05 BiAcB	0.47
FEV_1 = -1142.81 + 14.77 UAGC	0.43
MBC = -91638.95 + 2943.99 BcBL	0.47
10. Chhetris	
VC = -6370.01 + 25.25 TDC + 12.23 CG +124.80 SkFR - 79.78 SkSS	0.86
FVC = -5710.29 + 4.20 HtSu + 11.20 CG	0.83
FEV_1 = -5450.56 + 3.78 HtSu + 10.68 CG	0.77
MBC = -39686.45 + 737.88 APDC	0.59
11. Pradhans (Newars)	
VC = -4896.87 - 23.37 Age + 5.82 StHtV 12.45TDC+9.13 CCE - 14.20 HL +39.56 NH - 85.51 NB - 369.70 SkFu	0.96
FVC = -881.92-24.93 Age + 4.48 HtSu +5.71 CCN - 15.48 HL - 52.47 NB -385.75 SkFU	0.93
FEV_1 = -3240.36 - 20.74 Age + 4.29 HtTr +4.71 CCI - 97.17 NB - 203.55 SkFU	0.91
MBC = 117078.91 + 360.55 SiHtV -3427.00 NB - 2881.28 PUFHt	0.72
12. Rais	
VC = 4090.49 + 4.50 HtAc + 17.11 TDC +8.73 CG - 14.80 HL - 19.25 HB -51.44 MFr - 54.32 NB + 177.37 SkFU	0.91
FVC = -2164.64 - 17.22 Age + 2.68 StHtV +17.49 TDC - 69.22 NB	0.86
FEV_1 = 68.22-20.17 Age + 21.42 TDC +35.59 NH - 100.52 NB	0.88
MBC = -169790.77 + 278.12 SiHtV +444.23 CG - 2838.58 NB	0.79
13. Limboos/Subbas	
VC = -785.65 + 5.24 HtTr - 50.01 PUFHt +68.97 SkTi	0.71
FVC = -6404.85 + 6.49 StHtV	0.55
FEV_1 = -1968.60-30.63 Age + 8.42 HtIl +15.55 UAGR - 72.21 BcBR	0.72
MBC = 211822.35- 1677.26 MUFHt	0.36
14. Gurungs	
VC = -10733.47 + 5.58 HtAc + 6.96 SiHtV +35.05 NH - 70.46 SkTi	0.86
FVC = -10658.80 + 5.30 StHtV +10.64 SiHtV - 24.64 MFr	0.84
FEV_1 = -4527.08 - 19.65 Age + 9.63 SiHtV	0.72
MBC = -36069.70 - 749.77 APDC + 4441.78 BcBR	0.57
15. Mangars	
VC = -8984.72 + 5.20 StHtV+36.39 MFr	0.72
FVC = -9215.37 + 21.86 BiCrB + 55.18 MFr	0.73
FEV_1 = -4585.98 + 20.67 BiAcB	0.55
MBC = -221347.62 + 221.38 StHtV	0.52
16. Scheduled Caste - Kamis	
VC = -9277.95 + 8.54 HtTr	0.64
FVC = No Variable	
FEV_1 = No Variable	
MBC = No Variable	

groups manifest this morphological trait, it would strengthen the present findings. There apperas ot be a contro-versy surrounding bigger chest of highlanders, several anthropometric surveys among the high-land Asian populations have yielded inconclusive results with respect to the existence of large chests. A comparison of high-land Asian population groups reveals that chest girth of high altitude Sherpa children in Nepal, Kirghiz children in Soviet Union and Tibetan boys are small compared with their Quechua age mates in Peru (Frisancho and Baker, 1970; Pawson, 1976), Neither the high altitude Sherpa nor Kirghiz chidren have enlarged chests compared to their low altitude counterparts. Other studies reported earlier show bigger chests among high landers (Boyce et al., 1974; Frisancho et al., 1973; Mueller et al., 1978, 1979). Similar contraversy about bigger chest dimensions is also seen among adults. The population groups of the present study, when compared in Transhumant Gaddis (Brahmans and Rajput, middle altitude population groups) and Settled Gaddis (Brahmans and Rajputs; low altitude population groups) show similar values of respiratory function in most of the age groups (Bhasin et al., 2008b). Cotes et al. (1973) concluded that this may be attributed to high level of habitual activity as these populaion groups inhabit steep terrained mountaineous regions.

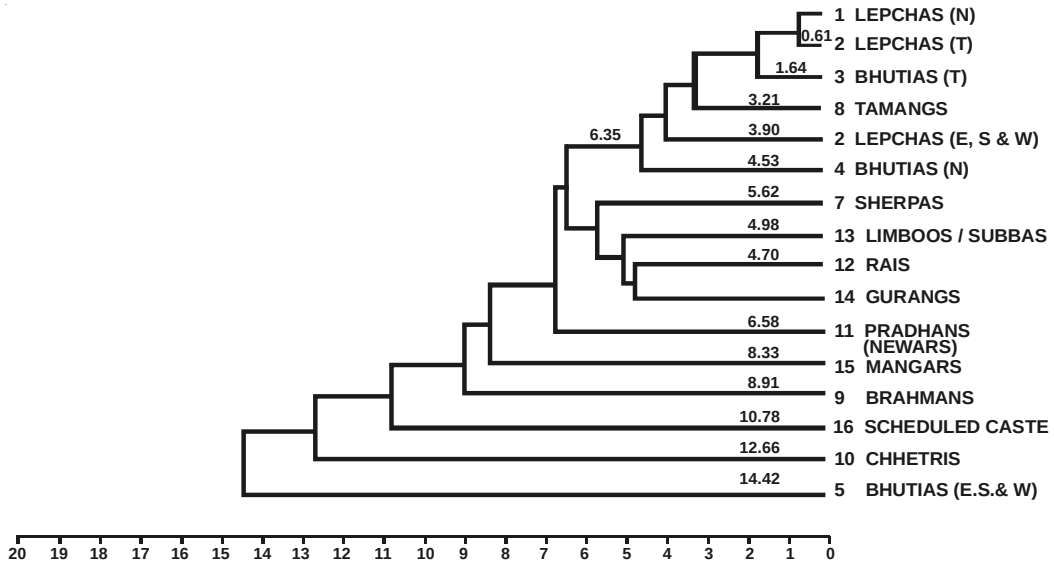

Fig. 3. Dendrogrom of the various population groups of Sikkim.

The same has been suggested by Jones (1977), Miller et al., (1978), Anderson et al. (1978) and Bhasin et al. (2008b).

There are several possible reasons why some, but not all of the population of high altitude exhibit bigger chest characteristics of Andean highlanders. One reason could be differences in measurement technique, another is the type of measure, another factor is the delayed growth of the Asian highlanders prior to maturity (Pawson, 1976; Beall, 1981) which may influence size for age comparisons. Another possibility is that there is a population genetic difference underlying the development of chest morphology in Asian and South American population groups with long histories of high altitude residence. It is theoritically possible that the two population groups have adapted differently to the same stress. More work is needed in this aspect.

The size, shape and porportion of the human body are not stable during the entire life span of an individual. All the major tissue, especially the soft one, undergo considerable alteration with age. The most mobile tissue to human body is fat and it shows marked change in quantity and its distribution pattern over the entire body during growing period as well as during ageing (Brožek, 1952; Krzywicki et al., 1967). It has been observed in the present study that the body fat as studied with the help of skinfold thickness at biceps, triceps, forearm - radial and ulnar and subscapular shows an increase from 8+ years onwards till adulthood. But the increase in fatness is not uniform, both in rate and quantity as evident from 100 per cent growth of fatness of biceps, triceps and forearm sites at age 8+ as compared with the 72 to 88 percent at subscapular site among the 19+ years old. This finding also indicates a relatively late extra deposition of trunk fat during growing period and this trend of extra deposition of trunk fat countinues during adulthood and becomes more marked with advancing age (Brožek, 1952; Garn and Young, 1956).

To evaluate the nutritional level of the present subjects, skinfold data was analysed for centiles. It has been found that a sizable portion of the present population lies below the 50th centile showing lower energy stores, thus indicating a poor socio-economic status leading to lower nutritional status. This finding is further supported by the absence of a single peaked and clear cut adolescent spurt for most of the variables in all the population groups studied. Malnutrition and chronic diseases are the important environmental factors which distrubes the normal growth course especially the adolescent growth spurt as the extra nutri-tional demand of the rapidly growing period is not met adequately. This condition is further highlighted at higher altitude where hypoxia exerts its own stress.

Thus, it can be inferred from the present study on pattern of body growth and physiological

Table 14: Generalised squared distance values among various population groups of Sikkim

S. No.	Population groups	Lepchas (N)	Lepchas (E.S. & W)	Lepchas (T)	Bhutias (N)	Bhutias (E.S.&W.)	Bhutias (T)	Sher-pas	Tam-angs	Brah-mans	Che-ttris	Pradhans (Newars)	Rais	Lim-boo	Gurungs	Man-gars	Scheduled Castes
1.	Lepchas of North District Lepchas (N)	-	4.32	0.61	3.91	13.91	1.78	5.47	4.02	9.50	12.49	6.47	7.15	5.90	5.29	9.37	9.27
2.	Lepchas of East, South & West Districts - Lepchas (E.S. & W.)		-	1.68	6.83	15.39	3.74	8.27	5.85	11.59	15.27	7.68	10.06	9.50	8.69	8.72	11.87
3.	Lepchas (Total)			-	3.99	13.45	1.50	5.51	3.69	9.27	12.53	5.91	7.23	6.25	5.56	8.11	9.24
4.	Bhutias of North District -Bhutais (N)				-	13.95	2.76	6.80	5.17	9.95	16.23	6.66	8.80	9.19	7.76	10.67	10.07
5.	Bhutias of East, South & West Districts - Bhutias (E.S. & W.)					-	10.46	14.93	13.82	12.44	12.72	11.37	14.67	13.71	18.62	16.77	20.06
6.	Bhtias (Total)						-	2.97	1.91	5.26	9.32	3.38	3.78	3.65	3.38	5.13	7.48
7.	Sherpas							-	5.75	8.91	14.66	8.42	5.81	5.94	5.11	8.49	12.14
8.	Tamangs								-	7.88	11.38	4.16	5.08	5.76	4.30	7.80	9.62
9.	Brahamans									-	9.20	7.59	9.00	9.49	10.71	7.82	13.73
10.	Chettris										-	9.79	9.79	10.79	13.76	13.90	18.08
11.	Pradhans (Newars)											-	7.00	7.40	8.75	9.96	10.17
12.	Rais												-	4.81	4.70	8.21	12.71
13.	Limboos/Subbas													-	5.16	7.38	9.97
14.	Gurungs														-	7.76	9.68
15.	Mangars															-	14.17
16.	Scheduled Castes																-

variables among various population groups of Sikkim inhabiting Inner-, Mid- and Outer-Himalayan zones, that although all the morpho-physiological variables are exhibiting normal growth, the rate of growth especially during adole-scent period is affected leading to a disturbed velocity curve or adolescent spurt. The chest dimensions of the present subjects are found to be more developed as compared to the boys from plains indicating the morphological adaptation to increased oxygen tension at higher elevations. As there are contradictions regarding enlarged chest among high altitude natives, more work is needed on chest morphology and lung functions among population of same genetic background but inhabiting different elevations and population of different genetic pools staying at the same altitude. Another point worth recommending for future research is an extensive study of nutritional intake and energy out put of the Himalayan populations, which would throw light on the causes whether hypoxia or malnutrition or both, for the occurence of multimodel velocity growth curves.

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