BLOCK 3

BIOSOCIAL ANTHROPOLOGY IN PRACTICE

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UNIT 8 CONTRIBUTIONS OF BIOSOCIAL ANTHROPOLOGISTS IN INDIA*

Contents

LEARNING OBJECTIVES

In this unit you will learn about:

- the practice of anthropology in India in its initial stages as an academic discipline; and
- the contribution of some key anthropologists, trained in various subfields of the discipline.

8.0 INTRODUCTION

The practice of anthropology in India has a colonial legacy. It found relevance under the British rule, wherein the administrators realised that in order to control the indigenous population they needed to gain an in-depth understanding of these communities. Recognising this the Britishers ensured that the British Civil servants under the East India Company realised the importance of anthropological knowledge, and by 1807 anthropology was taught at Haileybury College to train them before leaving for India. At this time very little was known about the communities that resided in India and thus descriptive work was required to fill in the lacunae. A number of British Administrative officers took to writing memoirs and descriptions of the communities that they encountered, while others were commissioned to write about the different geographical regions and their people. For example, the Governor-General of India appointed Francis Buchanan to collect information on the life and culture of the people of Bengal

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(Ghosh 2008), a task that was undertaken by him from 1807 to 1814. Further, the need to understand the people of India saw an influx of a number of British anthropologists into India, and resulted in the creation of detailed monographs on the society and culture of tribal communities across the country, by both anthropologists and administrators during the latter half of the nineteenth century.

This process of collection of socio-cultural information led to the involvement of some of the Indian anthropologists being trained by the Britishers to assist them in their anthropological work. Anthropologists like W. H. R. Rivers, J. H. Hutton, A. R. Radcliffe-Brown, and C. G. Seligman also came to India and further influenced others who were of Indian origin to do anthropological studies (Ghosh 2008).

The Indian anthropologists, in spite of being introduced to the discipline through colonial influence, brought with them an internal perspective of the cultures that they were a part of and/or were familiar with. Thus, a "limited kind of 'auto-ethnography' was already being practiced in India by Indian anthropologists long before it became a major issue in western anthropology" (Ghosh 2008: 3). Due to the history of the disciplinary origin and the colonial influence, British ideas continued to govern the discipline. However, Indian Anthropologists did take it upon themselves to disagree and debate important issues without necessarily falling out with their British counterparts. The colonial exposure also motivated a number of Indian anthropologists to seek education overseas as well as publish internationally. With time, Indian anthropologists played a significant role as educationalists, mentoring new generations of anthropologists in the country, spearheading departments of anthropology in different universities of India, where they also taught. "Anthropology thus pulled itself up by its own bootstraps to become an academic discipline in the universities of India as a legitimate study of human beings, rather than an appendage of the colonial government" (Ghosh 2016: 89).

The first full-fledged department of Anthropology, in India, was established at Calcutta University, in 1921. It had as its faculty, luminaries like K. P. Chattopadhyay, R. P. Chanda, and L. K. A. Iyer, and its first batch of students consisted of prominent anthropologists like N. K. Bose, D. N. Majumdar, B. S. Guha, P. C. Biswas, T. C. Das, S. S. Sarkar, Dharani Sen, and Andre Beteille.

Indian anthropologists focused on uniquely Indian issues, moving ahead of the available documented ethnographies of the colonial period. Documentation of cultures remained a significant task and contributed greatly towards understanding diversity and census enumeration. Village studies became central to anthropological focus and there was a shift from descriptive studies of preliterate villages to the analytical studies of complex societies (Ghosh 2008). A large body of work was produced by anthropologists like S. C. Dube, M. N. Srinivas, A. Aiyappan, D. N. Majumdar, Inder Pal Singh, K. S. Mathur, Yogendra Singh, G. S. Ghurye, L. P. Vidyarthi, B. K. Roy Burman, R. M. Sarkar, Baidyanath Saraswati, Makhan Jha, A. Danda, M. K. Raha, P. K. Misra, K. S. Singh, T. N. Madan, Iravati Karve, Leela Dube. P. K. Bhowmick studied the Lodhas and founded the Institute of Social Research and Applied Anthropology (ISRAA), for their development in a village created by him called Bidisa. Indian anthropologists contributed significantly to establishing the discipline in

the country through a robust fieldwork tradition as well as the sharing of their knowledge through publications and as teachers at academic institutions. They often collaborated with various government and non-government institutions as consultants and experts for the effective utilisation of anthropological knowledge. It would be extremely difficult to incorporate the works and contributions of the pioneering Indian anthropologists in such a restricted space. The unit brings forth the works of only a few of these anthropologists to highlight the expanse and multidimensionality of the pursuit of Indian Anthropologists.

8.1 GOVIND SADASHIV GHURYE (1893- 1983)

Govind Sadashiv Ghurye is often called the 'father of Indian sociology". Born into a Saraswat Brahmin family in the Konkan region of western India, he completed his BA and MA degrees, in Sanskrit and English literature, at Elphinstone College, Bombay. In 1920, Ghurye went to England to study sociology with Leonard T. Hobhouse, but he ended up working under the anthropologist W. H. R. Rivers at Cambridge. He expresses his need for this transition stating that "the anthropological approach to Sociology was the most appropriate one" (Ghurye 1973: 45). Post the sudden death of W.H. R. Rivers, he completed his Ph.D., in 1923, under the supervision of Alfred C. Haddon. G. S. Ghurye was the third in India, to obtain a Cambridge doctorate.

Post his return to India, in 1924, Ghurye was appointed reader and head of the Department of Sociology at the University of Bombay. He received his professorship in 1934 and continued with the university until his retirement, playing a key role in the institutionalisation and professionalisation of sociology and anthropology in India, as the founder of the Indian Sociological Society, and as the editor of the Sociological Bulletin.

Ghurye's first book, Caste and Race in India (1932), became a basic text for most anthropologists and sociologists in India. He took a cultural-historical approach of examining indological texts, to understand caste in India, looking at continuity and change in social institutions, and reflecting on the developing system of caste under the present milieu of political, economic, and social change in India. Contrary to Verrier Elwin's initial idea of 'Tribal Reserve Area' which prescribed that tribals should be left alone instead of being constantly interfered with and acculturated, Ghurye "wrote on the tribes of India and gave details of their administration. He was an assimilationist and wished to incorporate the tribals of India into the 'mainstream' of Indian culture…….. He enumerated the problems of the aboriginal tribes of India in a truly anthropological manner. He was of the opinion that these tribes should neither be called 'adivasis' nor 'aborigines'. They should not be a separate category but should be merged with castes and should be treated as backward classes" (Ghosh 2008: 22).

Ghurye influenced the discipline of Anthropology and Sociology through his continued scholarship and role as an educationalist, as Upadhya (2018) mentions, "Ghurye's brand of sociology, institutionalised in his MA sociology syllabus, also incorporated a large measure of anthropology—reflecting his conviction that in the Indian context the distinction between anthropology and sociology is artificial" (Upadhya 2018: 3). He further influences the disciplines through his numerous students including A. R. Desai, I. P. Desai, Irawati Karve, and M. N. Srinivas.

8.2 BIRAJA SANKAR GUHA (1894-1961)

Biraja Sankar Guha was born in Shillong. He completed his Master's in philosophy from the University of Calcutta, in 1915. However, swayed by his interest in the people of India he moved to study Anthropology. He went to Harvard on a Hemenway Fellowship where he served as a graduate assistant at the Peabody Museum. Here, he received his Master of Arts and Ph.D. degrees in Anthropology, in 1922 and 1924 respectively. He was trained by famous Anthropologists like E. A. Hooton, R. B. Dixon, and A. M. Tozzer, and was well acclaimed for his thesis titled 'The Racial Basis of the Caste System in India' (Sinha and Coon 1963).

On his return to India from the USA, Guha joined as faculty at the University of Calcutta, in 1926, where Anthropology had just been introduced as an academic discipline for the first time in the country. In 1927, the Government of India created a position of anthropologist within the Zoological Survey of India. Guha accepted this position, and was a part of an expedition to Naga Hills at Burma Border, for the abolition of human sacrifice. He also carried out a comprehensive racial survey of India as well as joined an expedition to Chittral in northwest Baluchistan (now in Pakistan) to solve the question of linguistic affinity of the tribes of Central India and the Brahui of the Northwest Frontier. During this time, Guha worked relentlessly to create a significant place for anthropology within the organisation. His efforts were realised late in 1946. However, in the interim period, in 1936, with the assistance of the British administration (due to its interest in ethnology), he played a pivotal role in establishing the Indian Anthropological Institute at Calcutta. He continued his efforts to strengthen and establish the presence of anthropology in India. He helped in establishing the National Institute of Sciences of India and was its Founder Fellow and Treasurer during 1938-42. In, 1939, he was elected as a Fellow of the Royal Asiatic Society of Bengal and served it as an Honorary Secretary for three years from 1939-42 (Sinha and Coon 1963).

B. S. Guha was appointed the Director and Anthropological Advisor to the Government of India, in 1946, when 'Anthropological Survey of India' was removed from the folds of Zoological Survey of India, at Calcutta. He remained an ardent field researcher and emphasised its need in Anthropology, and was pivotal in establishing a substation of the Anthropological Survey of India in the Andaman Islands, in 1952. He served at the Anthropological Survey of India until his retirement in 1954. He was also the Founder-Director of the Indian Museum, Calcutta (Sinha and Coon 1963).

In his later years B.S. Guha worked on the practical problems of tribal administration and social relations. Post-retirement, he was invited by the Government of India, he organised a training centre for Social Education Organisers i.e., Extension Officers involved in India's Community Development Program, in the tribal areas. He also, reorganised the Bihar Tribal Research Institute, Ranchi, at the invitation of the Government of Bihar. He collaborated with Gardner Murphy in the UNESCO project for the study of social tensions in India, and the records of his findings appeared in a Memoir of the Anthropological Survey of India. He was also a member Central Advisory Board in Anthropology, a statutory body set up by the Government of India for formulating plans for anthropological research in the country (Sinha and Coon 1963).

8.3 PRAFULLA CHANDRA BISWAS (1903-1984)

Prafulla Chandra Biswas was born in Calcutta (now Kolkata). He earned his Master's in Anthropology from Calcutta University under the tutorage of erudite anthropologists like Panchanan Mitra and L. K. Ananthakrishna Iyer. Post this he was awarded the von Humboldt Fellowship in 1933 to pursue his Doctoral research from Berlin University, Germany. He worked on morphogenetic variability of different races, under the guidance of the famous geneticist Eugene Fischer, and was awarded Ph.D. for his research '*Uber Hand und Fingerleisten von Indern*' (On Palm and Fingerprints of Indians), in 1936. Influenced by Eugene Fischer some of Biswas' early writings carry eugenic ideas where he advocates mass sterilization policies. This thought was also in conjunction with the increasingly popular discussions of eugenics in India during 1920s and 30s that visualised eugenics as an important part of nationalist and anti-colonial frameworks as well as a source of "modernisation" and "regeneration" (Hodges 2006). While his ideas on eugenics remained, he also advocated for social reforms and welfare.

Prof. Biswas returned from Germany and joined as a faculty at the Department of Anthropology, Calcutta University. Here he taught for eleven years and continued his research through extensive fieldwork in the North-East, Bengal and Bihar of India. His research focused on physical anthropology, however, like many anthropologists of his time, he did not restrict his work to this particular subfield of anthropology and forayed into ethnography as well.

Biswas through his paper 'Concept of Disease among the Primitive People of India' (1934) countered both Forrest Clements and W. H. R. Rivers, where he writes that "when the monograph of F. E. Clements came into my hand and the excellent writings of Rivers were reconsulted a need of new orientation was felt" (p.1). "Although, Biswas did not challenge the theoretical orientations of Rivers and Clements, yet by citing innumerable examples from Indian ethnographies, he was able to project India with its 'primitive medicinal' diversity. He was thus truly able to establish India as a world in miniature and corrected Rivers who thought that Asia (including India) lacked in disease object intrusion causative theory" (Joshi, 2016: 4). Biswas examined the existing knowledge and provided a critical perspective to it by highlighting Indian ethnographic elements.

In 1947 when the Department of Anthropology was established in the University of Delhi, P. C. Biswas was selected under the aegis of Maurice Gwyer, the then Vice-Chancellor of Delhi University to take over as the Head of the Department. Here, he continued to teach for the next twenty one years, gained his professorship, and supervised twenty PhDs, with a number of his students joining as faculty at different universities to strengthen the discipline. He had a pivotal role in the establishment of the Indian Anthropological Association, a representative body of the professional anthropologists in India, which was registered under the Societies Registration Act, in 1969, with the Department of Anthropology, the University of Delhi as its national headquarter.

Professor Biswas worked with the government and on developmental issues. For example, he wrote the 'Socio-economic Survey of Budhpur—A Delhi Village' in (1961) as part of a Census of India 1961 series of monographs. He also advocated the setting up of a board of tribal education consisting of experts

in tribal affairs. As chairman of the Anthropology Section of the 3rd Tribal Welfare Conference, he spoke about adult education along with the education of children, and a curriculum that considered the cultural background of the tribes and included practical training in agriculture, fishing, etc.

8.4 SASANKHA SEKHAR SARKAR (1908-1969)

S. S. Sarkar obtained a DSc. from the University of Calcutta in 1948. He also received training under the famous geneticist Eugene Fischer. He worked with the Anthropological Survey of India between the years 1947 and 1951 and was a research fellow at the National Institute of Sciences of India (NISI) (now renamed as Indian National Science Academy-INSA) from 1951 to 1956. In 1957 he joined the Department of Anthropology, the University of Calcutta as a lecturer, where he subsequently became a reader. In this period, he also worked for the Census of India.

Sarkar was interested in understanding the racial distribution within the Indian population, for this he studied the anthropometric characters of various indigenous populations and tried to reconstruct their racial types through historical origins. He was a part of the excavations at Harappa and Mohenjodaro. He also carried out intensive fieldwork among the aborigines of Bengal, Bihar, Assam, and Andaman and Nicobar Islands. "Through these studies, he tried to demonstrate empirically that the Indian sub-continent had never been an ethnic vacuum……..He indicated the presence of an Australiod element in the prehistoric population of the Indus Valley, as well as down south in the skeletal materials excavated from Brahmagiri. Apart from the presence of this autochthonous Australoid element, he hypothesised successive waves of immigration into India" (INSA). He proposed a "scheme of classification of the Indian people into six groups, namely, (i) Australoid, (2) Indo-Iranian, (3) Irano-Scythian, (4) Mundari-speaking, (5) Malayo-Polynesian, and (6) Mongoloid, based on metric data" (INSA).

He suggested an amalgamation of archaeological, cultural, linguistic, and other allied disciplinary information to understand, and to give due weight, to racial classification. He also stated that "blood group gene frequencies of populations should be looked at from the point of view of micro-evolutionary processes like isolation, admixture, etc., and put forward the interesting observations, as early as the forties, and fifties, that there is a south-north and an east-west ABO gene frequency gradient in the Indian subcontinent, a gradient running parallel to caste hierarchy, and so on" (INSA) pointing to the fact that the interrelationship between social and biological phenomena, are indeed considerable.

He further recommended that the knowledge of basic genetics should be utilised to provide marriage counselling in order to reduce/minimise the social burden of giving birth to a possible congenitally disabled individual.

Check Your Progress

1. How did Indian Anthropology establish itself in spite of and along with the British Colonial influence?

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2. Mention some of the projects that Guha was involved in his first stint at Zoological Survey of India, as an anthropologist.

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8.5 IRAWATI KARVE (1905- 1970)

Irawati Karve was India's first woman anthropologist at a time when anthropology and sociology were still developing as university disciplines. She was born in Burma and subsequently received her education in Pune. She pursued her BA (Honours) in Philosophy, with Sociology as major, from Fergusson College, Pune. She received the Dakshina Fellowship and went on to do her Master's in sociology from Bombay University, under the guidance of G. S. Ghurye, where she wrote significant papers on 'Folklore of Parshuram' and 'Chitpavan Brahman'. She continued her education and went to Kaiser Wilhelm Institute for Anthropology, Eugenics, and Human Heredity, (1928–30), where she worked under the guidance of Eugene Fischer. Her doctoral thesis was on *Normal Asymmetry of the Human Skull and Bones* and she was conferred her D. Phil degree in 1930 by Berlin University. In spite of her tutelage under Eugene Fischer she did not imbibe the racial biases of the scholar and was influenced more by the post-Independence nationalist version of Indology which emphasised the unity-in-diversity and the notion that while physical and cultural differences between castes represented diversity, India's unity lay in overarching Sanskrit texts (Sundar 2007: 14).

After her return to India, Iravati Karve worked as an administrator at SNDT Women's University in Bombay from 1931 to 1936. During this period, she was also engaged in postgraduate teaching. In 1939, she joined the Deccan College Postgraduate and Research Institute at Pune and remained a faculty at the Institute until her retirement. She served as the head of the Department of Sociology and Anthropology here and was also the Vice-Chancellor of SNDT College for some time. She also collaborated with the School of Oriental and African Studies of the University of London in England and the Humanities Division of the Rockefeller Foundation of the United States in the scope of her career as an anthropologist.

Karve's body of work represents a combination of integrated influences through her academic engagement with various subfields of anthropology. It reflects a) the Indological tradition from her early work with her MA supervisor, G.S. Ghurye, b) ethnological tradition which manifested through surveys of castes and tribes within India, c) German physical anthropology tradition which attempted to provide a genetic basis for the existence of a variety of groups (which she imbibed during her Ph.D. in Germany) and d) her passion for fieldwork which led her to take up new areas of research like socio-economic

surveys, or archaeological explorations with her colleague and archaeologist H. D. Sankalia (Sundar 2007: 14).

Iravati Karve was an Indologist who mined Sanskrit texts for sociological features. However, the Indological tradition that she subscribed to was very different from Dumont's in that there was no attempt at building or eliciting an underlying model of social relations. Instead, she was an Indologist in the classical Orientalist sense of looking to ancient Sanskrit texts for insights into contemporary practice (Cohn 1990: 143). Thus, Karve in her Indological work, explored ancient texts to explain the present, she then used anthropometric data to supplement her interpretations with 'hard facts'. She was an anthropologist, serologist, and palaeontologist, a collector of folk songs, a translator of feminist poems, and a Marathi writer. Her thesis, "on her own caste, 'The Chitpavan Brahmans—An ethnic study', is a classic example of physical anthropology (eye colour measurements) combined with an Indological discussion of caste origins in the form of the Parasurama myth drawn from popular versions and the Puranas……. as late as 1968, she retained a belief in the importance of mapping social groups like sub-castes on the basis of anthropometric and what was then called 'genetic' data (blood group, colour vision, hand-clasping, and hypertrichosis)" (Sundar 2007: 21). Some of her seminal works include 'Kinship Organization in India', 'Hindu Society — An Interpretation', 'Maharashtra — Land and People', 'Yuganta: The End of an Epoch'.

8.6 AYINAPALLI AIYAPPAN (1905 –1988)

Ayinapalli Aiyappan was born in Kerala. He pursued his graduation in Zoology from Presidency College, Madras, followed by an M.A. in Economics from the University of Madras, in 1927. After a small stint as a school teacher and a research assistant at Zoological Survey of India, Calcutta, Aiyappan joined the Government Museum, Madras as an anthropological assistant under Diwan Bahadur K. Rangachari, where he received his initial training in Anthropological fieldwork. He also received training in physical Anthropology under B.S. Guha, from the Indian Museum, during this period. In 1934, Aiyappan went to the London School of Economics, where he pursued his Ph.D. in Anthropology under Raymond Firth. He worked on 'Iravas and Cultural Change' and was awarded his Ph.D. in 1937. He returned to India and joined the Government Museum, Madras, and became the Superintendent of the museum post-independence. He was also a visiting professor at the University of Madras and Cornell University, during this time.

Aiyappan had an extensive interest in archaeology, which led him to join the excavation at 'Arikamedu' an archaeological site in Southern India, and he was conferred with the Saratchandra Roy Gold Medal of the Asiatic Society in Bengal, for his contributions to Archaeology.

He joined Utkal University in 1958, as a professor and head of the newly founded Department of Anthropology. Here he trained his students in not just anthropological fieldwork but collection and preservation of artifacts as well. He was also pivotal in opening Anthropology Departments in B.J.B. College and Khallikote College and laid stress on the opening of museums alongside the departments (Dash 2005).

Aiyappan also had a hand in planning for tribal welfare and activated the Tribal Research Bureau [presently termed as Tribal and Harijan Research and Training Institute (THRTI)]. He was an advisor to the institute and helped with the publication of the journal 'Adivasi'. The journal published research-oriented articles with reflections for much-needed governmental action in the upliftment of tribal groups and planning of programs for this purpose. It helped in the economic enhancement of certain tribal groups who learned to market their commodities directly to the government instead of through middlemen. Aiyappan was also the director of the Department of Rural Welfare of Orissa.

He was responsible for the reorganisation of the Orissa State Museum as a multipurpose museum with the addition of natural history, mining and geology, and anthropology galleries (Dash 2005). He subsequently joined Andhra University in 1966 as a professor at the Department of Anthropology after which he took over as the Vice-Chancellor of Kerala University in 1969. In 1970, he became the founder and chairman of the Centre for Development Studies, at Thiruvananthapuram, Kerala. He was also an Honorary Fellow of the Royal Anthropological Institute.

Aiyappan was a multifaceted individual, who successfully combined his multi-disciplinary knowledge of zoology, economics, and anthropology and its subfields in an inter-disciplinary continuum in his museological endeavours, tribal welfare initiatives, and academic, research, and institutional development.

8.7 MYSORE NARASIMHACHAR SRINIVAS (1916-1999)

M. N. Srinivas was born in Mysore. He received his B.A. in Anthropology and Sociology, and Masters in Sociology from Mysore University in the years 1936 and 1939 respectively. He received his initial training in ethnology under G. S. Ghurey, and received a PhD from Bombay University for his work among the Coorgs. In spite of finding mentorship under Ghurey, Srinivas was often in disagreement with him. He proceeded to pursue a D.Phil. (in Social Anthropology) from Oxford University, under the mentorship of A.R. Radcliffe-Brown and subsequently E.E. Evans-Pritchard. He completed his D.Phil. in 1947 and was appointed as a Lecturer in Indian Sociology at Oxford. His scholarship was such that he enjoyed the continued awards of different fellowships since his research pursuits in Bombay and was conferred with numerous awards throughout his life.

Srinivas returned to India in 1951 and joined Maharaja Sayajirao University at Baroda, where he became the first Professor and Head of the Department of Sociology. In 1959, he founded the Department of Sociology at Delhi University, under the Vice-Chancellor V.K.R.V. Rao. He strengthened the department by recruiting erudite scholars like sociologists M.S.A. Rao and Savitri Sahani, and anthropologists Andre Béteille and Gouranga Chattopadhyay. He also mentored a number of students who took up leading positions in departments of sociology and social anthropology in India. In 1968, the Department had gathered a high reputation and was recognised as a Centre of Advanced Study by the University Grants Commission. Srinivas also had a pivotal role in setting up the Institute

for Social and Economic Change at Banglore, in 1972, as a joint director with Prof. V. K. R. V. Rao. He remained a visiting Professor at this institute until his death. He was also a part of many Government Committees and an active member of the University Grants Commission, the Indian Council of Social Science Research, and Economic and Political Weekly.

M.N. Srinivas through his works introduced a number of key concepts that hold relevance in India's contemporary reality even today. During his first Ph.D., he introduced the idea of 'Brahminisation' as a mode of caste mobility and social change. He subsequently introduced the term 'Sanskritisation' as a more inclusive term than 'Brahminisation' in the spread of Hinduism. He included this shift in perspective under the influence of the structural-functional school of thought, in his book Religion and Society among the Coorgs of South India (1952), where he also introduces the ideas of horizontal solidarity and vertical solidarity within a caste and village respectively. Here, he also differentiated between the varnas and jatis in the understanding of castes and sub-castes, laying emphasis on the use of local terms to understand the Indian society better. He also emphasised the need for village studies in the understanding of the country. In his fieldwork in Rampur, Mysore introduced the concepts of 'dominant caste' and westernisation, distinguishing between ritual and secular statuses, and highlighting the role of western education, economic and political power in social mobility, and change. Contemporary ground realities in Indian society are further highlighted in the book *The Grassroots of Democracy: Field Studies of Indian Election*, a collection of nineteen essays that reflect on two national elections in India's rural, tribal and urban communities. The book conceived by Srinivas and A.M. Shah carries commentary on how primordial loyalties (caste, kinship, religion, tribe, clan) in varying combinations affect the electoral behaviour of the voters and delineates the continuity between local, regional, and national politics.

Srinivas was an ardent field researcher and advocated the same for Indian Anthropology and Sociology. His work '*The Remembered Village*', written from memory of his fieldwork (after the loss of his original field notes to a fire), adds a new methodological dimension to the practice of Anthropology.

Check Your Progress

3. Mention some key concepts that were explained by M. N. Srinivas.

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8.8 DEBA PRASAD MUKHERJEE (1931-2015)

Deba Prasad Mukherjee was born in Azimnagar, Dacca (now in Bangladesh). He completed his Bachelor's and Master's degree in Anthropology with specialisation in Physical Anthropology from Calcutta University in 1951. In the course of his career, he associated with a number of international, national governmental, non-government, and educational organisations, with

a zealous zest for academics and research. He began his career as a lecturer in Kandi Raj College, Murshidabad where he became the founder head of the Department of the newly created Biology department. Post this he worked as a senior investigator in the Planning Commission UNESCO project on "effects of Industrialisation". He also worked as a part-time lecturer in Bangabasi College while simultaneously pursuing the Statistician's Certificate Course at Indian Statistical Institute, Kolkata (in the evenings). In 1957, he joined the Anthropological Survey of India (at Shillong), as Research Associate, and conducted extensive fieldwork among the tribal population of North-east India. Further, in 1960, he joined a project on 'Race Crossing,' studying the first-generation Anglo Indians, conducted by Ruggles Gates. Here he studied the inheritance pattern of hypertrichosis of the ear rim (hair on the ear rim), looking at the extensive pedigree of the trait and presented proof of its Y-linked inheritance.

Mukherjee was interested in detecting inheritance through the study of dermatoglyphics and diseases. For this, he studied the handprints of Mahar caste population of Maharashtra, measuring the position of t-triradius. The paper that he wrote based on this data earned him the position of a Commonwealth Scholar at Galton Laboratory under Professor Penrose. Here he continued to complete his Ph.D. under the joint guidance of Sarah B. Holt and C.A.B. Smith and was awarded his degree in 1967. While he continued for another year at the Kennedy-Galton Centre (U.K), as an MRC Fellow, his key inclination was to work in India, he thus declined a teaching assignment at the U.K. and returned to India in 1969, where he worked ardently to include anthropology and human genetics into medicine.

On his return from the U.K, he joined as Assistant Director at National Institute of Family Planning and established a new division for 'Population Genetics and Human Development', and was a visiting professor to the Department of Anthropology (University of Delhi) and Department of Social and Preventive Medicine (Lady Irwin Medical College). He was recruited as an expert by the World Health Organisation, in 1971, as a part of the scientific group on genetic implications of family planning. Here he presented a paper on "Patterns of marriage and family formation in Rural India and Genetic implication of family planning", elucidating the long-term effect of the national family planning programme on human evolution.

Post his stint at the National Institute of Family Planning at Delhi, he moved to Sri Venkataswara University, Tirupati as head of the newly founded Department of Anthropology and Sociology. Here he motivated his students to pursue new areas of anthropological studies in the region including "inbreeding and population structure, growth research among children, cultural aspects of health practices among different castes, genetics of human fertility, family planning, human genetics and micro-evolutionary studies among tribal, caste and migrant populations, etc.," (Das 2015: 413).

Further, he founded a 'School of Anthropology' in Anthropological Survey of India as Deputy Director in 1975. In 1981, he joined the Department of Anthropology, Calcutta University, as Professor of Physical Anthropology and taught there for the next 15 years until his retirement in 1997. He continued to use his anthropological expertise for social causes and actively engaged

in "awareness camps of doctors, health camps, health and genetic study of hereditary diseases on outdoor patients of R. G. Kar Medical College, Calcutta. He established 'School of Human Genetics and Population Health' in 1993, with a group of social workers, physicians, and scientists, to address diseases and deformities from the perspective of medical genetics, genetic counselling in the individual, and genetic screening and detection in the community" (Das 2015: 413).

Check Your Progress

4. Mention some contributions of Prof. D.P. Mukherjee.

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8.9 SUMMARY

The early Indian Anthropologists had a significant role in establishing the academic discipline. In spite of being from varied positionalities within the discipline, they established a strong fieldwork tradition and advocated for the sub-disciplines of Anthropology to be used constructively and in communication with each other. They were pivotal in establishing various anthropological academic and research institutes, and their scholarship and writings established Indian anthropology on the global map, as well as highlighted the uniqueness of cultural characteristics of India. These anthropologists worked relentlessly to document the various tribes and communities of India for their socio-cultural as well as physiological specificities, contributing to census information as well as community development and welfare programmes. They were also advisors to the Government of India as well as non-government organisations at various capacities.

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8.11 ANSWERS TO CHECK YOUR PROGRESS

1. Refer to section 8.0
2. Refer to section 8.2
3. Refer to section 8.7
4. Refer to section 8.8

UNIT 9 ROLE OF PRACTICING ANTHROPOLOGY IN EPIDEMIOLOGY, PUBLIC HEALTH AND COMMUNITY HEALTH*

Contents

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LEARNING OBJECTIVES

After reading this unit, you will be able to:

- appreciate the relationship between culture and health;
- describe medical anthropology and its scope;
- analyse the theories of health and illness;
- discuss the methods used in health studies; and
- define ethnomedicine, epidemiology, public health and environment and community health in Indian populations

9.0 INTRODUCTION

Human beings learn the total way of life through enculturation and transfer their experiences and values to their children. This cycle is repeated in the life of every human being. Social anthropology deals with human behaviour and ideas. Medical anthropology is the subfield of social anthropology which studies the health aspects of human beings starting from perceptions to selecting the type of treatment for their ailment. Besides medical anthropology, the allied disciplines such as epidemiology, public health and environmental studies also shoulder responsibility in studying and promoting human health. The approaches of these disciplines are mutually complementing each other and practising anthropologists are benefited from trans-disciplinary approaches. In this unit, the salient features of these aspects are discussed. To begin with, let us understand the association between health and culture.

9.1 RELATIONSHIP OF HEALTH AND CULTURE

Culture is a learned and shared behaviour in the lifetime of human beings. Health is physical, mental and social wellbeing (WHO 1948) (www.who.int). Culture influences the human being from womb to tomb. With reference to health, culture influences various aspects of human beings either in isolation or in combination with socio-economic factors. These aspects include perception of illness, family members' response, influence on decision making for health-seeking behaviour, identification, classification and causative factors of disease, experience and expression of suffering, food preferences and avoidance in certain

health conditions and festival/rituals, belief on the treatment of provider, health care setting and suitability of medicine, culture-bound syndromes (group of symptoms characterising a particular condition which is specific to a particular culture) and their transmission to other cultures through acculturation (Hassan 2012).

Check Your Progress

1. Is there a relationship between culture and health?

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9.2 MEDICAL ANTHROPOLOGY

It is worth understanding medical anthropology because it is one of the components of social awareness. Medical anthropologists study the impact of culture on health and the influence of customs and rituals on the development of personal care. The sources for the development of medical anthropology are the attention of physical anthropologists to human evolution and adaptation; ethnographers' focus on primitive medicine, investigations on psychiatric components of culture and personality studies and contributions of anthropologists on global health (Foster et al. 1978). The scope of medical anthropology includes perceptions and beliefs of people on health, the evolution of general as well as holistic medicine and healthcare in different cultures, theories of diseases, causes of disease, socio-cultural perspective of diseases, the association of local (endemic) diseases and local problems, health care systems and medical pluralism, the influence of socio-economic and political factors in the access of health care and prevention, interventions, stress, and social support (Hassan 2012).

After having learned about medical anthropology, let us focus on various theories of health.

Check Your Progress

2. Define medical anthropology.

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9.3 THEORIES OF HEALTH

Theories of health and illness deal with the concepts and ideas of factors responsible for diseases (germs, loss of soul, breach of taboo, impairment in hot and cold balance and immune system of the body) and preventive measures to be taken to maintain the health. Theories of health and illness empower human

beings to understand the experiences of the body based on their core cultural values and to handle the challenging situations when encountered. Medical anthropology theories serve as concepts as well as their applications (Hassan 2012). A few perspectives of health are presented below.

9.3.1 The Functionalist Perspective

According to this perspective, the medical and health care institutions whether modern or traditional are social institutions. Practitioners working in these institutions by performing their roles and functions maintain social control and meet the needs of the members of the society. Advocates of ethno-medicine consider that the existence of health care institutions is due to the ideological traditions of its users. Further, they propose that though people have the choice in selecting the type of treatment, the health-seeking behaviour is driven by the cultural values of the user (Henslin and Nelson 1995; Hassan 2012).

9.3.2 The Ecological Perspective

This perspective takes the middle path between biological and cultural perspectives. Using evolutionary theory, it interprets health and disease in the framework of human ecology. It assumes that human biological adaptability or its value and cultural traits of specific environment influence the disease as well as resistance to the disease in organisms (Walker 1998). Diseases evolve in the specific local context and depend on the response of the people to ill health (McElroy and Townsend 1989). This perspective failed to explain:

1. The role of certain economic or political factors in influencing the environment and causation of disease
2. Whether the culture is an adaptive mechanism or part of the environment in which people are subjected to
3. Non-genetic nature of culture and
4. Heavy focus on the ecological variables than the interaction of biology, culture and environment (Springer 1992; Hassan 2012).

9.3.3 Bio-cultural Approach

It attempts to measure, describe and interpret how compelling factors in the environment influence the body (Hasan 2002; Wiley 1992). Clubbing both biological and social concepts, this approach proposes that human beings adapt to their environment using biological and behavioural modifications. This theory broadens the scope of the environment to include social factors. Though political and economic factors influence health, yet they are not investigated in this approach. Adaptation is viewed as a dynamic relationship between human beings and the environment.

Biomedical and biological terms (fat, blood pressure and blood lipid measurements) are explored for their association with health. Health is considered as the ability to adapt to the environment using biological and behavioural alterations. Though acquired immune deficiency syndrome (AIDS) is a biological disease, yet it is due to behaviour (sex with multiple partners and using of common syringes among drug addicts) that causes the spread of

infection among humans (Walker 1998). Preventive practices are aimed at changing high-risk behaviour by educating the people involved in it.

This approach is criticised for its non-applicability in non-western people (Armelagos et al. 1992), ignoring the role of social, political and economic factors affecting the health (Singer 1989) and influence of politics on the funding, execution and interpretation of the outcome of the health research (Morgan 1990; Hassan 2012).

9.3.4 The Critical Perspective

This theory views that health care systems are influenced by dominant social patterns and ideologies. The critical medical anthropologists investigate who will exercise authority on social institutions and how the power is delegated and expressed. Critical medical anthropology (CMA) believes that socio-economic differences in power and wealth at the individual, group, community or national level determine the health status and access to health care (Turner 1987). CMA deals with the causes of sickness, the experience of sufferer and action in the given political-economic background, the racist, and sexist dimensions of the biomedicine, association of medical systems with political structures and provider-patient relationship (Singer and Baer 1995). The body under the lens of CMA is considered as a social organism and its relationship with the environment falls under the scope of social relations. Both environment and health are viewed as social. Health is termed as the control and access to the material or non-material resources which are useful for maintaining a highly satisfying life (Baer et al. 1986).

CMA is criticised for not dealing with biological aspects of the disease, equating social inequality with genetic diversity and focusing on the recent past (Wiley 1992). Singer opined that CMA emphasised contemporary issues and human biological evolution is responsible for the contemporary status of the species (Walker 1998). CMA researchers should investigate the underlying socio, economic, political and environmental factors to understand the disease and local group's aetiology (Hassan 2012). Farmer (1992) and Brodwin et al. (1992) using CMA approach showed that people of a different culture can be differentiated based on the type of pain, experience and expression of suffering due to the social and economic factors (Hassan 2012).

9.3.5 The Cultural Interpretationist Perspective

This theory emphasises the social and cultural aspects of health, illness and disease. Illness and health are viewed as the products of complex interactions. They are shaped in such as way that the people give meaning to them and respond in socio-culturally accepted manner (Zerihun 2001; Hassan 2012).

9.3.6 The Biomedical Perspective

According to this perspective, patients are assumed to be passive recipients of instructions of physicians and treatment is recommended to the patient believing that it is caused by biomedical factors. Limitations of this perspective are, not taking into account patients' perceptions of illness and beliefs on treatment and influence of socio-economic and psychological factors on their health-seeking behaviour (Hassan 2012).

9.3.7 Behavioural Perspective

Behaviour learning theory gives emphasis on the environment and enforces adherence by educating. It believes that antecedents (beliefs or environment) and consequences (rewards or punishment) influence the choice of a patient in following a particular behaviour. The drawbacks of this perspective are reliance on the influence of external factors, following non-individualistic approaches and ignorance of less understood influences (habits, not accepting the diagnosis and past behaviour) on behaviour unlinked to immediate rewards (Hassan 2012).

9.3.8 Communication Perspective

As per this perspective, good health education skills improve patient-health care provider communication which ensures better medication/therapy adherence. This communication may require additional social or financial help (Hassan 2012).

9.3.9 Cognitive Perspective

This perspective includes the group of theories or models (Munro et al. 2005) mentioned in the following which assumes that attitudes, beliefs, expectations of future events or outcomes influence the health-seeking behaviour and target cognitive variables to change the behaviour. The theories of cognitive perspective advocate that when human beings have alternatives they choose the one that may result in a positive outcome.

i. **Health belief theory:** Perception of seriousness or susceptibility of disease influence the threat of disease perception and perception of barriers and benefits influence the effectiveness of health-seeking behaviour.

ii. **The protection-motivation model:** This model proposes that by targeting three components of fear arousal such as the probability of an event occurring, the magnitude of harm resulting from the event and the effective protective response, the changes in the health behaviour of an individual can be brought out.

iii. **Social-cognitive theory:** Multi aspects of casual structure involved in the regulation of human wellbeing, motivation and action provide information on the determinants as well as promotion of adherence.

iv. **Planned behaviour and reasoned action model:** The theory of reasoned action believes that socially accepted behaviour is influenced by the will of the person and the intent to be involved in a particular kind of behaviour which is the immediate and best determinant of that behaviour.

v. **Information-motivation-behaviour skills model:** This model was conceptualised to promote behavioural change especially for the prevention of HIV by promoting the use of contraceptives. This theory targets three components like motivation, information and behaviour skills to change the human behaviour (Hassan 2012).

9.3.10 Self-regulation Perspective

Individuals by combining past and new experiences form cognitive representations of illness threats that guide them in choosing strategies to cope with the illness threats and influence the related outcomes. This perspective assumes that people are active, self-regulated problem solvers, and motivated to treat or avoid health threats (Munro et al. 2005; Hassan 2012).

Check Your Progress

3. What are the theories of health?

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4. Discuss the cognitive perspectives on health.

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9.4 THEORIES OF ILLNESS

These theories of illenes are grouped into theories of naturalistic, supernaturalistic and emotionalistic causes.

9.4.1 Theories of Naturalistic Causation

These theories include the scientifically reasonable theories which explain the impairment of health as a physiological consequence of the experience of the victim. The theories under this section are divided into five types (Murdock et al. 1998; Hassan 2012)

i. **Infection:** This theory refers to the invasion of harmful micro-organisms into the body of the victim not implying the germ theory proposed by Robert Koch and Louis Pasteur.

ii. **Stress:** This deals with the resultant outcome in the victim due to exposure to physical or non-physical factors (emotional disturbances, fear, worry, extreme cold or heat, overexertion, prolonged thirst or hunger).

iii. **Organic deterioration:** This theory implies physical decline due to ageing, organ failure or genetic diseases.

iv. **Accident:** This describes the physical injury under situations devoid of the intent of the victim or intervention of supernatural powers.

v. **Overt human aggression:** This indicates the willful unpleasant action of causing bodily injuries on the other human being as seen in warfare, attempted suicide, brawls and violent quarrels.

In naturalistic causation, it is believed that when the body is in harmony with the environment it will be healthy and illness results when this is disturbed. Ayurveda, the Indian system of medicine, is found on the belief of natural causation of illness. The therapy includes preparation made up of herbs and minerals and diet-related instructions (Hassan 2012).

9.4.2 Theories of Supernatural Causation

Any theory which explains the impairment of health occurring as a consequence of the act or experience of the victim due to the contact with putative impersonal casual relationship than the intervention of human or supernatural being is defined as the supernatural causation. Fate or ill luck, spirit aggression, ominous sensations, contagion and mystical retribution are attributed as causes of illness or disease. Ill luck, the experience of some type of sounds, sensations, dreams and sights (ominous sensations) and belief in spirit aggression make the person perceive that they are responsible for his/her illness. In the same vein it is believed that diseases are caused by exposure to the contagion (person, substance or polluting object), violation of taboo or inappropriate behaviour towards supernatural beings, strangers, kinsmen and superiors (mystical retribution), hostile actions of supernatural beings or aggressive spirits and injuries caused by the malicious human beings employing witchcraft or sorcery (Hassan 2012).

9.4.3 Emotionalistic Causation Theory

This theory believes that illnesses are caused due to the experience of negative emotions. Emotional diseases specific to a certain environment or cultural traditions are termed as cultural bound syndromes (Howard and Dunaif-Hattis 1992). In some cultures, anxiety and fright has been shown to develop into an illness known as soulless or susto and a person with this illness are characterised by fatigue, vagueness, distraction and inactivity. In most of the cultures of Ethiopia, it is believed that supernatural beings such as saitan, ginnies, mitch, gannel and budda are responsible for causing various physical or psychological ailments (Zerihun et al. 2001).

As perceptions of illness influence the health-seeking behaviour of people the health care providers should be culturally sensitive when treating people belonging to different cultural and religious groups (Gallanti 1997; Hellman 2001; Hassan 2012)).

Check Your Progress

5. List out the theories of health and illness?

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So far you have learned various theories of health and illness. Now let us focus on the methods of study.

9.5 METHODS AND TECHNIQUES IN HEALTH STUDIES

Methods refer to the ways used in an investigation of people in an anthropological manner. The method used by medical anthropologists includes participant observation, case study, survey research, interviews, archival research, rapid assessment techniques, laboratory or clinical procedures, sampling techniques and statistical analysis. Methods should be adapted to the topic under study (Hassan 2012).

9.5.1 Participant Observation

This is a classical research method used by anthropologists. In this method, the field investigator integrates into the cultural context by learning a foreign language, living and involving in the daily life of a cultural group for an extended period to gain experience as a 'native' or born into it. As the interpretation of cultural context is based on the researcher they should be trained (Lambert et al.2002) and advised to avoid the conflicts with the local population in matters related to their perceptions and attitudes to the way of life and health-seeking behaviour of people under study (Hassan 2012).

9.5.2 Case Study Method

Case studies of individuals help in understanding the subject matter and reveal information on specific issues (Nitcher and Nitcher 1996). These authors investigated practices followed by women during pregnancy, fertility and demands for fertility control to understand reproductive health and found that in each of these issues, biological and social factors influence. Across different cultures, experiences, causative factors, consequences of mental and physical sufferings and expressions vary. Health care providers should recognize outstanding personality dimensions across the cultures as well as the interaction of individual and collective existence (Hassan 2012).

9.5.3 Survey Research

Surveys are useful in investigating the health status of the communities. Survey refers to the technique directed to the questioning of participants. Survey may involve in-depth interviews or short questionnaires. This method is employed in combination with other techniques suited to the topic under study (Lambert et al. 2002; Hassan 2012).

9.5.4 Cross-cultural Comparisons

This method is also called worldwide as cross-cultural analysis. Using this method, one culture is compared with another or several other cultures focussing on holistic or one element similarities between cultures to understand the causes of human behaviour unlinked to environmental, ethical or cultural perspectives and to gain insight into the health status of humanity (Lamber et al. 2002; Hassan 2012).

9.5.5 Documentation

This technique refers to the application of cross-cultural inquiries on written documents related to one culture or particular cultures or created on the specific second-hand studies of culture. The scope of this method has been expanded to include digital files (Lambert et al. 2002; Hassan 2012).

Check Your Progress

6. What are the tools used in the health research?

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The other important components of this unit are, ethnomedicine, epidemiology, public heath and environment and community health which are discussed below.

9.6 ETHNOMEDICINE

Ethnomedicine deals with different societies' notions of health and illness, including how people think and how people act about well being and healing (Quinlan 2011). Human beings when falling sick, think about how they had acquired it, how it will impact them and what needs to do to get relief from it. Individuals form explanatory (EM) models for each illness by clubbing their thoughts and circumstances with popular illness ideologies of the culture (Kleinman 1980). The convergence of EMs of both practitioners-patients is likely to lead to a better outcome for the patient. The goals of ethnomedicine are:

- investigation of health-related theories and knowledge by which people form medical common sense and treat their illness and
- translation of ethnomedicine knowledge to improve the health status of the group under study and develop alternative medical practices to the western and other medical systems.

Treatment options are categorised into professional (modern medicine), popular and folk. In professional healing, the researchers of ethnomedicine focus on communication and cooperation between providers and patients to improve practices and get better outcomes. Popular healers are common people who use common knowledge to heal for themselves and families to the tune of 70%-90% due to the problems of accessibility, the unacceptability of options, affordability and the need to travel longer distances (Helman 2001). Folk healing is done by midwives or spiritualists or herbalists or shamans or bonesetters, who are members of their culture. These specialists learn by self-exploration, unofficial apprenticeships and pass their knowledge to their kin.

The subfields of ethnomedicine are ethnophysiology, ethnopsychiatry and ethnopharmacology. Ethnophysiology study the notions of people on body

structure and function and their perceptions on internal organs, their roles and placements. This information will provide an idea of how different cultures perceive and respond to health issues. Ehnopsychiatry investigates the perceptions and practices related to mental health in different cultural groups. Culture influences the recognition, expression and manifestations of mental illness as a result of which differences are encountered across the cultures. The treatment practices (herbal/animal/mineral) used in relation to the illness in different cultural groups is the subject matter of ethnopharmacology. This subfield often uses the botanical and biochemical information of treatment constituents (plants/minerals). Ethnopharmacology researchers study the purpose, mode and timing of therapeutic substance usage (Quinlan 2011).

Check Your Progress

7. Define ethnomedicine and list out its subfields?

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9.7 EPIDEMIOLOGY

"Epidemiology is the study of distribution and determinants of health-related states or events in specified populations, and the application of this study to the prevention and control of health problems" (Last et al. 2000). Epidemiology report the distribution of disease and health-related problems in populations, causative factors of diseases, supply data required for setting priorities, planning, management and evaluation of health services for prevention and control of diseases.

Epidemiology inquires about time, place of the health-related outcome and characteristics of affected people and investigate what needs to be done to reduce, prevent and resources required for the management of health-related events. The other approach used by epidemiologists is to compare groups of people with and without diseases for differences in environmental factors and hosts in order to find the clues of the disease.

Epidemiologist measures the indicators of mortality and morbidity in populations using a tool such as rates (occurrence of a health-related event in a particular population in a given time period), ratios (relation between the size of two random quantities example; sex-ratio) and proportions (percentage of affected people in a given population). For measuring mortality, data from death certificates are collected and used to calculate the crude and specific death rates, case fatality rate, proportional mortality rate, survival rate and standardised death rates. Morbidity (sickness) data on populations is investigated using incidence (occurrence of new cases) and prevalence (occurrence of new and old cases) (Park 2013).

Methods employed in epidemiology are broadly of two types i.e., observational and experimental. In the former group the cause of the disease is observed whereas, in the latter group, the cause of the disease is controlled. Observational

epidemiological methods are divided into descriptive (case reports and case series) and analytical (ecological, case-control, cross-sectional and cohort) categories. Using the descriptive methods, only a description of patients is made whereas, in analytical methods, the causative factors of the disease are investigated using comparable groups which are similar to the patients in all characteristics except disease. Experimental methods are grouped based on the randomisation of subjects into randomised (field trials, randomised controlled studies and community trials) and non-randomised methods (uncontrolled trials, natural trials, interventional studies without controls, pre-post interventional studies and crossover interventional studies) (Aggrawal and Ranganathan 2019; Park 2013; Bonita et al. 2006).

The application of epidemiology includes the investigation of trends, magnitude and patterns of diseases, identification of causative factors of diseases and high-risk groups at the community level, planning for the health services and, defining and refining the characteristics of the medical conditions (Park 2013).

Check Your Progress

8. Define epidemiology?

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9.8 PUBLIC HEALTH

As per the American public health association, "Public health is a discipline that promotes and protects the health of people and the communities where they live, learn, work and play" (www.apha.org). Public health uses community efforts to prevent diseases and promote health. Health behaviour is influenced by biological, social, environmental and cultural factors. Public health employs multidisciplinary approaches to find culturally sensitive and acceptable strategies to improve the health of the community. Public health officials conduct surveillance of diseases from time to time to know their trends and prepare strategies to reduce and control them. Ethnographic approach on the investigations of perceptions and beliefs on illness and health-seeking behaviour in different communities, qualitative (focus group discussions, in-depth interviews, diary methods, participant observation, case studies and role-play simulation methods), quantitative (surveys) and rapid assessment techniques are the important contributions of anthropology for collection and interpretation of public health data. The rapid assessment technique provides reliable contextual information to the public health research which empowers them to take decisions on the execution of public health programmes in the local contexts.

The subfields of public health are environmental health, epidemiology, behaviour health, community health, biostatistics, health education, health economics, occupational health, reproductive health, nutrition, health, demography and ecology.

The scope of public health includes:

- Preventing people from getting affected with diseases or injuries, educating and promoting healthy behaviours and sanitation.
- Creating conditions for health promotion activities such as creating footpaths along roads and parks for physical activity, requesting public through advertisements to wear seat belts while travelling in cars and helmets on bikes, ensure smoke-free public places, and encouraging governments to hike taxes on cigarettes/ beedi to discourage smoking and reduce salt and sugar in food products.
- Vaccination of children to develop immunity against various infectious diseases.
- Detection and control of outbreaks.
- Assessment of health.
- Birth control.
- Detection of burden and magnitude and trends of disease.
- Providing a safe environment in terms of safe water and food, sewage (solid and liquid excreta), sullage (wastewater coming from kitchens and clothes washings) and sludge (digested waste) removal.
- Ensuring accessibility, accountability, planning and improving health services.
- Surveillance of communicable and non-communicable diseases and policy development (Anand 2018; Mazumdar 2012; Gidey et al. 2006).

Check Your Progress

9. State what is public health?

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Reflection

Do you think public health had a role to play in the COVID 19 pandemic? If yes, list some areas where you think public health had a role to play.

9.9 ENVIRONMENT AND COMMUNITY HEALTH IN INDIAN POPULATIONS

The environment can be defined as all living organisms (plants, animals, virus and bacteria), non-living objects (soil, water, air, housing, and disposal of sewage) and social factors (religion, income, customs, occupations, culture and habits) associated with human beings. All these factors are associated with each

other and also with human beings. Effects of environment on community health are described below keeping the Indian scenario into consideration.

9.9.1 Water

Water is required to support the life and wellbeing of organisms including human beings. Water to be consumed should be free from microbes, chemicals and devoid of colour and odour. The sources of water are rainwater, surface water (lakes, ponds, tanks and reservoirs), seawater and groundwater. Seawater is used where it is the only source after desalting and demineralisation. Human beings acquire water-borne diseases by using water contaminated with viruses, bacteria, protozoa and helminthic parasites for ingestion, maintenance of hygiene and participation in recreation activities (swimming). This cause viral (diarrhoea, poliomyelitis, hepatitis A and E), bacterial (typhoid, diarrhoea, dysentery and cholera and leptospirosis) and helminth infections (ascariasis, strongyloidiasis, schistosomiasis and dracunculiasis or guinea worm). Detection of coliform group of bacteria (Escherichia Coli, Kleibsiella aerogens, Streptococci, Clostridium perfringens) in water is used as an indicator for bacterial contamination. Bacteria, viruses, protozoa and helminthic parasitic species are added to the water sources through human or animal faecal contamination. The excess chemical constituents of water such as arsenic, cadmium, chromium, fluoride, lead, mercury, nitrates, carbon tetrachloride, chlorinated alkenes and ethane, aromatic hydrocarbons, dichloromethane, hydrocarbons (example benzene) and pesticides have been shown to cause health problems. These are introduced into the water sources through agricultural wastes and effluents of industries.

9.9.2 Air

Air provides oxygen, cools the body, transmits hearing and smells stimuli, and also spreads disease-causing agents (virus, bacteria and fungi). Any substances which interfere with the health of human beings, and are harmful to the vegetation and animals, can be called pollutants. Pollutants can be solids, liquids or gases. The sources of air pollutants are automobiles, industries, domestic sources (passive smoking and emitters from the burning of coal, oil and wood) and miscellaneous (nuclear reactors, dust, fungi, incinerators). Greater than 100 air pollutants have been reported but among them, the main pollutants are sulphur dioxide, carbon monoxide, lead, carbon dioxide, hydrocarbons (emitted out of burning of coal and petroleum) and polycyclic aromatic hydrocarbons (example- benzo a pyrene, naphthalene), cadmium, ozone, hydrogen sulphide, oxides of sulphide, and particulate matter (2.5μm). Air pollution is monitored by measuring the levels of smoke, suspended particles and sulphur dioxide by the National Air Quality Monitoring Programme in India. The immediate effects of pollution are acute bronchitis (asthma) and in severe cases cause death due to suffocation. Long-term exposure to the air pollutants results in respiratory allergy, emphysema (damage of air sacs in lungs) and lung cancer.

9.9.3 Noise

It is an unwanted or wrong sound. The main sources of noise are factories, industries, air crafts and automobiles. Noise is expressed in decibel (dB) or Hertz (Hz) (waves per second). Sound greater than 90dB or 4000Hz causes

buzzing and whistling. Repeated exposure to sound around 100dB, results in permanent hearing loss. Speech communications are disturbed in the range of 300-500HZ. A rise in blood pressure, heart rate, breathing and sweating, nausea, giddiness, fatigue, disturbances in sleep and vision were reported due to the exposure to noise in human beings.

9.9.4 Housing

It encompasses the house, its neighbourhood and the associated community services. The functions of housing are shelter, economic stability, family life, availing of community services and participation in the community life. Respiratory and skin infections, isolation, higher morbidity and mortality, house accidents, higher risk of infectious diseases (plague, malaria, typhoid, cholera, diarrhoea and dysenteries, helminth infections, conjunctivitis, poliomyelitis and trachoma) are associated with poor housing. Overcrowding in the houses has been shown to increase the spread of infectious diseases (diphtheria, influenza and tuberculosis) and psychosocial stress.

9.4.5 Disposal of Sewage

Sewage is solid and liquid excreta originating from houses and commercial complexes. Improper disposal of sewage pollutes the water, soil, food and act as a breeding ground for flies and mosquitoes. Intestinal and parasitic diseases, cholera, diarrhoea, typhoid, paratyphoid, hepatitis and dysentery are the diseases reported to be caused by the improper disposal of excreta (Parker 2013).

Check Your Progress

10. Delineate the health effects of water, air and noise?

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9.10 SUMMARY

Culture is learned and shared behaviour and health is a state of physical, mental and social wellbeing. Culture influences health from the perception of illness to the taking of treatment. Medical anthropology a subfield of anthropology studies the impact of culture on the development of personal care. The scope of medical anthropology is to investigate the evolution of medicine, theories on illness, associations of illness with local problems and medical pluralism. Several theories such as functional, ecological, bio-cultural, critical, cultural interpretation, biomedical, behavioural, communication on health and cognitive and naturalistic, supernatural and emotionalistic theories on illness were proposed to know the causative factors of disease, preventive measures to maintain health, to understand the bodily experiences based on their core values and to handle the challenging situations. Participation observation, case study, survey research, cross-cultural comparisons and documentation tools are used in the research of health.

Ethnomedicine deals with ideas of people of different cultures on illness and health and what they do to maintain health and healing. People form explanatory models on each illness by integrating their thoughts and circumstances with cultural ideas. The three subfields of ethnomedicine are ethnophysiology, ethnopsychiatry, ethnopharmacology. Epidemiology like medical anthropology studies the health status of people using a larger sample and sampling techniques with a causative approach. Anthropologists use an ethnographic approach and involve the population of a particular cultural group. Epidemiology using observational and experimental methods investigates health-related events. Public health mainly focuses on the preventive and health promotion aspects. Public health uses a multidisciplinary approach to find culturally acceptable ways to improve the health of the community members.

The environment includes biological, non-biological and social factors. These factors have ill health causing effects through polluting water, soil and air, spreading and inducing the diseases. Noise which is an unwanted sound can cause temporary to permanent hearing loss apart from health problems ranging from high blood pressure to visual abnormalities. Poor and overcrowded housing can spread infectious and parasitic diseases and cause psychological stress among its members. Improper disposal of human excreta can lead to the spread of infectious and parasitic diseases.

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9.12 ANSWERS TO CHECK YOUR PROGRESS

1. Refer to sections 9.1
2. Refer to section 9.2
3. Refer to section 9.3
4. Refer to section 9.3.9
5. Refer to section 9.3 and 9.4
6. Refer to section 9.5
7. Refer to section 9.6
8. Refer to section 9.7
9. Refer to section 9.8
10. Refer to section 9.9

UNIT 10 FORENSIC ANTHROPOLOGY*

Contents

LEARNING OBJECTIVES

After the completion of the unit, you will be able to:

- decipher the role of skeletal remains in personal identification like age, sex, or stature;
- understand various techniques and concepts used for personal identification, e.g., biometrics, dermatoglyphics, etc.;

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- gain the knowledge of body fluids or blood samples and their analysis as the forensic evidence for identification; and
- provide information on how forensic anthropology is being practiced by expert forensic anthropologists.

10.0 INTRODUCTION

The applied field of physical anthropology which focuses on the identification of skeletal remains for the purpose of legal or forensic issues is known as forensic anthropology.

Forensic scientists employ physical anthropology techniques to determine age, sex, stature, ethnic group, etc. from the long bones, skull. Forensic anthropologists work with the medical fraternity to identify the body fluids, bloodstains, explosives, pathology, fingerprints, ballistics, etc. obtained from the crime scene and analyse them.

The skeletal remains are investigated for the following three reasons:

- Unidentified skeleton remains/ body in criminal cases is discovered.
- Mass disaster dead identification for an inheritance, insurance, etc.
- Mass graves found during war or genocide.

Different definitions of forensic anthropology as defined by physical anthropologists are mentioned below:

Charles Snow in 1973 defined Forensic anthropology as the application of physical anthropologist's specialised knowledge to human sexual, racial, age and individual's unusual variation to the problem of medico-legal jurisprudence.

Thomas Stewart in 1979 defined forensic anthropology as a field of physical anthropology which for forensic purposes identifies more or less skeletonised remains known to be or suspected of being human.

Douglas H. Ubelaker in 1996 explained Forensic anthropology as the science of applied physical anthropology to the legal and court process to find the identity of skeletonised remains and related legal framework or structure.

Human skeletonised remains' identification helps to establish whether offence or crime was committed and to identify the culprit of the offence along with the age, sex, stature of the individual. It helps to solve the cases of dowry deaths, burning, throwing away of the bodies, mutilated bodies, plane crashes, explosions, etc. The basis of skeletal identity is the determination of sex, estimation of sex, and age.

The function of Forensic anthropologists is to establish the cause of death during the investigation and knowledge gained by them helps the law enforcement agencies to get the answers and conclusion i.e., outcome of the investigation. The application of techniques and knowledge of physical anthropology is evident in forensic anthropology to solve medico-legal cases.

10.1 HISTORY OF FORENSIC ANTHROPOLOGY

Forensic Anthropology is a recent field and its history is divided into four phases.

Formative Period (1849-1938): In 1894 at Harvard, Thomas Dwight delivered Shattuck's Lecture on the analysis of human skeletal remains in a legal setting and was hailed as the "Father of Forensic Anthropology".

Consolidation Period (1939-1971): Tom McKern and T. Dale Stewart in 1954 published skeletal changes in young American males and identified the techniques for the determination of age from skeletal remains of Korean War soldiers. In 1962 Wilton Krogman wrote and published *The Human Skeleton in Forensic Medicine* which is used till date. Computer invention in 1960 helped forensic anthropologists to apply statistical concepts for the identification of sex and origin of skeletal remains.

Modern Period (1972-1999): In physical anthropology, a section of forensic anthropology was developed by the American Academy of Forensic Sciences (AAFS). The creation of the American Board of Forensic Anthropology (ABFA) in 1977 for certification of professional forensic anthropologists and professional standards was defined. The "Body Farm" was established at the University of Tennessee, Knoxville to carry out the research of human decomposition and taphonomy by Dr. William Bass in 1980. FORDISC (Computer Program) was designed by Dr Richard Jantz and Stephen Ousley in 1986 which enabled the forensic anthropologists to carry out the metric analysis on skeletal remains of data of contemporary populations with an objective to estimate height, sex, or ancestry from the measured data. Dr Clyde Snow (1990) trained forensic anthropologists to research human rights and genocide cases. The first private forensic anthropology lab was set up i.e. C.A. Pound Human Identification Laboratory (CAPHIL) in the University of Florida by Dr. William R. Maples (1992).

Fourth Era (2000-present): In 2000 Ellis Kerley Foundation was set up as the first funding agency for forensic anthropology research. ASCLD-LAB (American Society of Crime Laboratory Directors- Laboratory Accreditation Board) came up as the first lab in 2003 to obtain the skeletal identification accreditation. In 2003, the Forensic Anthropology Society of Europe was created as a subsection of the International Academy of Legal Medicine. This organisation aims to promote forensic science in Europe in the same manner as ABFA.

10.2 TYPES OF EVIDENCE

Evidence is an instrument to establish a crime and determine links to a suspect from the crime. Evidence plays an important role to identify a victim or innocent, confession and provides the directions for further investigation.

Let us understand the types of evidence;

Circumstantial and Direct Evidence: Indirect evidence, facts are established by direct evidence like an eyewitness while in circumstantial evidence like fingerprint or hair, a jury or judgement is required.

Physical and Biological Evidence: Non-living evidence like fibres, fingerprints, paint, glass, etc. form physical evidence and evidence like blood, saliva, hair, etc. play a major role and are biological evidence.

Reconstructive Evidence: The pieces of evidence like broken glasses, pried-open doors, etc. which help to reconstruct the crime are referred to as reconstructive evidence.

Associative Evidence: Any evidence that can link a person to the scene is known as associative evidence. The identification of the culprit is based on the association of fingerprints, blood samples, etc. but the results are not conclusive as someone else might have committed the crime.

The evidence recognised by the court is real (any material present at the crime scene when the crime was committed), documentary, demonstrative, testimonial, or digital evidence.

Forensic anthropologists study skeletal remains like bones, teeth, etc. that are found at the crime scene if it is a case of murder or due to natural calamities resulting in a number of deaths.

Check Your Progress

1. Define the term forensic anthropology.

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2. State the applications of forensic anthropology.

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3. Write a short note on the types of evidence.

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10.3 SEX, STATURE, AND AGE IDENTIFICATION FROM BONES

The human skeletonised remains' identification helps to establish whether offense or crime was committed and the culprit of the offence along with the age, sex, stature of the individual. It helps to solve the cases of dowry deaths,

burning, throwing of the bodies, mutilated bodies, plane crashes explosions, etc. The basis of skeletal identity is to determine sex, stature, or age. The investigations provide clues to the following:

- Is the material a bone?
- Whether the bones are of a human or non-human and of one or more persons?
- What was the approximate age, ethnicity, sex, or stature of the individual who the remains belong to?
- What was the reason or time of death along with any other differentiating characteristics?

10.3.1 Is the Specimen a Bone?

In situations, where there are intact bones or large bone pieces, identification is generally upfront. In such cases, where there are only bone fragments or they are bleached or burned, then the microscopic analysis must be performed. In these situations, the existence of the Haversian canal is proof that the specimen is a bone.

> ***Reflection***
>
> Haversian canal: The structure of bone is an important consideration for the size, type, and surface of dental implants. Haversian canals are microscopic tubes or tunnels in cortical bone that house nerve fibers and a few capillaries. This allows bone to get oxygen and nutrition without being highly vascular.
>
> www.icoi.org/glossary/haversian-canal/

10.3.2 Determination of Bones as of Humans or Non-Humans

On the basis of the size and condition of the bone, the species may be macroscopically determined by comparing the characteristics to those of several animal species. In some cases, some hair or tissues remain clinging to the bone and they can be analysed and observed to determine their type. If the bones are too damaged or too small for macroscopic examination, then a microscopic examination can be performed. In these cases, the original species may not be analysed, but the chances of it being a human bone may be ruled out. Let's study the comparative anatomy that forms the basis to distinguish between human or non-human bones as mentioned below:

Step-1: The animal skull possesses a large facial part as compared to the cranial part.

Step-2: Human cranium is large while the facial part is small.

Step-3: The location of the foramen magnum is posterior in animals while median in humans.

Step-4: The placement of eye-orbits is lateral in non-humans and anterior in man.

Step-5: Human bones show torsion and non-human bones do not.

Step-6: The difficulty arises when synthetic materials at high temperature might take a bone-like shape, then identification is based on head or condyles

of bone or microscopic study to see the presence of Haversian canal system as a confirmation for bone.

Maturity and morphology help to distinguish between the non-human animals whose bones resemble the bones of juvenile humans and their characteristics are mentioned below:

- Fused epiphysis is exhibited in long bones of small adult non-human bones while juvenile humans have either un-fused separate or absent epiphysis.
- Morphological indicator is that in human juveniles long bones possess rough distal and proximal ends with the eventual fusion of epiphysis to the metaphysis.
- Fusion of tibia and fibula is seen in the non-human skeleton with the curvature of the shaft but normal juvenile humans have a straight bone shaft.
- Fusion of pelvis bone into one means non-humans but the size and multiple pieces exhibit juvenile humans and two pelvic bones are of an adult human.

The shape of the bones helps to differentiate between humans and non-humans as mentioned below:

- Skull is globular in humans while elongated in non-humans.
- Reduced nasal bones, parabolic maxillary and mandibular arches, foramen magnum at the base of the skull, and true forehead with forward-directed orbits are characteristic morphological features of humans.
- Nuchal crests in skull bones are common in animals, and humans have supra-orbital ridges and nuchal lines.
- Mandibular angle is acute in humans and obtuse in animals.
- Linea – aspra is located on the back-side of the femur in humans but absent in animals.

Biological Profile

After the determination of human bone, the identification process starts. First, the class characteristics are recognised as a biological profile. Then, individual characteristics are analysed that could result in absolute identification. The class features will help the anthropologists to keep the skeletal remains in a sub-section such as males, or as a section of a specific race. Other parameters such as socioeconomic status, stature, and time since death can also be analysed. Due to the variations in the skeletal features among people within the same sub-section, it is sometimes important to refer to collections or databases of skeletons, belonging to a specific sub-section so that range of variation within a sub-group can be known. The major class features that are analysed as a section of the biological profile are gender, age, stature, and race.

10.3.3 Remains of One or More Individuals

Skeletal remains of one or more individuals are carried out by sorting technique i.e. to find the similar bones and then their number; this helps us to find the number of individuals as the number of bones in humans is definite e.g. a pair

of legs and arm bones, together are 12 pairs, thus if there are more number of bones then it indicates remains of more than one individual.

10.3.4 Sex Determination from Skeletal Remains

Sex determination along with the investigation of skeletal remains, is an important area of forensic anthropology. Sex determination is based upon the detailed morphological study of pelvic bone and skull and the distinguishing characteristics are described in Table 10.1 and 10.2.

Table 10.1 Sex Determination from Pelvic Bone

S. No.	Trait	Male	Female
1	Pubic symphysis	Broad, more triangular, and biconvex anterior–posteriorly	More narrow and rectangular; flat posteriorly and convex anteriorly
2	Greater sciatic notch	Deep, more acute angle	Wide and shallow
3	Ilia	High, more upright	Lower, more flaring in upper part
4	Acetabula	Larger, more forwardly directed	Smaller, more laterally directed
5	Pre-auricular sulcus	Generally absent to small	Commonly better developed
6	Iliac auricular surfaces	Not elevated from surrounding bone	Partially or completely elevated
7	Ischio-pubic ramus	Broader, less everted	Often everted with ridge
8	Ventral arc	Absent	Present
9	Sub-pubic arch	V-shaped	Broader U-shaped
10	Dorsal pubic pits	Absent	Sometimes present
11	Obturator foramina	Larger, more oval	Smaller, more triangular
12	Sacrum	Relatively high and narrow	Shorter and broader, less curved in the upper portion
13	Pelvic inlet	Heart-shaped	More elliptic, spacious
14	True pelvis	Smaller	Shallow, more spacious, less encroached by ischial spines

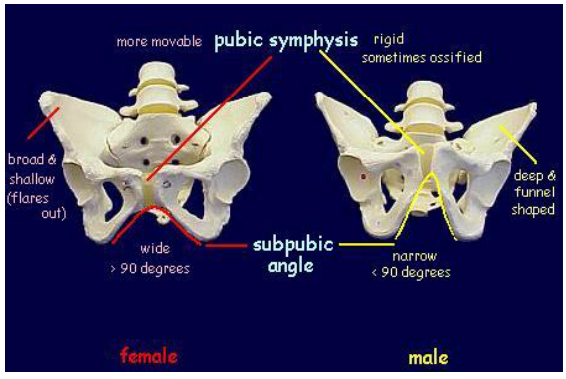

Fig. 10.1 Pelvis Bone of Male and Female

Source: https://onlinesciencenotes.com/differences-between-male-pelvis-and-female-pelvis/

Table 10.2 Sex Determination from Skull

S. No.	Trait	Male	Female
1	Size of vault, face, teeth	Larger	Smaller
2	Robustness	Greater muscularity relief	Less relief
3	Supraorbital ridges	More pronounced	less pronounced
4	The superior border of the orbit	Dull	Sharp
5	Forehead	More retreating	Rounded, frontal eminences frequent
6	Mastoid process	Longer, more robust	Shorter, less robust
7	Occipital muscle attachments	Nuchal crests	Nuchal lines or ridges
8	External occipital protuberance	Well developed	Occasionally well developed
9	Posterior zygomatic arch	Extends past auditory meatus as a ridge	Less stout, generally ends at auditory meatus
10	Chin	Squared off	Rounded
11	Gonial angle	Close to right angle	More obtuse angle
12	Gonial region	Flaring	Little flare
13	Ascending ramus	Stouter, broader	Narrower with smaller coronoid process

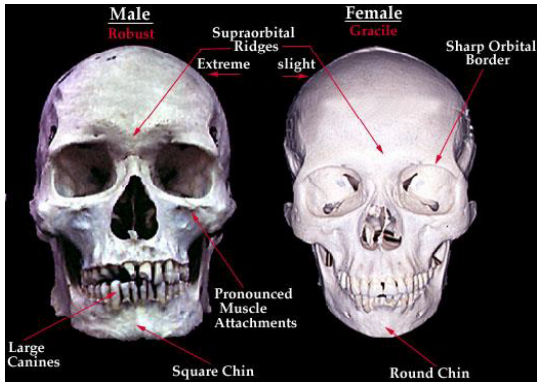

Fig. 10.2 Skull of Male and Female

Source: https://www.quora.com/What-are-the-absolute-facial-features-which-would-enable-one-to-distinguish-between-women-and-beardless-moustacheless-men)

Sex is also determined from the long bones, mandible, and clavicle but more identifying characteristics are present in the skull and pelvis.

Sex Determination from Indices

Cranio – Femoral index: The association of the weight of the two femurs to the weight of the skull. If the mean index is

Males - more than 1; Females - less than 1.

Cranio- Mandibular index: The correlation between mandibular weight including the teeth to the weight of the skull which highlights masticatory apparatus development, and values are: Males - 14.4 or more; Females - 13.3 or less.

Ischio-pubic Index: The association of pubic length (mm) to ischial length (mm) and range Males - 73-94; Females - 91-115.

Sciatic notch Index: The correlation of width of a sciatic notch to the depth of sciatic notch Males - 4-5; Females- 5-6.

10.3.5 Age Estimation from Skeletal Remains

The skeletal remains provide clues for the estimation of age but are dependent upon the type of material available and features taken into account are:

- Histology of bone (number of osteon increases with age),
- Eruption of teeth sequence,
- Closure of cranial sutures,
- Pubis symphysis face,
- Ribs sternal end,
- Bones ossification.

Human beings have two sets of teeth i.e., milk and permanent teeth; thus, the growth and formation add knowledge to identify the age of the individual. The teeth development eight-stage formula was given by Demerijan along with changes in teeth to determine the age. Gustafson designed a method to estimate the age above 11 years by visualising the following degenerating phases:

- Periodontosis,
- Attrition (wearing down of incisal or occlusal surfaces)
- Cementum apposition
- Development of secondary dentine
- Transparency of root
- Root resorption

The skull can provide the age of the remains by recognising the closing of different cranial sutures (refer to the figures) as mentioned below as the start of the closure completely gives the information of the age.

- Metopic suture,
- Basilar suture,
- Sagittal suture,
- Lambdoid suture,
- Parieto-mastoid Suture
- Temporo-mastoid Suture
- Occipito-mastoid,
- Spheno-temporal
- Spheno parietal

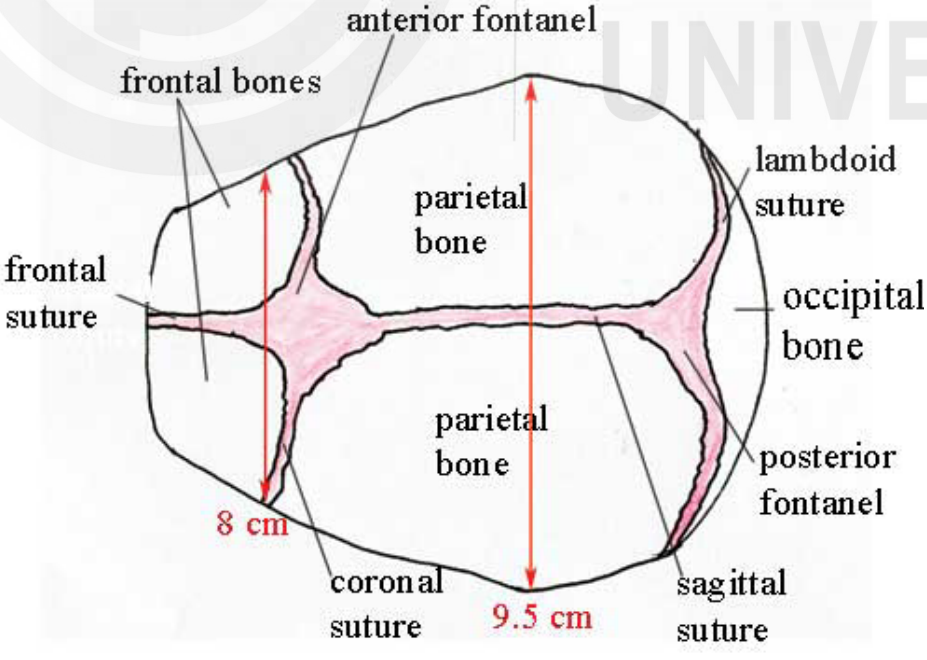

Fig. 10.3 (a) Sutures of the Skull

Source: https://forensicsdigest.com/scope-of-forensic-anthropology-estimation-of-age/

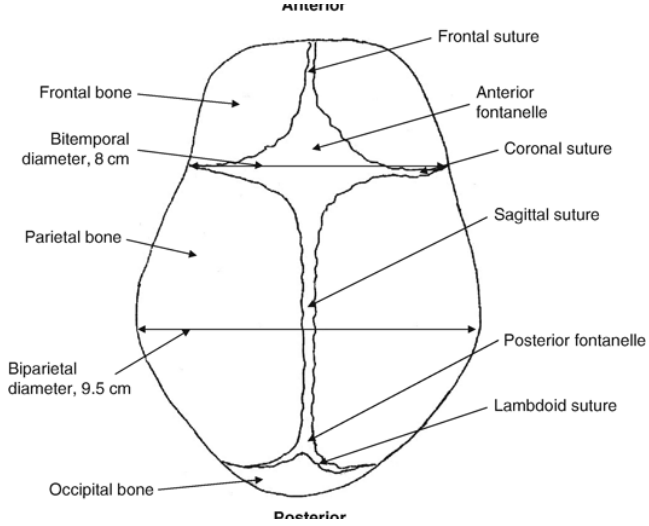

Fig. 10.3 (b) Sutures of the skull

Source: https://forensicsdigest.com/scope-of-forensic-anthropology-estimation-of-age/

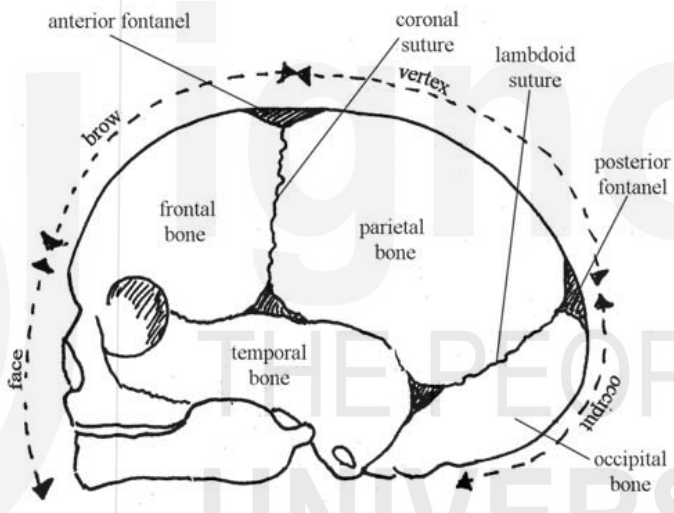

Fig. 10.3 (c) Sutures of the Skull

Source: https://forensicsdigest.com/scope-of-forensic-anthropology-estimation-of-age/

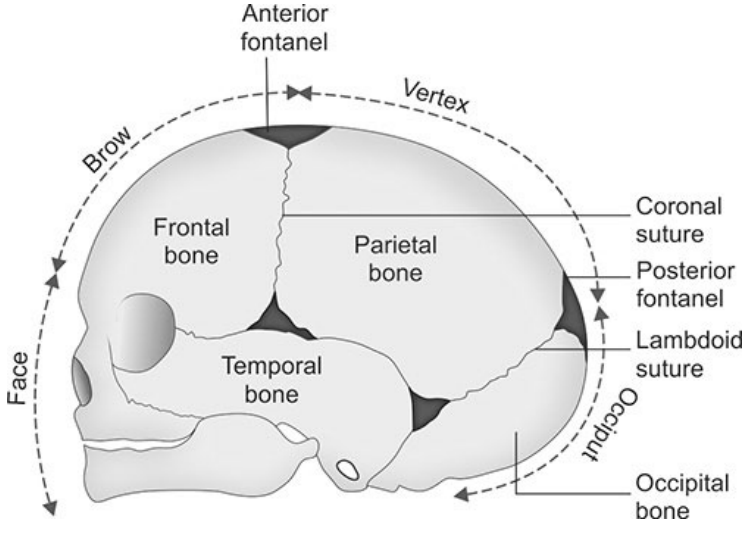

Fig. 10.3 (d) Sutures of the Skull

Source: https://forensicsdigest.com/scope-of-forensic-anthropology-estimation-of-age/

Other characteristics for age determination are studying the face of pubic symphysis i.e., changes studied on the surface. The whole process is divided into 10 stages like inner or outer border and inferior and superior extremity and other features on the surface like billowing, ridging and ossific nodules help to estimate the age. The changes in the rib's end in relation to shape, form, texture, or quality are also used for age determination. Ossification is also a criterion for age estimation but requires specialised techniques like CT or X-rays.

10.3.6 Estimation of Stature from the Skeletal Remains

In forensic anthropological research, the central position is occupied by the stature determination from the long bone remains. The stature also helps in the partial identity of the persons in forensic analysis. As the whole of body skeletal remains is not available, the experts employ mathematical modelling to estimate the stature.

Stature Reconstruction from a Bone Fragment:

The method for the reconstruction of stature was developed by Muller in 1935 based on either regression equation i.e. long bones measurements compared with the chart or multiplication factor i.e. Stature = Maximum length of the long bone x Multiplication factor. Long bones used for stature are the Femur, Fibula, and Tibia of the leg and Ulna, Radius, and Humerus of the arm.

Bone	Male	Female
Humerus	5.3	5.3
Radius	6.8	6.7
Ulna	6.0	6.0
Femur	3.8	3.8
Tibia	4.4	4.4
Fibula	4.5	4.4

For example: If Femur Length is 44cm then the approximate stature would be 44x3.8=167.2 cm.

Determination of Race:

The determination of the ancestry or race of a person can be quite difficult. The skeleton does not possess many apparent features that describe racial characteristics. Certainly, these days there are no original racial or ethnic groups. One of the most reliable means for race determination in the skeleton is focused on the skull and is based on gross morphological analysis or by mathematical examination of several morphological features. There are a number of skull features that are different racially. For example, the orbits of the eye vary from round to rectangular or triangular. Other differences also occur in the nasal apertures, the mouth area, and the palate.

10.3.7 To Determine the Time of Death

The time of death can be estimated from the skeletal remains with a scientific acceptance but its inaccuracy increases as the gap of time of death are increased.

The following variables are identified for death time:

- Decomposition of smaller bodies is faster than to large bodies.
- Mutilated or nude bodies decompose faster.
- Recovered bones' appearance and colour also help to estimate the death time.
- Plants exhibit a definite growth cycle thus plants nearby body provides information or even insects' life cycle in that region.

Check Your Progress

4. State differences between the male and female pelvic bone

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5. Explain the procedure to determine age from a skull

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6. Write a brief note on the stature estimation from long bones.

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10.4 BODY FLUIDS EXAMINATION

The body fluids like blood, semen, saliva, etc. present at the crime scene or cases related to murder, burglary, sexual assault, etc. form an important part of forensic investigations. The fluids are found in the form of stains thus, firstly they are examined by the naked eye, and then samples are tested in the lab. Preliminary tests are performed to detect the specific body; like for blood, the steps for the analysis are:

Step 1: Locating blood on objects – Following are the tests used to locate bloodstains. Both these tests use luminescence to locate small stains of blood or fluid on crime scene objects.

Luminol Test

On the suspected surfaces luminol solution is sprayed and if it results in

blue fluorescence (strong) seen under UV light due to haematin formation of bloodstains by the reaction with luminol thus the sample is of blood.

Fluorescein

Fluorescein emits light when it is exposed to heme and an oxidant and it undergoes fluorescence. The solution is applied to a suspected bloodstain with hydrogen peroxide. Then, a powerful wave light is used that induces fluorescence.

Step 2: Preliminary tests: To confirm that the stain is blood and not confuse it with any red color substance, the following tests are performed:

Test	Reaction colour
Phenolphthalein Test or Kastle Meyer Test	Pink
Benzidine Test	Bluish-Green
Leucomalachite Green	Green

Step 3: Luminol and Fluorescein are very important tests for locating blood on large surface areas but they are not blood-specific. Other tests might include certain vegetable extracts that might give false-positive results for blood. The two popular chemical tests performed for the confirmation of blood are:

After presumptive tests confirmatory crystal tests are done for the confirmation of blood as mentioned below:

Takayama Test

Add dropwise Takayama reagent on the sample placed on a microscopic slide and after slow digestion, Haemo-chromogen crystals are observed under a microscope as salmon-pink rhomboid crystals.

Teichmann Test

Bloodstain is kept on a microscopic slide and then dropwise Teichmann reagent is added. The crystals formed are seen under a microscope as a result of the conversion of haemoglobin to haemin and haemin reaction with halides to give brownish-yellow rhomboid crystals.

After the confirmation of blood, other tests are performed by Forensic Serologists like the origin of bloodstain, blood grouping, etc. for personal identification.

10.5 DERMATOGLYPHICS

A fingerprint is defined as the friction ridge skin pattern present on palms, fingers, soles, or toes and it is a piece of important evidence for forensic analysis. The finger and thumb tips have distinctive ridges or corrugated lines giving rise to distinctive features like valley or furrow i.e., the depression between two ridges which forms a curved and complex pattern. Every individual has a unique fingerprint and no two individuals can have similar prints and each finger pattern is unique so that two fingers cannot have the same pattern. The comparison and screening of fingerprints are known as dactyloscopy based on the following three criteria:

- No two persons or fingers can have the same ridge design.

- Throughout ones life fingerprints remain the same.
- For record-keeping fingerprints are classified.

Fingerprint Patterns

The friction ridges in each finger create a pattern. There are three major types of patterns: loop, arches, and whorls. They are classified on the basis of absence or presence of deltas. Ridges that curve and change their directions to form a triangular intersection are referred to as deltas. An Arch pattern has no deltas, 1 delta is there in a loop, and 2 deltas are there in a whorl. These 3 major pattern types are then sub-divided into a total of 8 patterns.

Arches are categorised into tented and plain arches.

Loops are divided into radial and ulnar loops.

Whorls are classified into 4 categories – plain whorls, central pocket loop whorl, double loop whorl, and accidental whorls.

Let's study the definitions of these patterns in detail:

Arch: The start of the ridge rising from the left or right similar to a tent and then back to right or left.

Loop: The initiation of the ridge from the left or right then re-curving to the left or right.

Whorl: The concentric circular lines design is a whorl pattern.

Arch **Loop** **Whorl**

Fig. 10.4: Fingerprint Patterns

Source: https://www.indiatoday.in/education-today/gk-current-affairs/story/unique-fingerprint-formation-961895-2017-02-21

The close study of fingerprints exhibits seven irregularities in the parallel lines i.e., also called minutiae or ridge characteristics. The locations and the type of particular minutiae impart the uniqueness that is based on a comparison of a fingerprint.

a) Ridge ends or terminates abruptly.

b) Y-shaped bifurcation in ridge with splitting into two.

c) Enclosed area in the ridge-like lake.

d) The pattern shows a small dot or circle.

e) Small independent ridge in the pattern.

f) Curved ridge is joined to regular ridge like a hook.

g) The joining of the two parallel ridges with a small crossover.

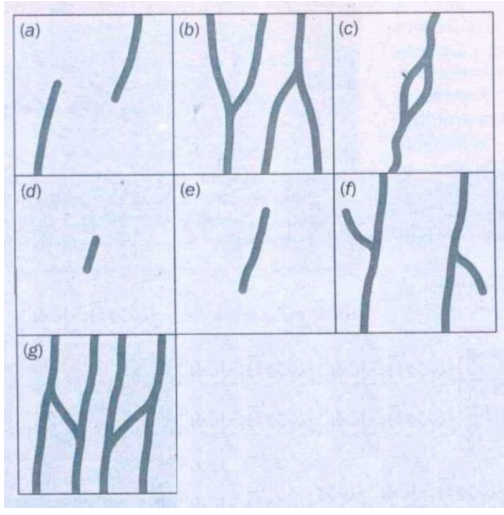

Fig. 10.5 The Fingerprint Characters

(http://fingerprints.handresearch.com/dermatoglyphics/fingerprints-diseases-syndromes.htm)

The ridge termination, island or dot, and bifurcation forms three minutiae, and its set in the whole pattern results in the unique fingerprint and the same positions of minutiae are not occupied in two fingers even if the ridge pattern is the same.

Fig. 10.6 Fingerprint characters within the pattern

Source: http://what-when-how.com/forensic-sciences/identification-and-classification/

Crime Scene Fingerprints

Three types of a fingerprints are exhibited at the crime scene:

- **Visible fingerprints:** The prints which are visible by the naked eye till the contrast between print and support exists and does not require the treatment is a visible fingerprint.
- **Plastic fingerprints:** The fingerprints formulated on soft, plastic, or greasy surfaces are known as plastic fingerprints as they are visible and thus photographed for comparison.
- **Latent Fingerprints:** The usual form of fingerprint evidence that requires physical, optical, or chemical treatment for visibility and is formed due to deposition of the friction ridges with a mixture of contaminants from the environment and natural secretions is the latent fingerprint.

Fingerprints in Personal Identification Fields:

- Identify criminal on the basis of fingerprints.
- Maintenance of identity records.

- To identify mass disasters victims.
- To establish the correct identity.
- Biometrics authentication.

Check Your Progress

7. Two samples of red colour are provided to you how would confirm whether it is blood or not?

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8. Define finger patterns.

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9. State and explain different types of crime scene fingerprints.

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10.6 BIOMETRICS

Biometrics consists of two words bio means life and metric is the measurement or quantitative recognition and identification. In simple words, if you have to choose a T-shirt for your blue jeans what you would do? Your action would be to choose from a pile and match; similarly in biometrics we compare given patterns from the existing ones in the database. It is related to brain recognition with its stored observations and for faster work with more accuracy, biometry has evolved. Biometrics in simple terms is the identification of humans by their traits related to the different aspects of physiology, chemistry, or behaviour. Biometrics is defined as the applicable means of identifying and authenticating individuals in a reliable and fast way through the use of unique biological characteristics and technologies that leads to the acceptable way of solving the crime. The advantages of Biometrics are accuracy, the uniqueness for identification, speed and robustness.

Frank Burch in 1936 (ophthalmologist) developed the first iris biometric pattern; later in 1960 proposed a speech and face biometric system while fingerprint biometric tools were also given by the FBI in sixties. In 2004 biometric personal

identification system was used in the US but at present, all the different types of biometrics are used for identification. Three groups of biometric tools employed are physical, behavioural, and chemical/ biological biometrics. The five required properties for a biometric efficient identification tool are:

- Universal implying trait should be present in all the individuals.
- Unique i.e. different in members of the population.
- Permanent.
- Can be measured.
- Not limited easily.

10.6.1 Fingerprint Biometrics

Fingerprint Biometrics is defined as the method of identifying fingerprints by employing the software on the basis of a pattern of finger and location of the minutiae. It is a physiological trait and the process of comparison between the known fingerprint against another in order to determine that it is of the same finger or palm, is known as fingerprint recognition and consists of two parts.

Fingerprint identification: to specify one person's identity by his fingerprint(s).

Fingerprints taken on paper are scanned and structural analysis is carried out i.e. to find minutiae like ridge bifurcations and endings as per the position and direction thus each fingerprint has a unique template. The different templates are present in the database which helps in comparison and identification with an application in Aadhaar in India.

10.6.2 Iris Biometrics

Iris is made up of pigmented elastic tissue with an adjustable circular opening in the center. The muscular pattern and colour is unique in every individual; even in the right and left eye it is different thus it becomes a reliable biometric recognition character. Therefore you have to remember that the colour and muscular pattern is a unique and permanent feature used for Iris Recognition along with distant technology. The high-resolution camera captures iris images and converts them to templates for comparison. They are known as iris codes while for the high-quality images illumination is done by near infra-red radiation.

10.6.3 Retinal Biometrics

Dr. Carleton Simon and Dr. Isodore Goldstein in 1930-1935 conducted the first scientific study to describe how every individual possesses a unique retinal structure, because of the different distribution of blood vessels and suggested the use of the retina to confirm the identity of an individual. Dr. Paul Tower (1950) reported that even identical twins have a very distinct and unique set of retinas and have DNA strand leading to a very stable biometric modality and hardly changes. The photograph of blood capillaries pattern is taken by the high-resolution camera and digital images are converted to templates by storing in a database for comparison.

10.6.4 Facial Biometrics

Another Biometric technology includes Face Recognition, a technique that is capable of identifying or verifying a subject through an image. This method employs measures of face and head to identify the identity of a person through the facial biometric pattern. The first facial recognition was carried out in 1960 based on the features of eyes, nose, etc. The 21 subjective markers e.g., hair colour, lip thickness was employed by Goldstein and Harmon in 1970 to automate the recognition. The standard linear algebra techniques were applied in 1988 by Kirby and Sirovich for face recognition. The reasons for the Face Biometric advantages over Biometrics are:

- No physical interaction on behalf of the user is required.
- Accurate with high enrolment and verification rates.
- No experts as such are needed for interpretation of the results.
- Only biometric that allows passive identification in a one-to-many environments.

10.6.5 DNA Biometrics

Behavioural or physiological traits Biometric systems are pertaining to individual recognition and out of which DNA profiling and fingerprinting is the most reliable and accurate method as it is intrinsically digital, and not altered during lifetime or death. DNA profiling is known as the ultimate identifier.

DNA Biometrics is defined as a specific pattern obtained from a person or sample from the crime scene. DNA fingerprinting, is also known as DNA typing, DNA profiling, genetic fingerprinting, genotyping, or identity testing and it is a method of isolating and identifying variable elements within the base-pair sequence of DNA (deoxyribonucleic acid). British geneticist, Alec Jeffreys (1984) developed DNA Fingerprinting with the principle of isolating and identifying variable elements within the base-pair sequence of DNA which do not participate in functioning and are highly variable called mini-satellites. Jeffrey reported that a unique pattern of mini-satellites is present in every individual and the exception is identical twins from a single zygote. At present DNA fingerprinting is making usage of micro-satellites of short tandem repeats (STR) of 2-5 base pairs long.

10.6.6 Handwriting and Voice Biometrics

Voice recognition is a crucial Biometric identifier as it recognizes the speaker as well as the speech. The measurable, physical characteristic or personal behavioural traits are applied to verify and authenticate an individual. The two components Speech recognition and Speaker verification are different as the former identify what you are saying and the latter verifies who you are. A speech recognition system assists the speaker in accomplishing what that person wants to do and to identify the speaker then the system has to authenticate the person and verify that he or she is in fact that person.

Handwriting Detection is a technique operated by Computers with the processes to receive and interpret intelligible handwritten input from sources e.g., paper

documents, touch screens, photographs, etc. The handwriting of a mature person is unique and applied to find the authorship of a document or signature on the basis of the unique way of formation of writing strokes. Biometrics focuses on dynamic features like velocity, acceleration, pressure, etc. along with geometry to identify individual handwriting, and it uses specialised designed pens to visualise features and template creation. Voice and handwriting biometric are behavioural traits, and thus can result in false results and rejection. The knowledge of biometric tools has a scope to open one's firm to store data and provide the services for the identification to industries, government agencies, etc.

Check Your Progress

10. List the different types of biometrics used in identifying and authenticating individuals.

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11. Name the properties that are required for a biometric efficient tool?

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10.7 SUMMARY

You have learnt in this unit the applied value of Forensic anthropology in legal investigations. The unit describes the methodology to you for carrying out the forensic analysis of the biological material present at the crime scene like skeletal remains, blood, fluids etc. The methodology for the estimation of stature, age or sex from the pelvis, skull or other bones, etc. has been described. You have also learnt about the presumptive or confirmatory tests to differentiate between the red fluid and blood samples collected from the crime scene. Dermatoglyphics forms an integral part of forensic science which is also covered in the lesson like its pattern types, collection of samples, etc. Modern technology Biometrics used in Forensic science has been described briefly to make the learner aware of the recent advances in the subject.

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10.9 ANSWERS TO CHECK YOUR PROGRESS

1. Refer to section 10.0
2. Refer to section 10.2
3. Refer to section 10.2
4. Refer to section 10.3.4
5. Refer to section 10.3.5
6. Refer to section 10.3.6
7. Refer to section 10.4
8. Refer to section 10.5
9. Refer to section 10.5
10. Refer to section 10.6
11. Refer to section 10.6

UNIT 11 DEMOGRAPHIC ANTHROPOLOGY*

Contents

LEARNING OBJECTIVES

At the end of this unit, you will be able to:

- define demographic anthropology;
- describe the rise and development of demographic anthropology;
- explain the demographic processes-fertility, mortality and migration; and
- discuss the inter-relation between population change and culture.

11.0 INTRODUCTION

Demography is the study of human populations. This includes population size, structure, and change; the vital events of fertility, mortality, and migration that jointly produce population patterns; and the relationships between population dynamics and biological, economic, political, social, and cultural ones (Johnson-Hanks 2018: 1). It is a coherent and robust field of study related to other social science disciplines that address broader issues. The primary focus of demographic studies had been to monitor the levels of mortality, fertility, and migration and how all these three processes influence population growth

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(or decline), produced changes in the density of the population and its age-and-sex structures. It also focussed on how these levels change across time and space and their consequences on the other aspects of human society.

There has been a close relation between demography and other social sciences like anthropology, sociology, economics, and geography and each has been complementing the other. For instance, geography and demography are close due to their distributional perspectives. We know that population growth and settlement have an association with the geography of the region. The climatic conditions, temperature, rainfall, and water availability in a region allow for people's settlement in that region. Similarly, anthropology and demography complement each other and come together as a team to study demographic changes in society. Both study human beings and have created a complex set of research models to construct mutual strength and reduce disciplinary limitations, thereby introducing anthropological demography (Majumdar 2010).

Although there is a difference in the research methods, intellectual frameworks and epistemologies of the two disciplines, i.e., Anthropology and Demography, there has been confluence and productive union of the two, and recent years have been marked by great theoretical and methodological advances (Kertzer & Fricke 1997: 1). The synthesis of the two disciplines has resulted in Demographic Anthropology as a sub-discipline that uses anthropological theory and methods, to better understand the demographic phenomena in current and past populations (Bernardi 2007), focusing on mutually complementary aspects of human populations. On the one hand, we have demography that is positivistic and statistically oriented and captures population size. On the other, we have anthropology that is descriptive and focuses on the social processes that shapes the production and reproduction of human populations. This study of society and culture, together with the study of population dynamics, constitutes Demographic Anthropology.

Before we understand the emergence of the sub-discipline of Demographic Anthropology, let us first understand demography.

11.1 DEFINING DEMOGRAPHY

Term 'demography' comes from Greek and means describing people- *demo* for people and *graphy* to write about a particular topic (Thomas 2018: 1). Demography is also called population studies as it seeks to analyse human populations and profile them in terms of their salient characteristics and the dynamic processes that influence these characteristics (ibid 2018). The term demography was coined in 1855 by Achille Guillad, in his book *Elements De Statistique Humaine ou Demographie Comparee*. For him, the focus of demography was the mathematical knowledge of populations, their size, distribution, and population structure. The demographers study the bio-social traits like age, sex, and social-cultural traits such as marital status, occupation, religion, education, and income.

Poston & Bouvier in their book Population and Society have defined it as the scientific study of the size, composition, and distribution of human populations and their changes resulting from fertility, mortality, and migration (Poston & Bouvier 2010: 3). Demography is also concerned with how populations

are distributed in physical space (e.g., how urban and rural they are) (Bogue 1969).

Thus, Demography is a social science that studies:

- the size, composition, and distribution of the human population of a given area at a specific point of time;
- changes in population size and composition;
- the components of these changes (fertility, mortality and migration);
- the factors that affect these components; and
- the consequences of changes in population size, composition and distribution or the components themselves.

Demography is an applied discipline and demographers use their knowledge to understand real-world problems. For instance, if the demographers are studying the changing age structure of a population, they can address the challenges of funding for the government's social security schemes. Or, if they are investigating the fertility trends, they can address and analyse, high/ low birth rates in a population. Thus education, economic development, transportation, disaster preparedness and criminal justice are areas where demographic data can significantly contribute to policy settings (Thomas 2018: 2).

The study of demography is very relevant in the contemporary world, where everything is directly or indirectly interrelated. We have noticed:

- The rise of increasing income inequality
- Effects of climate change and increase of climate refugees
- The increase in movement of people across countries
- The conflict between various ethnic and religious groups
- Changes in the societies across the globe
- The aging population and changing family structures
- Increasing death rate due to diseases.

These issues have national and/or international implications and all are directly or indirectly related. All the social institutions are impacted by these changes and have its roots in the population's demographics.

Check Your Progress

1. Define Demography.

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2. What is the relevance of studying demography?

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11.2 RISE AND DEVELOPMENT OF DEMOGRAPHIC ANTHROPOLOGY

Demographers and many anthropologists have realised that while documenting the diversity of human societies, it is essential to focus on the population size, density, and how the social institutions are affected by the population dynamics. In the late 19th century, many influential anthropologists attempted population surveys; Radcliffe-Brown's (1922) work on the Andaman Islands is an example (Kertzer and Fricke 1997: 3-4). By the 1930s, British Anthropologists like Meyer Fortes and Raymond Firth began to work on population issues while studying kinship systems. Firth (1936) devoted a whole chapter of his classic study of the Polynesian island of Tikopia to 'A Modern Population Problem' while Fortes (1943) examined fertility among the West African Tallensi. Some strands of American Anthropology included demographic topics in their studies like the study on cultural ecology (Steward 1936), the study of foraging people (Lee & Devore 1968), study on cultural materialism by Marvin Harris (1996), and highlighted demographic questions. The interest in demographic topics among anthropologists studying social organisation, domestic group dynamics, marriage (Kertzer 1989), and feminist concerns (Greenhalgh 1995) have led to the rise of new areas of research. The studies of fertility and the women's position in their household have been prominent. In the 20th century, few developments led to the call for the synthesis of Demography and Anthropology.

A significant development was when demography and anthropology came together in the 1950s when few anthropologists joined the Committee on Population Problems in Non-industrial Societies of the International Union for the Scientific Study of Population (IUSSP). It addressed the issue that local social organisation and culture had an impact on the population dynamics and should be taken into consideration. Later a few more developments led to a formal union of demography and anthropology.

The mid-twentieth century was dominated by demographic transition theory and within its paradigm, an influential Princeton European fertility project was launched in 1963 to study the fertility decline in Europe. It was found that the course of fertility decline did not follow the suggested path by standard predictor variables like urbanisation, literacy, infant and child mortality, and industrialisation. It was concluded that cultural settings influenced the onset and spread of fertility decline independently of socio-economic conditions. It was realised that along with socio-economic conditions, the cultural settings played a significant role. Likewise, another major project in 1987 on the World Fertility Survey, which aimed to produce comparable population estimates for countries with incomplete data, found a need to look for contextual information to achieve valid data collection and interpretation.

The second development was the call for change in the methodology in demography. The limitations of the sample survey had become apparent. Though the sample survey offered representative data for cross-cultural comparison, the large data sets offered little scope for a contact of the demographer with the population. It was argued that the qualitative and ethnographic methods should complement their quantitative approaches.

John Caldwell, an Australian demographer, was one of the proponents who reflected a need to closely study the socio-cultural factors and their relevance in demographic studies. His study in West Africa during the 1970s led him to launch micro-level demography studies or an anthropological approach to demography (Caldwell and Hill 1988). He also insisted on abandoning the 'armchair approach' to demography and encouraged the engagement of demographers/ analysts to the field. The benefits of an anthropological approach to demography are:

- continuous contact of the demographer/analyst with the population studied;
- employment of flexible research methods;
- multidisciplinary team;
- gain of contextual information to understand the complexity of social reality;
- relating the complex social reality with the demographic data;
- understanding the social realities in which the demographic behaviour is embedded;
- a correct interpretation of the association between variables and
- more rigorous evaluation of the validity of the data (because of information gathered on local meanings, actions and social practices, especially on sensitive topics like infertility).

In the last few decades, demographers have used micro-demographic approaches, and a union of qualitative and quantitative methods has resulted in a better understanding of population dynamics. For instance, a demographic anthropologist would collect data on marriage and fertility (demographic characteristics) and the socio-economic profile of the population to get a complete and comprehensive account of demographic change; or for example, there may be specific social factors affecting female's fertility behaviour in a population that can only be determined through fieldwork.

Population trends impact all social institutions. For instance, the aging population of a country has implications for the economy, education, healthcare, and political system. We see headlines in newspapers like 'Growing elderly population puts pressure on medicare' or 'Drop-in birth rates are leading to population decline'. We have to understand both the obvious and not-so-apparent dimensions of the demographic changes. The age-sex structures of a population as well as its inheritance and settlement rules significantly influence the political and economic relations among families and communities (De Witte 2017: 893).

Check Your Progress

3. What led to the development of Demographic Anthropology?

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4. What are the benefits of anthropological approach to demography?

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11.3 DEMOGRAPHIC PROCESSES

The three components of population change are birth, death, and people's movement: these make up the three basic demographic processes referred to as fertility, mortality, and migration (Dumond 1965: 302). Let us discuss all these three demographic processes in detail before we understand population dynamics and culture change.

11.3.1 Fertility

Fertility refers to the actual production of children, which in the strictest sense is a biological process but the events that lead to sexual intercourse to conception to childbirth are affected by social, cultural, economic, and psychological characteristics of the woman and the man and the environment they live in (Poston & Bouvier 39). The demographic study of fertility at the individual level is known as Micro-fertility analysis. At an individual level, there are different ways to study fertility:

- Examining the number of births, a woman (or man) has produced by a given point in time;
- Examining the number of births, a woman (or man) has had by the end of the childbearing years;
- Focussing on the timing and spacing of births at various stages of the life cycle. (Poston & Bouvier 2010: 40)

The **Macro-level analysis** is the second way to study fertility which determines the rate at which births occur in a population or sub-population during a given period. Demographers primarily study fertility at the macro level as they compare it with mortality and compute rates of reproductive change. As mentioned earlier, multiple reasons affect the fertility of a population or sub-population. Many studies have been conducted to generate an understanding of why certain societies have more babies than others.

In 1956 two famous demographers, namely Kingsley Davis and Judith Blake provided a comprehensive framework for the comparative study of human fertility and culture. They mentioned behavioural and biological variables that influence human fertility. For instance, certain intermediate variables like intercourse, conception, and gestation, and social, economic, cultural, and environmental factors influence fertility. Other factors like marital disruption, use of contraceptives, induced abortion, intrauterine mortality, infertility, and sterility are a few important factors that significantly affect fertility levels. Take an example of urban societies these days. Married couples employ family planning and make certain choices for having small families with one or two children or may even choose to remain childfree. Such choice making decisions influence fertility. As per the National Health and Family Survey (NHFS-4) of India, women in urban areas have lower fertility than women in rural areas. Therefore, we can say that fertility and fertility rates are heavily conditioned by social, economic, psychological, cultural, and environmental factors (Poston & Bouvier 2010)

Reflection

Marcia Inhorn has studied the lives of poor infertile women in Alexandria, Egypt, and documented her findings in her books, Quest for Conception: Gender, Infertility, and Egyptian Medical Traditions and Infertility and Patriarchy: The Cultural Politics of Gender and Family Life in Egypt. Her work not only gave insights in the life of these women but also reflected on the attitudes about children and fertility in the population at large. The deep desire of women to have children to gain status and power in their families and society aptly captures the complexity of fertility behaviour.

11.3.2 Mortality

The quantification of mortality is central to demography. Mortality refers to the relative frequency of death in a population. Demographers use two different concepts when referring to mortality, i.e., the Life span, which is the numerical age limit of human life (Kintner 2004: 307), and life expectancy, which is the average expected number of years of life to be lived by a particular population at a given time. Demographers more often use the concept of life expectancy. Our knowledge of mortality levels and conditions before the Industrial Revolution is very sketchy. The mortality was high and due to the lack of availability of the death data, many questions are unanswered. As late as the 18th century, life expectancy ranged from only 30-40 years in much of Europe and the United States (Dublin, Lotka, and Spiegelman 1949). The mortality levels were also high due to famines, epidemics, floods, war, poor living conditions, etc. According to demographer Donald Bogue, death in any society is brought about by one or a combination of multiple factors, and a full understanding of mortality requires an understanding of the trends in each of the major causes of death (1969: 578).

The situation in developing countries is very different from developed countries. Due to the lack or unavailability of medical services, deaths occur outside the medical system and may not be registered in many developing countries. Even more, sometimes unpopular causes of deaths like suicide, HIV/AIDS are misrepresented. Other well-known reasons for death are individual behaviour and lifestyle diseases, alcoholism, smoking and dietary habits. In many developing countries, the socio-economic status and lack of medical facilities

may result in high mortality rates among women and children. Infant mortality has received special attention from demographers. During the latter part of the 19th century, fewer infant deaths resulted from a decrease in infectious and parasitic diseases.

Another primary reason noted by demographers like Hobcraft, McDonald, and Rutstein (1985: 376-77) for infant death is the close spacing between children. If family planning methods are discouraged in society, there will be close spacing between two pregnancies. For instance, when a woman gives birth and later breastfeeds her young one, it depletes her resources. If she gets pregnant again after a short interval, the next child may be born prematurely or have a low birth rate, thus decreasing the chances of survival. Here there is a need to study the gender differences in the society that do not give women enough autonomy or decision-making power to decide their reproductive processes. Take the example of female infanticide, a well-recorded phenomenon where the parents do not want a girl child. There is a need to understand and probe to get to the deeper complexity involved in understanding gender differences and the socio-economic and political circumstances that lead to female infanticide. Understanding the cultural landscape then becomes very important to capture the mortality and, thus, the demographic changes that occur within a society. These are instances that affect the mortality level in a population. Therefore, death is a complex behaviour affected by personal choices/attitudes, socio-economic conditions, environmental forces, and political situations that have to be considered.

11.3.3 Migration

Migration is defined as the movement of people from one place to another within the country or outside. It is yet another process that changes the population size. Unlike birth and death that happen once, migration may occur on multiple occasions. There are two main types of migration:

- Internal Migration-change of residence within a country involving a geographical move that crosses a political boundary.
- International Migration– the movement of people between countries.

Migration is a significant event not only for the individual who migrates but also for the community. Migration decreases the size of the population in the **area of origin** and increases the population in the **area of the destination**. Such a move usually involves changes in one's job, school, medical facilities, shopping center, and other institutional aspects of daily life.

Considering the dynamics of the population growth for communities, internal migration is the most important of the three demographic processes. Migration has been the major method of redistributing the population within the country (Bogue 1969; Poston, Luo and Zhnag 2006). The questions of migration take us to the push and pull factors. Migration **push factors** include job loss, discrimination, low availability of social and life partners, catastrophes like floods and epidemics. Migration **pull factors** include better chances of education and employment, better environmental or climate conditions, race, and sexual orientation (Bogue 1969: 753-754).

International migration can be immigration or emigration. Immigration refers to the migration of people into a new country to establish a permanent residence and emigration refers to the permanent departure of people from a country. In every international migration, a migrant is simultaneously an immigrant and an emigrant. Twentieth-century immigrants to the significant destinations of the world like the United States, Italy, Canada, Germany, Australia, and the United Kingdom may be grouped into four broad categories (and not mutually exclusive): refugees/ asylum seekers, migrants from former colonies, economic migrants, and 'ethnic privileged migrants (Munz 2003). For instance, economic migrants are voluntary migrants who migrate because of economic aspirations. Whereas, refugees or asylum seekers involuntarily emigrate because of the threat of violence, deprivation, or persecution, and often move to a neighbouring country, e.g., during Adolf Hitler's rise to power in the 1930s, millions of Jews and political refugees fled Germany. Take another example; the development of the global market economy attracts human capital to a relatively small number of global cities like New York, Los Angeles, and Chicago. There are push and pull conditions facilitating migration in most of the countries of the world. In addition, to push and pull factors there are certain contextual factors that operate. Migrants arriving at a destination country are pulled into communities called ethnic enclaves, which help them, transition into their life as immigrants by providing support and environments much like those in their mother countries. The push and pull factors, individual and contextual factors led to international migrations affecting demographic dynamics.

Check Your Progress

5. Define Fertility.

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6. Define Mortality.

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7. Explain in detail how the three demographic processes work on population dynamics?

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11.4 POPULATION DYNAMICS AND CULTURE

The role of culture in the study of demographic processes has gained prominence. Apart from studying the demographic processes like fertility, mortality, and migration, demographic anthropologists consider the numerous aspects of culture such as means of subsistence, social organisation, the kinship that affect the population size, and population density in a particular society at a particular time. Here in this section, we will discuss each one in detail.

11.4.1 Kinship

The demographic outcome of kinship is one of the richest areas for substantive and theoretical work in anthropological-demographic research (Gupta 1997: 36). Kinship institutions, as well as forms of marriage, household formation, and inheritance, have considerable demographic consequences. The structure of households and inter-generational relationships affect the health and fertility dimensions of the members. Kingsley Davis (1955) formulated the theoretical model of kinship and their implications for fertility behaviour. Davis contrasted the marriage systems of Europe and South and East Asia and showed that the logic of the joint family system would make for higher fertility than the European system of nuclear families. The joint family system allows early marriage and the young couple is absorbed into the larger economic system. The entire household shares the cost of childbearing allowing for high fertility, unlike in Europe, where the couple has to be economically independent to raise a family. But anthropological-demographic studies have highlighted that apart from studying the linkages between kinship systems with demographic outcomes like fertility behaviour, there is a need to link kinship systems with health and mortality. The kinship system also affects the relative position of different individuals within a family or a household. For instance, in north Indian joint families, there are strong inter-generational and intra-generational bonds between household members related to each other by blood. The woman marrying into the household may not have autonomy or decision-making power within the household hierarchy (Gupta 1997: 43). The decision about her and her children's health is often constrained and may result in maternal and child mortality. Thus, the kinship system has a more powerful impact on health and mortality and helps understand the demographic outcomes.

11.4.2 Family System

The family systems and demographic processes are intertwined and often, the decisions about marriage, reproduction, and migration are made in the context of families. Often the decisions made by family members affect the mortality rates at the various stages of the life course (Skinner 2007: 53). The elders in a family may decide whether the pregnant woman will be giving birth at home or in an institutional setup, which may compromise her and her newborn's health. Women often have little say in the decisions regarding their own bodies and health.

The family system incorporates the marriage forms, succession, and transmission of property, co-residential arrangements, and migration. Which offspring would be the legal heir of the family's property and co-residing with the old parents and which offspring would be moving out of the ancestral home will be decided

by the family norms in a society. For instance, consider the male primogeniture system where the eldest will be the heir and once his conjugal home is set, the younger sons tend to leave their natal family for better economic opportunities. It can be said that the demographic processes are incomprehensible without considering the normative contexts of the family systems.

11.4.3 Means of Subsistence

There is ethnological and archaeological evidence that suggests that population size and density increased with the evolutionary sequence of the means of subsistence. In conformity with the Malthus theory, some anthropologists interpreted this relationship to imply that population size and density are determined by improvement and innovations in the means of subsistence (Nag 1973: 64). Harris (1971) suggested that the techno-environmental efficiency increased the rate of population growth i.e., production determined reproduction. Many anthropologists and economists maintain that population growth is because of the improvement in the means of subsistence and means of food acquisition. But it is also known that change in means of subsistence and its eventual effect on population size and density happens gradually over long periods. So, it is difficult to assess that change in population density and size is due to changes in the technology of food acquisition.

11.4.4 Social Complexity

Social scientists have been aware of the relation between the size of the society and the degree of social complexity. Herbert Spencer (1885), nearly a century ago noted, as the population grows, divisions and sub-divisions within the society become numerous and decided (Carneiro 1986: 355). As more individuals are added to society, more coordination will be required to keep them operating as a society. Durkheim in his work *The Division of Labour in Society* pointed out that increase in population is a necessary but not a sufficient condition for the development of the division of labour in society. Raoul Naroll in his paper *On a Preliminary Index of Social Development* (1956) devised measures and applied them to 30 well-documented ethnic units and found a correlation between the size of the largest community in society and measures of social complexity. Similarly, Carneiro and Hilse in 1967 developed a measure of social complexity and investigated its relationship with total population size in a sample of 46 single community societies and found a close relationship between the two variables. Carneiro in another paper titled *On the relationship between the size of population and complexity of Social Organisation* (1986), mentions that 'as human numbers increase they stretch the capacity of the existing structure to accommodate them and when this pressure exceeds the 'elastic limits' of the systems, it responds by giving rise to new practices and institutions' (361-62).

11.4.5 Social Stratification and Political Organisation

Similarly, there is a role of population pressure in the evolution of social stratification and political complexity. Carneiro and Hilse (1967) suggest that population pressure in simple farming societies living in circumscribed areas with restricted arable land acts as a stimulus to war and ultimately lead to the development of social stratification and state (Nag 1973: 67). They recognise population pressure as necessary and a sufficient condition for the development

of social stratification and state in societies under specific ecological and cultural conditions. Their view is supported by another study by Stevenson (1968), who saw a positive relationship between population pressure and political complexity in tropical Africa and suggested that political organisations are more often associated with denser populations.

Check Your Progress

8. How are the kinship and family system inter-related with the demographic processes?

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9. The relationship between means of subsistence and social complexity and population size has been explained. Write a short note on it.

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11.5 SUMMARY

The field of demographic anthropology has evolved over the last few decades. The emergence of demographic anthropology over the last few decades has been gradual. The demographic issues are not just limited to demography and other disciplines like anthropology, political science, geography, psychology, urban planning, public health, and environmental sciences. The synthesis of demography and other social sciences like anthropology has been fruitful and is able to deliver a more comprehensive study of a population. This synthesis has led to the development of a sub-discipline of demographic anthropology which allows the use of ethnographic and qualitative methods to make more sense of quantitative data. The amalgamation of quantitative and qualitative approaches has led to a careful assessment of the data quality. Apart from studies on fertility, mortality, and migration, newer issues of the contemporary world like the aging population, persisting social inequalities, effects of population change on environment and sexuality are being published. The range of studies under the rubric of demographic anthropology has increased substantially and offers a vital area of research.

Key Terms

- **Demographic processes:** the three processes of fertility, mortality, and migration that account for any change in the size of a population.
- **Emigrant:** one who migrates away from a country with the intention of establishing a permanent residence in another country.

- **Emigration:** the permanent departure of people from one country to establish permanent residence in another country.
- **Epidemic:** a disease that spreads and then disappears within a fairly short time, if it can be controlled. Where it appears in a large number of countries, it is sometimes called a pandemic.
- **Immigrant:** a person who enters a country with the intention of residing there permanently.
- **Immigration:** the migration of people into a new country from any other country for the purpose of establishing residence there.
- **Life expectancy:** the average number of years yet to be lived by people attaining a given age, according to a given life table.
- **Life span:** the maximum number of years a person can expect to live; the numerical age limit of human life.
- **Malthusianism:** the theory or belief based on the writing of Thomas Malthus, that if left unchecked, the population tends to out strip the means for its subsistence.
- **Population:** a set of people residing in a given area at a specific time.
- **Population aging:** the increase in the proportion of the population that is old, usually defined as persons of ages 60 and older, or as persons 65 and older.
- **Population density:** the relationship between the size of a population and the size of the area in which it lives, usually expressed as the number of persons per square mile (or kilometre) of land.
- **Refugee:** a person who has immigrated into a new country in response to strong pressure because his or her continued stay in the country of origin may have exposed that person to danger of persecution.

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11.7 ANSWERS TO CHECK YOUR PROGRESS

1. Refer to section 11.1
2. Refer to section 11.1
3. Refer to section 11.2
4. Refer to section 11.2
5. Refer to section 11.3.1
6. Refer to section 11.3.2
7. Refer to section 11.3
8. Refer to section 11.4.1 & 11.4.2
9. Refer to section 11.4.3, 11.4.4 & 11.4.5

UNIT 12 TRENDS IN ANTHROPOLOGY IN PRACTICE*

Contents

Learning Objectives

After reading this unit, the learners would be able to:

- comprehend the diverse arenas where the anthropological knowledge has been put into practice;
- explain the concepts of physiological anthropology, kinanthropometry, nutritional anthropology and their application in the betterment of human life;
- define genetic screening and counselling; and
- describe designing, fashion, visual, and media, anthropology.

12.0 INTRODUCTION

In the earlier units, you have been acquainted with many aspects of anthropology in practice, how the practitioners translate their theoretical knowledge into praxis. We have seen how anthropologists are using their knowledge for the betterment of society, how the field data is being used for policymaking, advocacy, etc. Some of these avenues have been long in practice, however, there are many new areas where the practicing anthropologists have ventured into. In this unit, we would discuss a few of those areas where anthropologists are using their practical knowledge across the fields of physical/biological, social, and cultural anthropology. These avenues are growing in strength and in a few years would be full-fledged areas where the presence of the anthropologist would be much recognised.

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12.1 PHYSIOLOGICAL ANTHROPOLOGY

Physiological anthropology is a part of physical/biological anthropology that deals with the study of human health in relation to the environment. There are many determining factors that make a healthy human being besides the genetic constitution. The genetic constitution of a human being is marked by the physical (air quality, water, seismic safety, etc.) and social environment (emotional and social wellbeing) over a period of time that determines the health (Stokols, 1996). Blood pressure, heart, and pulse rate are some of the external markers in a human body that physiological anthropologist takes into account while determining a healthy body.

The standard systolic and diastolic blood pressure in healthy human beings ranges between 110-130 mmHg and 60 and 80 mmHg, respectively. Deviation from this range say an increase in the systolic and diastolic blood pressure can make a person vulnerable to the risk of stroke, congestive heart failure, coronary heart diseases, peripheral vascular disease, and even renal disease (Barlow et.al. 2004). Thus, we see that high blood pressure can lead to chronic strain on the normal cardiovascular function in the human body.

Heart rate is defined as the number of times a human heart beats per minute, which is around 60 to 80 beats per minute (bpm) for a healthy human being. This parameter is calculated on the basis of resting heart rate (RHR) when the body is at rest and in a comfortable position without any stress or exertion due to heavy physical labour like walking, running, jumping, etc. An increased heart rate (80-85 beats/min), when measured in RHR, is associated with the risk of developing hypertension and atherosclerosis and is a strong predictor of cardiovascular morbidity and mortality (Palatini 2007).

Pulse rate is basically the stretch and subsequent recoil of the aorta wall that propagates as a wave through the arterial system, that appears as a pulse in the superficial radial artery on the thumb side of the wrist, the temporal and carotid artery. In healthy human beings, the pulse rate is equal to the heart rate.

Now let us understand how this physiological knowledge about the human body helps the study of the adaptation of human cardio-respiratory function with different environmental conditions like heat, cold, and high altitude. How does the human body react to the rise in environmental temperature? We start feeling hot when we exert ourselves in the heat, the body starts releasing heat in the form of sweat. This state when the environmental temperature is more than the body temperature is known as heat stress and the body losses heat by four processes: radiation, conduction, convection, and evaporation. Likewise, in a cold climatic condition, when the environmental temperature is lower than the body temperature, the body adapts by increasing heat retention and enhancing heat production. Bringing about a change in the dietary pattern to suit the cold climatic conditions is an efficient way of retaining heat in the body, whereas in a condition of the high altitude the body needs to preserve oxygen as the supply decreases as we move higher up (Mcardle & Katch, 2007).

Check Your Progress

1. Define Physiological Anthropology.

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2. State how the human body reacts to the rise in environmental temperature?

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12.2 KINANTHROPOMETRY

The term kinanthropometry was coined by Bill Ross in 1972. The term is derived from three Greek words *kinein* (to move), *anthropos* (human), and *metrein* (to measure). Kinanthropometry refers to the study of the dynamic relationship between human structure and how it functions in motion. It deals with the understanding of the physical structure of an individual conditioned by its genetic constitution and physical environment in relation to gross motor functions. Kinanthropometry takes into account human size, proportion, shape, maturation, body composition, gross function, and cardiorespiratory function. So, now you must be wondering why we need to study these aspects, where and how they can be put in use? The knowledge gathered from kinanthropometry has been widely used to study sportspersons, the kind of physique required for different sports, and the designing of sports equipment's that would help in better performance. The study of kinanthropometry helps one understand growth, maturation, and how nutrition affects the body composition; the basic components that are of prime importance in understanding the performance of the body. The major focus in the study of kinanthropometry is to obtain detailed measurements of the body composition of individuals for application in varied fields like physical education, sports science and medicine, human biology, human growth, physical anthropology, gerontology, ergonomics, etc.

Let's try to understand the work of kinanthropometry with an example. Do you think athletes who are into running, swimming, or high jumping need the same physique and body composition? For running and high jumping, athletes need less fat but heavy muscles to perform while swimmers need a moderate quantity of fat to provide extra buoyancy and applied dimensions of heat loss in water for better performance. This is where the anthropological knowledge of phenotype, somatotype, and anthropometric measurements based on population studies helps the anthropologists engaged in kinanthropometry studies in selecting athletes with the right body composition and physique. One

must remember here that genotype cannot be changed but it can be molded with training, nutrition, and motivation to a large extent. For example, if a swimmer suffers from muscle loss, a proper diet and muscle training based on the understanding of the body composition can help rectify this deficiency and build muscle strength. The knowledge of anthropometric measurements helps kinanthropologists to design sports equipment and gears based on the understanding of different somatotypes. Kinanthropometric involvement helps in establishing the basic prerequisites of sportspersons for their maximum performance.

Check Your Progress

3. Who coined the term kinanthropometry?

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4. Define kinanthropometry with suitable examples.

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12.3 NUTRITIONAL ANTHROPOLOGY

Do you think a person who eats three meals a day is a healthy person? Well, that may not always be the case. Even if a human being eats three meals a day, one might still suffer from malnutrition (both over and under). The catch here is that food has to be in proportion to the need of the body, and a body needs different types of nutrients to make it healthy. One needs to pay attention to what one eats in terms of quantity (how much to eat?) and quality (what to eat?). If one is vegetarian only eating green leafy vegetables won't help the body if it is not supplemented with proteins. The fact is one must engage in eating a balanced diet that provides all the supplements needed for the maintenance of a healthy body.

Now, let us try to gauge the engagement of anthropologists in nutrition. Like we had described in the earlier section on kinanthropometry, nutrition has a pivotal role to play in helping athletes strengthen their muscles and strength. A proper amount of nutrition if provided to the body can help in strengthening the body and building immunity to fight against viruses and bacteria's that attack the body. In recent times owing to the COVID 19 pandemic, you must have heard about how important nutrition is for the body. Many people to stay healthy and fit engage in diet plans that involve categorising food into what to eat and what not to eat? If you go to a dietician for weight loss, first you would be asked to

get a health check-up done, wherein your blood type, total blood count, height, and weight would be measured and your family history of disease would be recorded. This is important to understand your body composition based on which diet plan would be prepared that best suits your needs. Thus, anthropological knowledge helps in understanding what kind of nutrition best suits a body type. While selecting a diet plan, cultural norms of food restrictions come into play. It is one's culture that prescribes what a human being can eat or not eat. This information gathered by anthropologists also goes a long way in establishing food habits in terms of nutritional studies.

With this background of information, let us discuss how the knowledge gained by physical anthropologists in anthropometry, somatoscopy, dietary surveys, and laboratory & biochemical examination would be utilised in assessing the Nutritional status of communities.

The nutritional status of a community can be assessed by the following methods:

Anthropometric measurements: The measurements such as height, weight, mid-upper arm circumference, head circumference, waist circumference, and chest circumference are commonly used anthropometric measurements. The most commonly used indices in assessing nutritional status are body mass index (BMI), Height-for-age, weight-for-age, weight-for-height, waist-hip-ratio, and waist-height ratio.

Clinical Examination: In addition to the use of anthropometric measurements, clinical examination is one of the important methods used in the nutritional assessment of communities. This method is based on the examination for changes, believed to be related to inadequate nutrition and infections that can be seen or felt in superficial epithelial tissue, especially the skin, eyes, hair, tongue, mouth, nail, and gums. Clinical examination of assessing nutritional status involves checking signs of deficiency at specific places on the body or asking the subject whether they have any symptoms that might suggest nutrient deficiency.

Dietary Survey: A dietary assessment is a comprehensive evaluation of a person's food intake. Estimation of dietary intake focus on the amount of food consumed by an individual or group and can be used to assess the adequacy of diet to meet the food and nutrient requirement. Though a number of methods are available, the most commonly used methods are described below:

a. **Inventory method:** This method is often employed in institutions like hostels, army barracks, orphanages, homes for the aged, etc., where homogenous groups of people take their meals from a common kitchen. In this method, the amounts of foodstuffs issued to the kitchen as per the records maintained by the warden, are taken into consideration for computation of consumption.

b. **Actual Weighment:** In this method, the total raw foods ready for cooking are weighed taking into consideration the wastage of food. In the same way, the total food cooked is also weighed.

To assess the intake per person per day the following procedure is adopted:

$$\text{Intake in terms of raw food per person per day} = \frac{\text{Total raw amounts used for a preparation}}{\text{Total no. of residents Partaking the meal} \times \text{No. of days of survey}}$$

c. **Household Diet survey:** Household diet survey provides information on food and nutrient intakes of that household for a given day, preferably for the previous 24 hours (recall method). Raw equivalents of all the ingredients used for the preparation of foods on the reference day are weighed and recorded. Also, demographic particulars of the individuals who have participated in the meal/s are also recorded. The intake of various foodstuffs is computed and expressed as average per CU/day, as follows:

$$\text{Average Intake per C.U/day (g)} = \frac{\text{Total Raw amount used (g)}}{\text{Total C.U of HH (Consuming the food)}}$$

Laboratory and Biochemical Examination: Laboratory methods include estimation of Haemoglobin using blood, examination of stool for intestinal parasites, and urine for the albumin and sugar levels. The Biochemical tests include estimation of the concentration of nutrients such as serum retinol, serum iron, etc. in the blood.

Check Your Progress

5. Define Nutritional Anthropology.

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6. State the methods by which the nutritional status of a community can be assessed?

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12.4 GENETIC SCREENING AND COUNSELLING

Genetic screening and counselling are the two areas of applied human genetics which are being widely used for the betterment of human society. Genetic screening involves physical examinations and diagnostic procedures that involve a population. In the Indian context, genetic screening is not mandatory. In the United States, however, in terms of genetic screening newborn babies are screened routinely through the Guthrie test wherein blood is drawn to

test for phenylketonuria (PKU), an autosomal dominant disorder that causes increased levels of phenylalanine (an amino acid) in the body. In recent times genetic screening is done for invitro fertilisation of egg basically known as embryo therapy if there is a defective allele. Herein, the aim is the production of several copies of the normal alleles of the defective gene DNA, which is then introduced into the zygote i.e., the developing cells in the embryo. This further leads to the integration of the DNA to replace the defective allele for normal functioning. The other avenue of genetic screening is patient therapy which involves the introduction of normal genes into critical tissues of the patient that is affected by a genetic disease. If a mother's age is above 35 years during pregnancy amniocentesis test is recommended in the first trimester. In such cases, the amniocentesis test which involves drawing the amniotic fluid from the mother's womb can help determine genetic aberrations. Down's syndrome is one of the commonly found genetic disorders that affects the foetus where the mother's age exceeds 35 years. The amniocentesis test can also help detect other inherited genetic disorders such as muscular dystrophy or cystic fibrosis.

Genetic counselling implies the use of knowledge of human genetics for understanding diseases, estimating the risk of occurrence, and finding suitable solutions to prevent the occurrence in subsequent human generations. For genetic counselling the method used is pedigree analysis where the family history of diseases (if any) is traced. This helps in understanding the risk of occurrence of genetic disorders and assessing the risk of recurrence or incidence in a family member. Genetic counselling does not involve any diagnostic procedures. If an incidence is recorded among one of the family members genetic counselling is advised to understand how to prevent or assess the risk of occurrence in future generations. Some of the incidents if they run in the family like autism spectrum disorder (ASD), intellectual or developmental disability, diabetes mellitus, coronary heart disease, Huntington's disease, Thalassemia, Hemochromatosis, Turner's syndrome, haemophilia, Kleinfelter's syndrome, Hereditary Optic Atrophy, cancer, etc., in such cases expecting mother is advised to seek preconception counselling and prenatal diagnosis. Parents with an autosomal dominant disease may also seek genetic counselling. Genetic counselling can also be sought for caring for children born with genetic disorders and for the management of the health of individuals if genetic disorders are recorded in the family.

Check Your Progress

7. Give an example of genetic screening.

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8. What is genetic counselling?

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12.5 DESIGNING AND FASHION

When you purchase online clothes or even when you visit a store, do you have to give your measurements every time? Well, no, normally, one has to choose from either the UK or the US size standards that are written on the back of the label near the collar. Have you ever thought about where do these standard measurements come from? These standard measurements are again from the study of different populations done by physical anthropologist which involves gathering anthropometric data. So, before we start a discussion on designing and fashion, let's first understand the concept of anthropometry. The study of anthropometry deals with the measurements of the human body, both living and skeleton. The term anthropometry is derived from two Greek words: *anthropos* (human) and *metron* (measure). Anthropometric measurements take into consideration bodily characteristics like body composition and body shape known as static anthropometry which in turn is aligned with dynamic anthropometry that measures body's movement and strength capacities and how space is used, which is the core of designing and fashion.

What is a design? If you go to purchase a chair for your study table what would be the selection criteria? You would first look for the right size that fits in with the study table in terms of the height of the chair that must align with the height of the study table. Thereafter you would want a backrest or chair back that comforts your spine while you study for long hours, also if you are looking at a revolving chair you would take into consideration that it doesn't swing from side to side all the time, as it might be a distraction while studying. Thus, the chair has to be sturdy yet comfortable. So, a designer while designing has to take all these aspects into account that makes the product comfortable for a user. The focus is not only on the external beauty of the product, which is pleasing to the eyes alone.

One of the major thrust areas is the knowledge of ergonomics that helps in designing and fashioning equipments for our day-to-day usage. Ergonomics basically deals with the study of people's efficiency in the workspace to optimise human wellbeing and overall performance. So, how can this efficiency be understood? Efficiency stems from providing and using the right kind of workspace. For example, many of you must have heard of the term Repetitive Strain Injury (RSI) and Carpal Tunnel Syndrome (CSI) common wrist injuries for office workers who use the computer keyboard or the mouse for long stretches of time. This stems from the lack of knowledge as to what kind of keyboard is to be used as per our needs. This is one area that anthropometric knowledge that comes in handy while designing and fashioning the mouse and the keyboards. Designing shoes also is vital for understanding how anthropometric knowledge is used. Did you know there are 26 bones on a human foot? The entire weight of the body depends on the foot and most of the time we are on our feet, walking, standing, running, etc. Thus, it is always important to wear the right and comfortable footwear. Shoe sizes have been standardised yet it becomes crucial to understand that shoe size changes with body composition, increase or decrease of body weight, age, and sex. Moreover, with age, many people

suffer from a bunion on the foot that is a lump of bony tissue that grows on the outside of the joint between the big toe and the rest of the foot. It's caused by the misalignment of your toe and the metatarsal bone in your foot, which can also be caused by wearing inappropriate footwear.

Check Your Progress:

9. What is anthropometry.

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10. Define ergonomics.

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12.6 VISUAL ANTHROPOLOGY

Visual anthropology a sub-field of cultural anthropology is concerned with the documentation, study, and production of everyday life through the medium of photographs and ethnographic films. Often times the term visual anthropology is interchangeably used with ethnographic film. Visual anthropology also encompasses the anthropological study of visual representation, including areas such as performance, museums, art, and the production and reception of mass media. All artifacts used in day-to-day lives that represent a culture like pottery, jewellery, paintings, sculptors, photographs, etc. are the focus of visual anthropology. Thus, in anthropology, the concern of visual anthropology revolves around the narration of a story through visuals.

Visual anthropology as a sub-field came into prominence during the 1960s however, visuals in anthropology had always been a focal point for anthropologists. In many of the earlier monograph's rituals, dance, and other cultural forms have been represented via photographs. Within the ambit of salvage ethnology, even before anthropology came up as an academic discipline around the early 1880's Edward Curtis had recorded the Native American way of life. These recordings were an attempt to document for posterity the ways of life of societies that were assumed to be on the verge of extinction. Among the first anthropological works in the documentation of culture Cambridge Anthropological Expedition to the Torres Straits Islands, 1898 led by Alfred Cort Haddon is worth mentioning here. During this expedition, cultures were recorded using still photography. Franz Boas studied the Kwakiutl over a period of 40 years, during which time he recorded in 16 mm motion picture footage of dances, games, and recorded songs and music. However, this data was never published, as acceptance of such data within the anthropological intelligentsia

and the medium where and how to publish was not known. Boas, however, from his collection used 173 figures and 26 plates in his work 'The Kwakiutl of Vancouver Island' 1909. Another remarkable work was 'Balinese Character: A photographic analysis'. 1942 jointly published by Bateson and Margaret Meads in 1936-38. Almost 25,000 photographs and 22,000 feet of motion picture film were recorded by Bateson.

However, these visual representations bore the mark and burden of studying the 'other' flaunting ethical boundaries. One such work was of Robert Flaherty, Nanook of the North, 1922 where he had documented the Inuit way of life. Flaherty sought to capture the 'pristine culture', the 'traditional' way of life so much so that he refused to film and record the changing lives of the Inuit, where they had graduated from using the harpoons to guns in their walrus hunting expeditions. Flaherty insisted on filming the traditional way of using harpoons and leaving in dark the move towards modernity of the Inuit. This, however, in later years raised the question of subjectivity, authenticity, and ethics in visual documentation. To counteract the allegations in visual documentation, in 1966, filmmaker Sol Worth and anthropologist John Adair trained a group of Navajo Indians, Arizona in filmmaking. The hypothesis put forward was that the 'natives' must present their way of life, as they see it, the insider worldview.

The academic recognition of visual anthropology as a sub-filed of cultural anthropology came with the creation of the Film Study Center at Harvard's Peabody Museum of Archaeology and Ethnology in the United States in 1958. By the year 1965 ethnographic film reviews were accepted in the anthropological journals. While in 1966 American Anthropological Association started including sessions in their conventions on visual anthropology. In the year 1966 Wenner-Gren Foundation for Anthropological Research started providing financial assistance to the study of ethnographic visual media. Today we have come a long way from the times American Anthropological Association started a journal on Visual Anthropology. In 2011, Marcus Banks and Jay Ruby published the first history of the field *Made To Be Seen: Historical Perspectives on Visual Anthropology*. Chicago: University of Chicago Press.

Visual anthropology in the present era is a well-established sub-field of cultural anthropology that represents the subjective and reflexive genre. The anthropological focus herein is to move towards a visual representation using a wider range of visual media and technologies (Pink 2006). Anthropological research is engaging itself and also experimenting with a wide range of visual technologies that we are going to read about in the next section on multimedia in anthropology.

Check Your Progress

11. What is visual anthropology?

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12.7 MULTIMEDIA

Multimedia as the term itself suggests takes into account multiple mediums or sources for production, presentation, and communication. Print, videos, films, power-point presentations, graphical representations are some of the mediums that come to mind when we talk of multimedia. In anthropological studies, however, since its inception language and rituals have been conceived as the forms of media through which meanings have been conveyed. As we have read in the earlier section visuals in anthropological fieldwork have been captured through the use of mediums like voice recorders (chants, songs, interviews, etc.), photography, and also motion films. In many of the monographs, one of the common phrases when describing a ritual or a festival is stated with the words; "and then they danced/sang". This statement used to be complimented with the visuals in the form of plates depicting a group of people singing or dancing. Such visual treat also emphasises the ethnographer's presence in the field where the activity is taking place. While in the case of analysing quantitative data a wide range of statistical software packages most common one being Statistical Package for Social Science (SPSS) is used. Graphical representation is used to translate the analysed quantitative data, to give a more precise and clearer picture.

However, in the present era multimedia is also being used as a medium for data collection and not just for mere data presentation. The virtual world is the new field area for anthropologists. It has opened avenues where anthropological data is being collected without being directly present in the field. Google forms as questionnaires are being widely used for collecting online data. Social media platforms like Facebook, Instagram, Twitter, etc. are resourceful today to gather online data. Some of the web-based messaging applications like WhatsApp, telegram are the sources through which data is collected. The use of applications that provides two-way communication on virtual platforms as google meet, Zoom, etc. is the new wave for conducting online interviews. These applications have come much into prominence and are widely accepted during the COVID 19 lockdown phases when researchers were not able to conduct face-to-face interviews.

Virtual spaces like Facebook, Instagram, Twitter, etc, have been the center of studies too. One of the recent social media campaigns 'Me Too' had highlighted the suppressed voices of the women initially in the entertainment industry who had faced years of harassment and abuse- physical, mental, and emotional. It gained momentum and surged into a full-fledged movement in the social media platforms where women from across the globe joined in with their own share of stories.

Check Your Progress

12. State how multimedia is used in anthropological studies.

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12.8 SUMMARY

This unit has brought to light the various upcoming areas and avenues where anthropologists are working. There are many more upcoming areas like disaster management, development program, public health, tourism, etc. where the anthropologists are making their presence felt. In recent times we have experienced the COVID 19 pandemic and we have seen how both physical/ biological and social and cultural anthropologists have been involved, be it in the field of genetic or public health or involvement in community awareness programmes, the anthropological knowledge about people and populations had gone a long way. In the future too there would be many more avenues where the anthropologists would engage themselves for the betterment of humanity.

12.9 REFERENCES

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12.10 ANSWERS TO CHECK YOUR PROGRESS

1. Refer to section 12.1
2. Refer to section 12.1
3. Refer to section 12.2
4. Refer to section 12.2
5. Refer to section 12.3
6. Refer to section 12.3
7. Refer to section 12.4
8. Refer to section 12.4
9. Refer to section 12.5
10. Refer to section 12.5
11. Refer to section 12.6
12. Refer to section 12.7

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