POPULATION STRUCTURES AMONG TRIBES

Edited by

K. N. Reddy
D. V. Raghava Rao

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Tribal Research Centre
Ooty

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THANJAVUR

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INTRODUCTION

The present volume on 'Population Structures among Tribes' is the outcome of the National Seminar held under the auspices of Tribal Research Centre, Tamil University, Ooty, Tamil Nadu, from 11th to 13th December, 1985. The national seminar was arranged to facilitate the overall view of the tribal populations in terms of their structure, demography and consequent biology in relation to culture. The theme of the seminar was intended to meet the following:

1. Though a fairly good amount of work has been conducted on populations, we are still not in a position to grasp the total picture of a population, particularly with reference to development planning. Scholars have used different sampling procedures and techniques. There is even confusion of the meaning and nature of 'the biology of a population'. Often studies are reported on a very meagre sample of a population purporting to represent the whole population. There is an urgent need that the techniques are standardised and terms are given definite meaning.

2. The people of India are divided into several categories in terms of religion, language, geographical

area, endogamy (in terms of castes and sub-castes) and exogamy (lineage and clan). Though endogamy is one of the structural frames that is taken into account in selection of a mate, the endogamy itself is enmeshed in exogamous units for purposes of kin identity and marriage. These organised exogamous groups are, as a matter of fact, well maintained in tribal populations rather than among non-tribal populations. The number of exogamous groups present in any endogamous groups is an important aspect of population study and also to understand the biology of that population. Data in this respect are known vaguely through ethnographic studies and census studies but a systematic knowledge on the number, size and distribution of such exogamous groups, their mating behaviour, fertility and mortality trends, and other demographic profiles at clan levels is lacking.

3. Often, especially among tribal populations, sub-populations are embedded for reasons of cultural refinement and thus are differentiated not only from other populations but among themselves. Such isolates within the larger populations are to be identified for further research studies.

4. The unified picture of a population, i.e., the essence of various studies (biological and cultural) is yet not possible. If it is not presented or covered either through compendium of bibliographic works or by some other means then there would be a lot of confusion in future of demographic or Physical Anthropological research.

5. The exercise through this national seminar may help in delineating new areas of research and development activities among the specific tribal populations of India.

The response from the participants was great.

More than twenty papers were presented in the seminar. Besides, 3 special lectures from distinguished workers were arranged. The participants of the seminar were drawn from various Universities and national institutes, apart from the staff members of our Tribal Research Centre. The subject matter was covered from different angles on a wider canvass conveying many important issues on the population structures of various tribes. Most of the papers were based on specific field situations studied by individual researchers. Some of the papers whose contributors could not come over to Ooty for presentation are also included in the present volume for reasons of merits of their papers.

Papers presented to the seminar were duly revised by the respective contributors in the light of the discussions made during the seminar. These have been duly edited wherever necessary including minor changes in the title of the papers. But endeavours have been made to maintain their original format, by and large. We have also tried to bring some order in the stylisation of the whole presentation. We are aware that we could not do everything that was required to be done for this difficult task.

In the following pages you will find the population structures of various tribes. For reasons of convenience the papers are arranged regionwise. It is our hope that the efforts of this seminar will have lasting impact in the subject area concerned.

K.N Reddy and D.V. Raghava Rao.

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WELCOME ADDRESS

D.V. Raghava Rao

Honourable Chief Guest Prof. Krishnamurthy, Prof. Rangan, distinguished Professors and delegates, special invitees, ladies and gentlemen.

It is indeed a great pleasure to me to welcome you all to the inauguration of the National Seminar on 'Population Structures among Tribes' organised by this Tribal Research Centre of the Tamil University.

I feel greatly privileged in introducing Dr. S.Krishnamurthy, the Chief Guest for the inaugural function. Prof. Krishnamurthy is a very distinguished scholar in population studies. He obtained his postgraduate and doctoral degrees from the well known Harward University and carried out research and teaching assignments in the universities of Harward and Pennsylvania in U.S.A. Prof. Krishnamurthy also served as Research Fellow, Dept. of Demography, in the Australian National University, Canberra for about four years. Love for his mother land has brought him back to India in 1984. During 1984-85 he was heading the Population Research Centre at Dharward as Director. Prof. Krishnamurthy came much closer to us this year when he joined as Professor of Population Studies in the Bharatiyar University, Coimbatore. During the course of his career he has published little over 40 research papers and reports in reputed journals in India and abroad. It is indeed very kind of him that he has readily accepted our invitation at short notice to inaugurate this national seminar. On behalf of this Centre I extend warm welcome to Prof. Krishnamurthy.

I believe that at least some of you might be knowing that this Tribal Research Centre in this part of the country, is the brain-child of our respectable Vice-Chancellor, Prof. V.I. Subramoniam. The main inspiration and support for this National Seminar also came from him. Prof. Subramoniam was really keen in participating in this seminar. It is rather unfortunate that the Vice-Chancellor could not come over here to preside over the inaugural function of this seminar today due to certain unavoidable reasons. He is however, very kind to send his blessings and good wishes for the success of this seminar.

A good friend of mine and a distinguished scholar in Linguistics, Prof. Rangan, is with us today to preside over the inaugural function, representing our honourable Vice-Chancellor. I extend cordial welcome to Prof. Rangan.

Prof. Rangan is heading the Dept. of Linguistics in this University. This centre is a part of Language Faculty in the University and we are fortunate to have Prof. Rangan as its Dean. Prof. Rangan has been ably serving the University as a member of its Syndicate. He has the credit of working in various capacities in different organisations including C.I.I.L., Mysore before joining this University. Prof. Rangan has several publications to his credit. Among his several publications, I may make a special mention of his books on tribal languages Balti Phonetic Reader and Balti Grammar which received wide attention among academic circles. I once again extend warm welcome to Prof.

Rangan and request him to preside over the inaugural function.

Distinguished Professors and delegates from different parts of our country have readily honoured our invitation and have come over here to participate in this National Seminar. Some more delegates would be joining us this afternoon and tomorrow. It is my very proud privilege to extend warm welcome to all of you who are here with us now and to all those delegates who would be joining us little later. You might have already noticed that you are placed in picturesque surroundings in this beautiful town. From our side, we shall try our best to make your stay comfortable here.

I may also add here that this Tribal Research Centre is the youngest of 13 such Research Centres in the country. We are just two years old and this is our first effort in organising a relatively big seminar of this type. We may naturally fall short in certain arrangements; May I therefore request you to kindly bear with us if there are any lapses in our arrangements.

We heartily welcome all our special invitees whose participation would certainly contribute for the success of this Seminar. I also extend warm and cordial welcome to the various representatives of the press, and look forward for their cooperation in giving wide and helpful coverage to the proceedings of the seminar.

Ladies and gentlemen, on behalf of this Centre, I once again extend warm and cordial welcome to all of you for this inaugural function.

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INAUGURAL ADDRESS

S. Krishnamurthy

Population structure or composition may well be defined as an "aggregate description of the characteristics of individuals who constitute a group". Some of the frequently used characteristics for such descriptions are age, sex, race, ethnicity, educational attainment, economic status, occupation, religion, caste, clan, marital status and household or family membership. These characteristics are generally biologically fixed, socially ascribed or personally achieved.

Population structure is used to gain some understanding about the location of the group with respect to the subcatagories of the characteristic. Such description also helps us to understand how homogeneous the group is with respect to that particular characteristic. Comparison of two groups or one group at different points in time with the help of such description enables us to understand the differences or similarities between the two groups or the changes in the structure over time in the same group.

Structural (compositional) elements are cross-classified to provide refined and detailed description of the population. When these compositional elements are cross-classified with measures of certain behaviour, they become a basis for explaining patterns of such behaviour. It may, therefore, be said that population structure or composition is a key in social research.

Demographers go a step further and try to infer human behaviour from the population structure itself. Since in the absence of large scale migration age structure of a population is determined solely by past fertility and mortality, it is possible to estimate the level of fertility with age structure and growth rate of the population. It is also possible to detect the sex differential in mortality by studying the age-sex structure of the population. At present a host of indirect methods are available to infer demographic behaviour from population structures characterised by such variables.

Whether population structure is used for description, for explanation or for inference, it has to be free from errors. A population structure in useful only to the extent the data used for classification is free from errors. One of the fundamental characteristics of population structure is age. Age returns from the censuses and surveys in India are well known for their poor quality. It is, therefore, appropriate to consider age as an example and try to understand the types of errors, sources of errors and methods of improving the quality of data used to construct population structures.

Errors and their Sources

Omission or occasional double counting of persons in various age groups is called Coverage or completeness errors. Even if a person is properly accounted the person's age is not always correctly reported. The difference between true age and reported age is termed as Content Error.

Ill-defined jurisdiction and sampling units and misinterpretation of the definitions by the survey staff are major sources of coverage errors. Inaccuracies in mapping the study area, for example overlapping sub-divisions assigned to different enumerators, could result in double counting of some households. Enumerators sometimes get confused between household and family and between normal residents and visitors. In such situations enumerators interpret the definitions as it occurs to them. Such cases may also lead to omission or wrong counting. It is also observed that respondents may also report selectively. In a household survey some members of the household may not be reported by the heads of households who happened to report as they may consider that it is not necessary to report the household servants and the like. These illustrate the major sources of coverage errors.

Lack of understanding of the question, lack of knowledge and deliberate falsification on the part of the respondents are the major sources of content errors. These errors also occur while transcribing or processing data. 'How old are you?' and 'What is your age now?' are very simple questions to understand. One might wonder what kind of misunderstanding can there be in such simple questions. The problem lies in what the word age means to the investigator need not be the same to the person responding. If one happens to meet a chinese mother on a chinese new-year-day who happened to have had a child birth two days earlier and ask her about the age of her latest child. The answer would be 'two years old'. She is correct according to chinese tradition. The three days old child gets the age of two years because as per the chinese system of age reckoning a child is aged one as soon as it is born and the child gets older by one year on the chinese new year day. The interviewer is also correct in doubting her answer because the interviewer might be interested in reckoning age in Western System. Similarly because of the Thai tradition of using the going-to-age (Yang), the 1960 Census of Thailand yielded a poor age return because many people tended to give their 'age at next birthday' for the question on 'age at last birthday'. Such variations in age reckoning methods between tribal communities are quite likely to exist and, therefore, careful examination of the data and the mode of data collection is necessary before any inference is made on them.

There is no need to elaborate on the possibilities of deliberate falsification. Never-married girls of older age always tend to report their age below the ideal age at marriage. Old people tend to over report their age as they feel that the are respected by younger generation because of their old age.

In many of the traditional societies exact age of a person is not of great use to the individual and in many societies the practice of celebrating birthdays is absent. Most of rural and tribal India come under these. In these places birth registration is not effective. As such a substantial proportion of people may not know their exact ages or may have a vague idea of their ages. Therefore, interviewers generally face a 'do not know' response to questions on age. When insisted on, the respondents give crude approximations of their ages. These approximations are mostly in multiples of five, i.e., ages ending in '0' or '5'. In a large majority of surveys information about the household members are obtained from one of the adult members in the household. When many do not know their own ages, it is too ambitious to expect that one adult will be able to give the exact ages of all the other adult members in the household. Naturally the responses are likely to be loaded with substantial amount of error. These are the principal reasons for the very high magnitude of age heapings found in Indian Censuses. Not infrequently it is noticed that interviewers themselves use their discretion in revising the age stated by the respondents probably based on the physical appearance of the respondents.

Even after the data collection, errors are likely to creap in everytime the data is transcribed or processed. Coding and punching of data and recording, manipulating and processing of data with the computer are all the stages where errors may creap in. Verification checks are needed to minimise such transcription and processing errors.

Alternative Methods of Age Reckoning

Since direct questioning on age did not produce satisfactory results in most of the developing countries, researchers looked for alternative indirect way of obtaining better results. They can broadly be classified into seven categories. (1) Historical calendar method, (2) Cohort method, (3) Family History method, (4) Community comparative method, (5) Components of age method, (6) Official documents, and (7) Eye estimation method.

According to historical calendar method, the date of birth of a young person is determined by relating the birth with the occurrence of some notable events (Examples are Deevali or Pongal days, annual festival days of local deity, flowering of certain plants and occasional recent events like draughts and famine, floods etc.); the dates of which are known. In the case of an adult an historical event of known date the informant could recall in his/her youth and the approximate age at that time are identified. The present age of the person is then deduced using these informations. If a person could recall the day of independence and that he was about seventeen years then, the age at the time of survey is deduced by (age at the time of event + year of survey -- year of the event). The individual is aged 17 + 1986 - 1947 = 56.

Some tribes in Kenya are reported to have elaborate circumcision ceremonies. Every year on a chosen day a group of young boys are circumcised who are about the same age and a name is given to the Cohort. Most of the people can easily identify themselves well with the groups they belong. Hence identification of a person's membership in a group is enough to estimate the age of the person. This is what is known as Cohort method.

Information on relationship between members of a family and other relevant details such as puberty, marriage, menopause, birth order and number of children are collected. These are brought together to assign age to each member consistent with these informations. This method known as family history method is time consuming.

Another extremely time consuming method is the community comparative method and is basically an extension of the family history method and is first applied in a survey of Kung bushmen tribe of Kalahari, Africa. Information on the relationship, descent, seniority rights, age-grade relationships, etc., are gathered for all members in a small community. All the members are then ranked according to relative age. Assuming an age distribution the age of individuals are deduced.

Age at menarche does not vary markedly between women. This can, therefore, be ascertained with greater accuracy. Time span between menarche and marriage, between marriage and first birth, between successive births, and between the last birth and the date of survey are elicited from the respondent. Sum total of all these is then the estimate of age of the respondent. This approach is applicable only to adult or older women and it is based on the assumption that a woman may remember these events and the intervals between them better than she does her age.

Official documents other than the birth certificates also form good source of data on age. But it is also likely that fictitious age might have been recorded in the documents if they were for the purpose of obtaining social security benefits, differing a military draft, obtaining liquor permits, etc.

There is no need to describe what is known as eye estimation. In many situations interviewers resort to judging the age of the respondents who are unable to give their age. Obviously this approach is not likely to give reliable information on age.

It is a pity that none of these methods has been evaluated systematically and, therefore, at this stage only opinions can be offered with regard to the effectiveness of these methods. Further, in the absence of birth certificates and correct knowledge of age, the choice of a method of age reckoning depends on many factors such as the culture, the sub-group under study, availability of historical events, the purpose of the study, availability of time and money and aptitude of the interviewers.

Though demographers have devised a variety of techniques to measure the quantum of error in age returns and to correct the age structure obtained from defective data, their effectiveness is very limited. Further errors in one variable tend to be correlated with errors in other variables. A divorced woman wher elects to report herself as a never-married person with the intension of marrying again tend to under report her age. Therefore, in fact there is no substitute for error free data.

Though we have listed only the problems in obtaining a correct age structure, the principles and philosophies are all applicable to any other population structure we are concerned with. Hence caution need to be exercised when studying and comparing population structures, particularly among tribes from whom obtaining reliable data had always been a difficult job.

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It is a pity that none of these procedures has been evaluated systematically and therefore at this stage only opinions can be offered with regard to the merits. However, all these methods are inferior to the possession of birth certificate and correct knowledge of age. The choice of a method of age reporting depends on many factors such as the purpose for which [illegible] study, availability of interviewers, [illegible] of the study, availability of [illegible] and more particularly [illegible].

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KEYNOTE ADDRESS

K.N.Reddy

Respected president, chief guest Prof. Krishnamurthy, prof. Raghava Rao, distinguished participants and ladies and gentlemen; it is indeed a great privilege bestowed on me to deliver the keynote address to this seminar on 'Population Structures Among Tribes'. Let me at the outset give you the reasons that prompted me to propose a seminar of this kind.

When I was carrying out the field work among Irulas of Nilgiris last year on their demography. I encountered the existence of the well organised *kulam* systems among them. I had taken keen interest in these *kulams* or otherwise called in our anthropological terms 'clans' and started working on the nature of their demography. The second phase of the field work, has contributed for better understanding of the clan organisation in detail such as its territorial affiliation, mating affiliation with other clans, and its size and sustenance. These *kulams* are patrilineal and exogamous in nature and are undoubtedly the micro-units of total population. The necessity for the formation of such clans is to maintain their kinship identities and also to regulate biological matings. This field experience also led me to think that these cultural divisions namely lineages and clans, might be the structural units in all populations irrespective of tribe or caste. And these cultural divisions are, as a matter of fact, units of an endogamous population and the size and number of such units may differ from population to population. Further, the total number of such clans and their size would constitute the make-up of whole biological population. It is felt that when we intend to carry out a demographic survey we have to first identify these cultural units of the population and then look for all demographic variables. Then only, I feel, the study would be complete. Such identification of cultural units, their size and distribution, would help us greatly in circumscribation of the population. This knowledge of a population is necessary and pre-requisite especially for drawing meaningful samplings.

To substantiate my view of looking at a population, I may refer to other populations like the Jatapu of Andhra Pradesh, the Bhils of Rajasthan with whom I had earlier experience and found similar clan organisations and territorial and mating affiliations. When I inquired into smaller populations like Toda, Kota, and Cholanaickam, for these details, I got some more useful information. The Todas of Nilgiris numbering about 1200 are divided into endogamous populations each of which is again sub-divided into number of exogamous sects or clans. The Kotas of Nilgiris who are also about 1400 in size do not represent in terms of clans, but in the form of *Keries. Keri* means a locality and members who represent a *keri* are considered as parallel cousins and matings are prohibited among them. The Kotas of Nilgiris are distributed in seven villages only and in all these villages the keries can be considered as structural units of that population. Among the Cholanaickan, the cave men of Kerala, still a different kind of make-up is observed. They are organised in the form of territorial bands. There are ten such territorial bands with 205 souls who constitute the totality of the population. The members of each territory are considered as parallel cousins and matings are prohibited among them. Thus, the above information on larger and smaller tribes, their cultural divisions for the maintenance of biological regulations, warrants further detailed anthropological demographic and demogenetic studies at micro-cultural units to unravel the biology and culture of these specific populations. With this background in mind I felt the need for a national seminar of this kind. Our dear Vice-Chancellor was kind enough to appreciate the rationale behind this seminar proposal and granted it without any reservation. I am grateful to him for his academic gesture.

India is an abode of various genetically different human groups, not found anywhere in the world. They inhabit various ecological niches, experiencing wide socio-economic disparities, and practicing different cultures and religions to suit their mode of life. As a matter of fact, all men belong to a single species, capable of mating and having offsprings, regardless of geographical origin, colour, or other biological differences. But variations are observed between specific populations and these are mainly attributed to environmental and reproductive isolations. So, classification of men or populations is on. Most of our researches of the past and the present are nothing but tracking down the process and extent of human evolution through variation. Thus, one of the main objectives of population genetics and anthropological demography in general is to understand and predict the mechanism of social and physical evolution of man, both in space and time. In other words, efforts have been made to interpret how gene frequencies are maintained and change in a given population. These entities, the genes, were the first living units to be discovered. The discovery of genes has had a fructifying effect upon the whole of biology comparable to the effect of the atomic theory upon the physical sciences. Thus, the classification of genes continues. It is a fact that the human species is not homogeneous but consists of sub-divisions of various orders which differ from each other in the relative commonness of many genes. All of these arise in the course of evolution through the mechanism of mutations, gene combinations, and natural or artificial selection of those collection of genes which are suited to certain environments. These divisions maintain their identities through what is called culture which is an adaptive mechanism for the biological drives. In a broad sense, the study of these interacting components, viz., biology and culture certainly reveal important clues to the understanding of human evolution. Hence, I would like to highlight the importance of the integrated approach of the discipline of anthropology. Anthropology is essentially biocultural. It is our customary law to treat the discipline in this direction and understand men and populations in this perspective. Unfortunately, in Indian context, we are not doing researches in these lines. Cultural and physical anthropologists are working in independent directions. This might result in wide gaps of understanding the biology and culture of people whom we study all the time. To understand the biology of a population, cultural background of the population is a pre-requisite. The cultural units called clans and lineages are not given much importance in demographic studies till date. We have been heavily leaning to western models, theories, and formulae, developed for populations which may be different from the populations that we are encountering here. We need to understand our populations in Indian perspective and develop models and theories accordingly. The interplay of our genetic structure, our physical beings, our culture, and the environment seem to be incredibly complex. Yet, when unravelled, it may provide essential information on the significance of human biological variability.

As all of you are aware, demographic researches in recent years received due attention not only in

India but also in other parts of the world. World Health Organisation (1964, 1972) have emphasised the need for research in population genetics of primitive groups. Anthropological demographic and demogenetic studies aimed at understanding population structures or genetic structure of populations in India suffer from ambiguities. One indicator of this fact is the variety of terms like, genetical demography, genetical structure, population genetical study, population genetical work, demogenetical profile, and genetic survey, which are used for such investigations. These studies equally well used different terms for populations as well, like community, deme, natural populations, etc., and different were their subject of study such as caste, language group of a population, local caste population, and language groups. Some scholars even studied a population labelling it before hand as hybrid. In reality, the distinction between these terms is not very sharp and in many instances they are used interchangeably. Such a usage of different terms for a common theme creates lot of confusion in the minds of workers and readers. It is, therefore, necessary to develop common terms to avoid ambiguities.

Many demographic reports of populations are restricted to villages, districts, thereby skipping the real biological boundaries of a population. And moreover, they tend to purport their findings for the entire population. As a matter of fact, villages, tehsils, and districts are just administrative units and they do not exactly circumscribe the population. If the circumscribation of the endogamous population is within these administrative units then it would be alright for scientific study. Thus, there is an urgent need that the techniques are standardised and terms are given definite meaning.

Anthropological demographic or demogenetic studies in India have not yet emphasised in clear terms that such studies may contribute a great deal to our national development. It could be done provided we clearly define the scope of these studies. With the classification of the tribal populations through anthropological demographic and demogenetic studies we can find out which particular populations can sustain which particular development plans. This may require sustained research efforts in this direction. For example, the small tribes need our attention more than the large tribes. Basu (1971) has clearly indicated that the Northern Pahira live in precarious conditions compared to Southern Pahira-I and Southern Pahira-II. But they are described along with other two groups and development plans, if any, are likely to pay equal importance, while these groups need differential treatment. Basu said, "In genetic terms, considering females only, the North Pahira gene pool is relatively unfit..." The study thus calls for our attention to delineate the populations before these are eliminated.

Another important aspect of demographic or demogenetic studies which deserves our attention and keen interest is the depopulation problem. We have tribes of different kinds. Some are very large and others are very small. Some are still food gatherers, few are nomadic, and others are either switched over to agriculture or still continuing shifting cultivation. A clear demographic picture of these tribe is very much useful not only for the academic benefit but for all development and welfare programmes. The common notion is that tribal populations are experiencing high fertility rates and high mortality rates. That means they still come under prehistoric stage of demographic transition. They are yet to reach the other two stages like high fertility and low mortality rates; and low fertility and low mortality rates, as have been experienced already by some human groups of developing and developed nations. It is our earnest duty to locate these demographic transitions in various populations and help them accordingly. The other interesting feature I would like to highlight here is, that, among the tribes some are growing and others are either static or declining, in spite of high fertility and high mortality rates. The Toda and Kota of Nilgiris are the best examples of static or slow dwindling populations; the Onge and Andamanese of Andaman islands, and the Cholanaickan of Kerala, are examples for fast dwindling populations. The demographic and demogenetic studies can play vital role in locating the various stresses of the population causing this problem. We may have to take up serious demogenetic studies of polyandrous populations like Todas of Nilgiris, Kinners of north-western Himalayas, to find out the nature of these populations, their culture, mating patterns, and the resultant fertility and mortality trends among them to unravel the determinants of fertility. It is observed in general polyandrous populations are inhabited mostly in high altitudes. We may have to look into whether altitude and fertility are associated biologically. Another equally important academic interest here is that if we can locate through our studies the determinants of low fertility among the small or dwindling human groups, it would further help us greatly to check and apply the same with larger and growing tribes or other populations.

Often, especially among tribal populations, sub-populations are embedded within them for reasons of cultural refinement and thus are differentiated not only from other populations but among themselves. Such isolates within the larger populations need to be identified both for academic interest as well as development purposes. The present day numerically large tribes would be facing the problem if we make our efforts to classify them as biological populations with the help of demogenetic studies. For example, Irulas are numerically large tribes of South India with several sub-populations in it divided on the basis of geography and food culture, like Vettakadu Irulas, Melanadu Irulas, Irula Pallars and so on. The Korku are a numerically large tribe of Madhya Pradesh and Maharashtra. This tribe is divided into two sections on the basis of cultural form. They call themselves as Thakur-Korku in Dewas district while korku of Amraoti district as Korku-Korku. There is a population of Korku living in between these two populations in Khandwa district, to which adequate anthropological attention has not been given so far (Khaja *et al.* 1966).

The Mina of eastern Rajasthan are divided into severl divisions on the basis of traditional occupation and land ownership (Singh, 1975, 1978). The Bhil, the largest among the indian tribes, are divided in terms of social space and geographical distance into numerous small endogamous groups (Singh, 1978, 1979, Goyal 1979). Time seems ripe to attempt demographic and demogenetic studies to delineate these populations and help planners to know their target in terms of individual populations.

The last but one important issue that I would like to place before you is duplication of research. We tend to take a population which has been already subjected to various types of studies and often report what had already been reported. It is desirable if such studies can bring out any secular trends over a period of time. Otherwise, it is a gross waste of time and money. It is also happening that the results of such studies are not readily available to other workers involved in similar works. Though a fairly good amount of work has been conducted on populations, we are still not in a position to grasp a total picture of a population, particularly with reference to development planning. The unified picture of a population, i.e., the essence of various biological and cultural studies is necessary not only for review work but for conduct of future research and development planning. It is high time that we should either attempt serious bibliographic compilations of works on population wise or do something about it to minimise repetitions, save time and money.

There is a keen desire among demographers, anthropological demographers, biologists, social scientists, to study a community, population or a group intensively. Indian tribes who are culturally and biologically differentiated from caste populations and among themselves provide an unique opportunity for them to work together. It is hoped that the sustained researches of this nature and the resultant development planning would certainly help the populations to maintain themselves in a scientific way.

I conclude with the submission that given a proper direction the anthropological and demogenetic studies may be fruitfully utilized to extract the information with regard to the populations, their genetic make up and provide the data to planners who are in need of such information for planning and formulating development projects for populations on priority basis. We feel this seminar on 'Population Structures among Tribes' with distinguished scholars would help understand the trends of researches on various populations, formulation of common methodology and concepts, and identification of gaps in research. We also hope that this seminar would generate new ideas and models for future researches.

Thanking you.

There is also a lesser among many anthropological, demographic, biological, social scientists to study a community, population or a group of individuals who are culturally and biologically differentiated from other populations and among themselves provide an unique opportunity for them to work together. It is hoped that the sustained researches of this nature and the constraints development planning would certainly help the populations to maintain themselves in a scientific way.

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Thanking you.

PRESIDENTIAL ADDRESS

K. Rangan

Prof. Raghava Rao, Prof. Krishnamurthy, Dr.K.N. Reddy, distinguished professors and scholars who have come from various parts of our country to take active part in the seminar, distinguished guests and my colleagues.

I consider it as a privilege to be with you and preside over this function. Since our Vice-Chancellor is occupied with unavoidable and pressing works at Thanjavur, he is unable to come and preside over this function. However, he wishes the seminar a success. He likes the scholars to feel free and exchange their views so that we may expect interesting results out of the deliberation of these three day seminar.

I am neither a student of anthropology nor a student of demography. I have come here as a student of language and linguistics. I wish to follow the presentation of the papers and discussions. I would like to put before you some of the problems which may not be directly related to the theme of this seminar. However these problems are related to the minority language speakers especially the tribal groups of our country.

In a country like India where people of different languages and cultures live side by side, it is natural that each group wants to maintain its own group identity. Language is used as a force to unite its members and as a symbol of group identity. Maintenance of language depends on many social conditions and one of them is the use of language in domains like education, administration and mass media.

Article 350A states that it shall be the endeavour of every state and of every local authority within the state to provide adequate facilities for instruction in the mother tongue at the primary stage of education to children belonging to linguistic minority groups....

Population size and financial constraints are pragmatic considerations which come on the way of implementing the policy of introducing the language of the tribal group at the primary stage. Introduction of tribal languages at primary stage will reduce the percentage of drop-outs of the tribal children in schools and help to maintain the language and culture. Further the attempt may be viewed as a strategy for smooth transition from the language of the tribals to the language of the region. It paves way for the smooth integration of the tribals with the main stream of our national life.

Introduction of tribal languages at primary stage requires the attempt to devise the script for those languages. Since the tribals at certain stage are expected to join ultimately the main stream, it would be better to suggest the script of the regional language with suitable modifications. Furthermore the children of the tribal group when they learn the regional language at a latter stage will not be uncomfortable while learning the script of the regional language. The suggestion give here serves the function of maintaining the languages and culture of the tribals as well as integrating the tribals with the main stream of national life.

The tribal children are uncomfortable in the school because of the language used and also the contents of the lessons in the text-books. The text-books deal with the contents which are not within the reach of the experience of the children. There is no need to insist uniform standard for the textbooks to be used for the children of tribal and regional language groups. Both the language and content of the textbooks must be within the reach of the experience of tribal children.

The study of tribal languages and culture is important from another point of view. Since they have lesser exposer to outside contact, it may be possible for one to discover the elements of ancient culture/proto language being preserved. Therefore the study of tribal languages and culture is important from this view also. It is generally believed that the distribution of dravidian languages is restricted to the southern part of India. But we come to know that the dravidian languages are found spoken in Orissa, Madhya Pradesh and other northern States. Some of the languages like Kurukh and Brahüi are spoken outside India. We find speakers of Kurukh and Brahui in Nepal and Pakistan.

Let me conclude my remarks with one more observations. Language is viewed not only as an instrument of communication but also a primary instrument of social group formation. It is used in social context. One finds two groups of scholars in the field of language study. One group is interested in those features which are common to all the members of the speech community. The other group insists on the features which vary from one group to the other. They further state that variation is systematic. It is correlated with the structure of the society. Linguists attempt to correlate the linguistic variables with social variables. Since language is viewed as a product of society, it is said that the study of language particularly the study concentrating on language variation enables one to understand the structure of society. For example if someone says *embalatu* 'eighty', then we immediately say that, he is a Tamil speaker from the district of Thanjavur. The linguistic variable noted here is correlated with the group of speakers from Thanjavur district. The use of lexical items like *a:ttukku* 'to the house' signals that the speaker belongs to Brahmin community. Variation study is related both to the division of speakers in terms of geographical areas and social variables such as caste, sex, education, etc. In short, it is possible for one to understand the structure of society through the study of language structure. It is one of the areas in which scholars from anthropology, sociology and linguistics as collaborate and bring interesting results.

Thanking you.

POPULATION STRUCTURE OF IRULAS OF NILGIRIS

K. N. Reddy

Introduction

Population structure to demographers means the age and sex composition of the population which they utilise for building up of the population projections. It varies in time and space as a consequence of births and deaths as well as selective migration. For population geneticists, population structure means all usual demographic parameters and also means and variances of births, deaths, number of children, mortality, mating size and breeding structure of the population, their effective population size, admixture rate, and such other characters which throw light on genetic processes in the respective populations.

Wright (1951) considers mating system and effective size constitute the essential components of a population structure. Yasuda and Morton (1967), on the otherhand, see population structure as the totality of deviations from Pan mixia. Genetic demography and structure of a population is a developing trend in Anthropological demography. Earlier workers have repeatedly emphasized the need for population geneticists to pay considerable attention to demographic structures of human populations (Spuhler, 1959; Sutter, 1963; WHO, 1964 and 1971). It is interesting to note that the cultural behaviour and social structure directly contribute to the understanding of genetic structure of human population (Cavalli-Sforza, 1967; Reid, 1973).

Systematic anthropological demographic studies, with reference to India, are very few. The first pioneering work comes from Basu (1969) among the Pahira, a small tribe distributed in West Bengal and Bihar. The second detailed study has been reported on the Kota of the Nilgiri Hills, Tamil Nadu, by Ghosh (1976). Susmita Talukdar (1979) made a similar study on "genetical demography of two Dule Bagdi demes". Besides, there are studies on various populations focusing on certain aspects of demography (Dronam Raju and Meera Khan, 1960; Dronam Raju, 1964; Rakshit, 1972; Mukherjee, D.P., 1974; Chaudhary and Kumar, 1976). However, the need for research in anthropological demography (Rakshit, 1976), and prospects of population genetical work in India (Sen, 1976), have already been emphasised. Demographic studies of Indian tribes have also been warranted for development purposes (Singh, B., and Reddy, K.N. 1982; Roy Burman, 1978).

Contrary to the above studies an attempt is made here to examine the population "Irulas of Nilgiris" in a different anthropological perspective. The exogamous cultural groups that are present in the endogamous population are considered as structural units for the biology of that population. The number of clans that are present, their size and distribution, mating behaviour, effective size, selection intensity, inbreeding levels, fertility and mortality trends are located.

Materials and Methods

As per 1971 Census the Irulas are the second numerically largest tribe of Tamil Nadu, with a population of 89,025. They are largely distributed in seven districts namely, Chengleput, North Arcot, South Arcot, Tiruchirappalli, Salem, Coimbatore and Nilgiris.

In Nilgiris, Irula is the largest tribe with a population of 6,567 (1971). They are found in the lower altitudes of Nilgiri plateau and in the northern slopes of Moyar valley. Of the four taluks in the Nilgiri district they are found mainly in two tahsils, namely, Kotagiri and Ooty; very few are found in Coonoor and none in the Gudalur tahsil. This study was therefore confined to the Irulas of Kotagiri and Ooty tahsils.

Field work was done for about two months between June and August, 1984 in 18 Irula settlements (12 from Kotagiri and 6 from Ooty Tahsils) selected purposively as the Irula settlements are based on *Kulam* (clan) concentration. Data on all demogenetic factor were collected through interview schedules from a total of 840 couples of the selected Irula settlements.

Results and Discussion

The population of Irulas of Nilgiris is clearly divided into several organised *kulams* (clans). Each *kulam* is an exogamous patrilineal descent group. In Nilgiris about eight *kulams* are found to be predominant, namely, *Kalkatti, Kuppar, Sambar, Devnar, Pungar, Kurunagar, Koduvar* and *Peradar*. Other *kulams* like *Poriger, Vellama, Velligar, Vangiyar* and *Uppiligar* are present in the Masinigudi area of Nilgiris. As these *kulams* are observed only in the contact zone between Tamil Nadu and Karnataka States they are not included in the present study. *Kulams* vary from one another in their size. The kulams, Kalkatti, Kuppar, and Sambar are large in size and they together account for more than half of the total population. Besides, these three *kulams* are distributed uniformly in the study area. *kulam* Pungar, on the other hand, is found only in Kunjapani area (Kollikarai, Kunjapani and Sambanarai), Kurunagar and Koduvar *Kulams* are distributed wiedly in the villages of Anaikatti, Siriyur, Kalampalyam and Hallimoyar, Devnar *Kulam* in the villages of Vagapani Sambanarai and Mettukkal and Peradar *Kulam* in the villages of Mettukkal, Godagur and Kambiyur. Such nature of distribution of *kulams* indicates territorial affiliations.

Marriages are regulated through what is termed in Irula language, *kulam mure or more*. One interesting feature noticed from the study is that the *kulams*, Kuppar, Kalkatti, and Sambar, can take mates from any other *kulam* except their own. Whereas, the rest of the *kulams*, like, Devnar, Pungar, Kurunagar, Koduvar, and Peradar are consider themselves as brotherly *kulams* and so depend on Kuppar, Kalkatti and Sambar *kulams* for mates. Thus certain *kulams* have the privilege of taking mates in all *kulams*, while certain other *kulams* have restrictions in taking mates. This might influence the genetic structure of the population.

Age and Sex Composition

The pyramid of the entire Irulas of Nilgiris shows the general tendency of becoming narrower as the age advances from the infancy to old age. This represents a characteristic tradition of a population (figure 1). However, the pyramids of individual *kulams* of Irulas of Nilgiris, reflect different picture. The *kulams* Kalkatti and Kuppar show the generalised form of pyramids (figure 2 & 3). The *kulam* Sambar shows the smaller base of the pyramid (0-4 years) (figure 4). This suggests the low birth rates and/or high infant mortality. The pyramid of the kulam Devnar has broad base followed by sharp decline in age-groups of 5-19 (figure 5). This suggests that there are more premature deaths, i.e., deaths before reproductive age, in this *kulam*. The other pyramids of the *kulams*, Kurunagar and Koduvar are within the purview of the characteristic traditions (figure 6 & 7). The pyramid of the *kulam* Pungar presents comparatively smaller base suggesting low birth rates and/or high infant mortality (figure 8). The pyramid of the *kulam* Peradar exhibits considerable deviations from the traditional one (figure 9). It has smaller base uptil the age groups of 10-14 followed by rise in distribution of higher age-groups till 55-59 except in 35-39 and 40-44 age-groups. However, the distribution narrows considerably from the age-groups of 60-64. This suggests that the survival capacity of this *kulam* increases after attaining the reproductive age. Low fertility rate, high infant mortality, and premature deaths might be the main cause for smaller base of its pyramid.

Sex Ratio

The sex ratio for the entire population is 106 males for 100 females (Table 1). Sex ratios in Kalkatti, Kuppar and Sambar *kulams* are 110, 106, and 117 males respectively for 100 females as against 97, 102, 90, 101 and 101 males for 100 females in kulams, Devnar Pungar, Kurunagar, Koduvar and Peradar respectively. This shows that the availability of males to females are more in the first group of *kulams* where as it is equal or low in the second group of *kulams*. The presence of only 97 and 90 males for 100 females in the Devnar and Kurunagar *kulams*, respectively may be due to sampling errors or the incidency of lower birth rate or higher death rate of males.

Mating Types

Mating types among Irulas of Nilgiris in terms of their *kulams* are given in table 2 and the distribution of Irula women of various *kulams* in mating types with men is given in table 3. There is no random mating among Irulas of Nilgiris. No population, for that matter, is an ideally random mating group. As has been earlier stated, *kulam* plays an important role in the selection of mates among Irulas. Of the eight *kulams* only three *Kulams* namely Kalkatti, Kuppar and Sambar, can exchange mates with all *kulams* except their own whereas the remaining five cannot do so. However, out of 840 mating types surveyed, four matings are found among these five *kulams*. No mating is reported between Peradar and Sambar *kulams*, restricting the choice of mates for Peradar *kulam* to the remaining two *kulams* viz., Kalkatti and Kuppar. *Kulams* - Devnar, Kurunagar, Koduvar, and Pungar, are expected to exchange mates with Kalkatti, Kuppar, and Sambar *kulams* only. As a result, these brotherly *kulams* have had established individual rapports with other three *kulams* by means of consanguineous matings. The percentage of consanguineous matings are more in these *kulams* than among the *kulams* Kalkatti, Kuppar and Sambar. Finding a mate either at random or reference is easy for *kulams* of the former group and difficult for the rest of *kulams* because of their rigid practice of *kulam* Mure. May be due to this reason the individual growth of *kulams* is also subjected to same stresses. The growth of kulam depends on males only as females join the spouse's *kulam* after marriage. So culturally a particular *kulam* tends to dwindle down if females are more to males.

Consanguinity

Consanguinity contributes to the breeding and genetic isolation within the population. The nature and incidence of genotypes carried by individuals and populations can be assessed through the study of consanguineous marriages because such matings facilitate the recessive genes to manifest their effect and the semi-dominant genes to increase their efforts by becoming homozygous. It reflects the way genes combine in successive generations. Such marriages are found to occur more frequently in some Southern States, while they are considered to be a taboo in some populations of Northern India.

In Irulas of Nilgiris, consanguineous marriages are preferred. Out of total 840 marriages, 46% are consanguineous unions. The consanguineous: non-consanguineous ratio is 84.62. Cross-cousin marriages are the most common form (42.38%) of consanguineous unions. Marriages with Mother's brother's daughter account for 28.33% of total unions and it closely conforms with Reid's (1973) findings in South Indian populations. Uncle and niece marriages constitute only 3.45% among the Irulas (Table 4).

The mean inbreeding coefficient (F) for the entire population is 0.031. The 'F' value is the highest for the combination of *kulams* Sambar/Devnar (0.057), followed by Kuppar/Pungar (0.049); Kuppar/Sambar (0.043); Kuppar/Devnar (0.041); Kalkatti/Kuppar (0.039); Kalkatti/Devnar (0.034); and Kuppar/Peradar (0.034). These values are higher than the average value for the population. In contrast, the 'F' values are lower. than the average value for the population in the combination of *kulams* like Kalkatti/Sambar; Kalkatti/Kurunagar; Kalkatti/Pungar; Kalkatti/Koduvar; Kalkatti/Peradar; Kuppar/Kurunagar; Kuppar/Koduvar; Sambar/Kurunagar; and Sambar/Pungar. The higher 'F' values between most of the *kulams* are due to the fact that the five brotherly *kulams* have to exchange, mates with only three remaining *kulams* viz., Kalkatti, Kuppar and Sambar leading to the formation of strong mating association ultimately contributing to a high incidence of consanguineous marriages. Such details within the population may throw greater light on inbreeding levels and the genetic structure of the population.

Breeding Size, Aging Index, and Dependency Ratio

Over one-third of the total individuals belong to pre-reproductive age with a slightly higher per cent in males except in *kulams* Devnar, Kurunagar, Pungar, and Koduvar. In the reproductive age-group (15-49 years), one-half of males and females contribute to the breeding size of the population. However, higher frequency of females than males is noticed in *kulams* Kurunagar, Pungar and Peradar, indicating the tendency of higher fertility in these *kulams*. Also attributions of sampling error cannot be ruled out. In all *kulams* and by putting all *kulams* together, older males are higher than the post-reproductive females, except in *kulams* Kuppar and Devnar where post-reproductive females are higher (Table 5).

Stockwell (1972) defined the index of aging as "the number of persons aged 65 and over, per 100 children under 15 years of Age." In this study 50 years has been taken as border line for post-reproductive age ignoring the fertility in males beyond this age in order to avoid statistical complications. The aging index for the entire Irulas of Nilgiris is 29.59 and it is 32.55 for males and 26.45 for females (Table 5). The index value is the highest (47.22) for Peradar *kulam* followed by Kalkatti (31.79) and Pungar (31.25). Highest index values are found among both the sexes in these *kulams*. In contrast the Koduvar *kulam* had shown the lowest index values (20.90) followed by the Devnar (27.38) and the Sambar (27.69) *kulams*. The same trend is seen between the sexes in these *kulams*. The other *kulams* fall in between these two extreme points. Thus the *kulam* Peradar is represented by more old age people than young people. The *kulam* Koduvar is comprised of young people.

The dependency ratio corresponding to the ratio of biologically non-reproductive (below 15 and above 49 years) to reproductive individuals (15-49 years) for the entire Nilgiri Irula population is 82.38 (table 6). This, further reads that the producers are more than consumers. The dependency ratio is less in Peradar *kulam* followed by Devnar, Kuppar, Kalkatti, Sambar, Koduvar, Pungar and Kurunagar. The higher value for the *kulam* Kurunagar indicates that dependents are just equal to producers.

Effective Population Size

The effective population size is a measure of the reproductive potential of a population and is usually calculated based on reproductive inequalities in the population according to Wright's formula (cf. Sen, 1976). The effective population size for the entire Irulas of Nilgiris is 1290 which is lower than the actual breeding size (Table 6). This is largely due to greater variance of the number of children per couple than the mean number of children. This size is also smaller for all *kulams* except in Koduvar. The larger effective population size in the *kulam* Koduvar may be due to the smaller variance of the number of children per couple than the mean number of children. In *kulams*, Pungar, Peradar and Kurunagar, the effective population size is just lower than the actual breeding size.

Opportunity of Selection

Index of selection potential or the selection intensity for each *kulam* of the Irulas has been calculated according to Crow's (1968) formula and the results are given in table 7.

Among the entire Irulas of Nilgiris the average number of live births per woman aged 40 years or more is ($\bar{x}$) 5.03 and its variance (Vf) is 9.36. The total number of live births (N2) to the women of all ages in the population and the total number of premature deaths are, 1403, and 279 respectively; so that the frequency of mortality before reproductive age, i.e., 15 years (pd), is 19.89%. From these results the mortality (Im) and fertility (If) components are found to be 0.327 and 0.370 respectively, which give the index of selection intensity (I) as 0.818. It thus appears that the mortality component of the total selection intensity is smaller than the fertility component among the entire Irulas of Nilgiris. The same trend is found across *kulams*, where in all, the mortality component of the total selection intensity is smaller than the fertility component. In 5 out of 10 tribal populations studied by Spuhler (1962), 1 out of 4 Caingang Indian populations studied by Salzano (1963), and none out of 3 Pahira sub-populations studied by Basu (1967) Im is less than If. The index of total selection intensity (I) among the Irulas of Nilgiris is more toward the lower half of the range (0.6-3.7) observed by Spuhler (1962) among the ten tribal populations. It seems that among the Irulas of Nilgiris selection is acting with a moderate intensity and that differential postnatal mortality accounts for only a small part of the total opportunity for selection.

Fertility and Mortality

An analysis of the data collected on the number of children ever born in relation to the age-group of entire Irula women of Nilgiris is presented in table 8. From this table it is clear that 10.51% of total Irula women are not having any child at all; 17.43% have one child, 16.93% have two children, 16.19% have three children, 12.73% have four children, 10.63% have five children, and the remaining 15% have six or more children. Analysis of data across the age-groups of women shows that women in the age-groups of 20-29 and 45+ (those who reached full reproductive life) have the largest number of children ever born. From this analysis it is found that the mean number of children ever born to a woman is 3.18. If we study this by age-group of women it is observed that the mean number of children ever born is highest in the age-groups 45+ and it is 5.36. We may thus come to the conclusion that most of the Irula women of Nilgiris have 2 to 6 children ever born.

Information relating to the number of children alive in relation to the age-group of entire Irula women is provided in table 9. This table shows that 12.61% of women have no children alive whereas the previous table shows that 10.51% of females never begot any child. This means that the number of women in the category of having no child is increased by 2 per cent.

24.10% have one child alive, 20.27% have two children alive, 18.05% have three children alive, 10.75% have four children alive, 6.43% have five children alive, and the remaining 7% have six or more children alive. This analysis shows that the majority of the Irula women have 1 to 4 children alive. The mean number of children alive is 2.46 which is less than the mean number of children ever born. Women belonging to the age-group of 45+ have the highest mean (3.91) of number of children alive followed by the age-groups, 40-44, 35-39, 30-34, 25-29, 20-24 and 15-19.

Table 10 shows the percentage distribution of entire Irula women by age and number of children dead. It is found that no children are dead for 63.78% of women, one child is dead for 18.29% of women, two children for 9.52% of women, three children for 4.08% of women, four children for 2.22% of women, and five or more children are dead for 2% of women. This analysis shows that there are about 30% of women to whom one or more children are dead. Analysing the data on the basis of age-group of women it is found that the mean number of children dead is highest in the age-group of 45+, which is about 1.47% and it is below 1% in all other age-groups except in 40-44, where it is 1.12%. This means that the mean number of children dead is considerably low in majority of the age-groups. The overall mean number of children dead is 0.7%.

Summary and Conclusion

Anthropological demographic data on Irulas of Nilgiris with special reference to their clan organisations present the following interesting interplay of biology and culture.

The entire population, Irulas of Nilgiris, is enmeshed in exogamous units (clans), referred by Irulas in their language as *kulams*. There exists eight such clans *(kulams)* distributed in the core of Nilgiri hills. These *kulams* maintain territorial and mating affiliations. This brings genetic differentiation among them at *kulam* (clan) levels for all demographic features viz., age and sex composition, sex ratio, consanguinity, breeding size, aging index, dependency ratio, effective population size, selection intensity, and fertility and mortality.

The present analyses indicate the need for further comparative studies at clan levels on specific populations of India. Further, the results emphasise the essential features of 'biological population' in terms of clan structures and their associations with other clans for kin identities and mating purposes for tracking down its nature of biology. The growth of decline of individual clans in human groups depends on differential fertility and knowledge of reproductive capacity, fertility and mortality trends at clan level would help greatly in constructing the true demographic structure of the population.

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TABLE - I

Sex ratios among the different kulams of the Irulas of Nilgiris by broad age-groups

Sl.No.	Kulams	0-14 years			15-64 years			65+ years			Total		
		Males	Females	Sex ratio	Males	Females	Sex ratio	Males	Females	Sex ratio	Males	Females	Sex ratio
1.	All kulams	550	518	106	995	946	105	33	22	150	1578	1486	106
2.	Kalkatti	151	129	117	258	146	105	9	4	225	418	379	110
3.	Kuppar	130	121	107	256	244	105	8	7	114	394	372	106
4.	Sambar	107	88	122	168	148	114	6	4	150	281	240	117
5.	Devnar	38	46	83	91	89	102	2	--	--	131	135	97
6.	Pungar	40	40	100	67	67	100	2	--	--	109	107	102
7.	Kurunagar	33	42	79	52	55	95	3	1	300	88	98	90
8.	Koduvar	32	35	91	51	49	104	2	--	--	85	84	101
9.	Peradar	19	17	112	52	53	98	1	1	100	72	71	101

TABLE - 2

Mating patterns among Irulas of Nilgiris by kulams

Sl.No.	I	II	III	IV	V	VI	VII	Total
1.	Kalkatti Kuppar 81	Kalkatti Sambar 54	Kalkatti Devnar 29	Kalkatti Peradar 14	Kalkatti Kurunagar 24	Kalkatti Koduvar 19	Kalkatti Pungar 4	= 225
2.	Kuppar Kalkatti 81	Kuppar Sambar 22	Kuppar Devnar 33	Kuppar Peradar 22	Kuppar Kurunagar 7	Kuppar Koduvar 10	Kuppar Pungar 47	= 222
3.	Sambar Kalkatti 55	Sambar Kuppar 24	Sambar Devnar 5	Sambar --	Sambar Kurunagar 27	Sambar Koduvar 10	Sambar Pungar 3	= 124
4.	Devnar Kalkatti 31	Devnar Kuppar 39	Devnar Sambar 6	--	Devnar Kurunagar 1			= 77
5.	Kurunagar Kalkatti 26	Kurunagar Kuppar 6	Kurunagar Sambar 18	--	Kurunagar Devnar 2			= 52
6.	Pungar Kalkatti 4	Pungar Kuppar 50	Pungar Sambar 2	--	Pungar Kurunagar 1			= 57
7.	Koduvar Kalkatti 26	Koduvar Kuppar 10	Koduvar Sambar 6	Koduvar Peradar 1				= 43
8.	Peradar Kalkatti 16	Peradar Kuppar 24						= 40
					Total combination of mating types			= 840

N.B. -- For all above mating types the first is male, and the second is female.

TABLE - 3

Distribution of women of various kulams in mating patterns with men of other kulams

Sl.No.	I	II	III	IV	V	VI	VII	Total
1.	Kuppar Kalkatti 81	Sambar Kalkatti 55	Devnar Kalkatti 31	Kurunagar Kalkatti 26	Pungar Kalkatti 4	Koduvar Kalkatti 26	Peradar Kalkatti 16	= 239
2.	Kalkatti Kuppar 81	Sambar Kuppar 24	Devnar Kuppar 39	Kurunagar Kuppar 6	Pungar Kuppar 50	Koduvar Kuppar 10	Peradar Kuppar 24	= 234
3.	Kalkatti Sambar 54	Kuppar Sambar 22	Devnar Sambar 6	Kurunagar Sambar 18	Pungar Sambar 2	Koduvar Sambar 6		= 108
4.	Kalkatti Devnar 29	Kuppar Devnar 33	Sambar Devnar 5	Kurunagar Devnar 2				= 69
5.	Kalkatti Kurunagar 24	Kuppar Kurunagar 7	Sambar Kurunagar 27	Devnar Kurunagar 1	Pungar Kurunagar 1			= 60
6.	Kalkatti Pungar 4	Kuppar Pungar 47	Sambar Pungar 3					= 54
7.	Kalkatti Peradar 14	Kuppar Peradar 22	Koduvar Peradar 1					= 37
8.	Kalkatti Koduvar 19	Kuppar Koduvar 10	Sambar Koduvar 10					= 39
					Total combination of mating types			840

N.B. -- For all the above mating types the first is male, and the second is female.

TABLE - 4

Mating patterns and consanguinity levels among Irulas (in the total population as well between kulams)

Sl.No.	Mating kulams (clans)	Consanguineous		Non-consanguineous		Consanguineous and Non-consanguineous ratio	Mean Inbreeding Coefficient (F)
		Number	Percentage	Number	Percentage		
1.	All kulams	385	45.83	455	54.17	84.62	0.031
2.	Kalkatti/Kuppar	96	59.26	66	40.74	145.45	0.039
3.	Kalkatti/Sambar	31	28.44	78	71.56	39.74	0.019
4.	Kalkatti/Devnar	31	51.67	29	48.33	106.90	0.034
5.	Kuppar/Sambar	27	58.70	19	41.30	142.11	0.043
6.	Kuppar/Devnar	45	62.50	27	37.50	166.67	0.041
7.	Kuppar/Pungar	74	76.29	23	23.71	321.74	0.049
8.	Sambar/Devnar	9	81.82	2	18.18	450.00	0.057

TABLE - 5

Aging Index, Breeding Size and Dependency Ratio of Irulas of Nilgiris

Kulam/Sex	All Ages	Below 15 years		Breeding size 15 - 49 years		50 years and above		Aging index	Dependency Ratio
		No.	%	No.	%	No.	%		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
All Kulams									
Males	1578	550	34.86	849	53.80	179	11.34	32.55	85.87
Females	1486	518	34.86	831	55.92	137	9.22	26.45	78.82
Total	3064	1068	34.86	1680	54.83	316	10.31	29.59	82.38
Kalkatti									
Males	418	151	36.12	215	51.44	52	12.44	34.44	94.42
Females	379	129	34.04	213	56.20	37	9.76	28.68	77.93
Total	797	280	35.13	428	53.70	89	11.17	31.79	86.21
Kuppar									
Males	394	130	32.99	228	57.87	36	9.14	27.69	72.81
Females	372	121	32.53	215	57.80	36	9.67	29.79	73.02
Total	766	251	32.77	443	57.83	72	9.40	28.69	72.91
Sambar									
Males	281	107	38.08	141	50.18	33	11.74	30.84	99.29
Females	240	88	36.67	131	54.58	21	8.75	23.86	83.21
Total	521	195	37.43	272	52.21	54	10.36	27.69	91.54

Contd.....

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Devnar									
Males	131	38	29.00	82	62.60	11	8.40	28.75	59.76
Females	135	46	34.07	77	57.04	12	8.89	26.09	75.32
Total	266	84	31.58	159	59.77	23	8.65	27.38	67.30
Kurunagar									
Males	88	33	37.50	42	47.73	13	14.77	39.39	109.52
Females	98	42	42.86	47	47.96	9	9.18	21.43	108.51
Total	186	75	40.32	89	17.85	22	11.83	29.33	108.99
Pungar									
Males	109	40	36.70	54	49.54	15	13.76	37.50	101.85
Females	107	40	37.38	57	53.27	10	9.35	25.00	87.72
Total	216	80	37.04	111	51.39	25	11.57	31.25	94.59
Koduvar									
Males	85	32	37.65	45	52.94	8	9.41	25.00	88.89
Females	84	35	41.67	43	51.19	6	7.14	17.14	95.35
Total	169	67	39.65	88	52.07	14	8.28	20.90	92.05
Peradar									
Males	72	19	26.39	42	58.33	11	15.28	57.89	71.43
Females	71	17	23.94	48	67.61	6	8.45	35.29	47.92
Total	143	36	25.17	90	62.94	17	11.89	47.22	58.89

TABLE - 6

Effective population size of Irulas by kulams

Population	Number of parents	Number of children per parent			Effective size
		Mean	S.D.	Variance	
Kalkatti	408	4.06	2.72	7.40	339.36
Kuppar	394	4.18	2.55	6.50	347.89
Sambar	193	4.71	2.93	8.58	164.43
Kurunagar	99	3.20	1.98	3.92	92.54
Pungar	86	3.43	1.90	3.61	84.71
Koduvar	65	3.80	1.62	2.62	70.71
Peradar	59	3.29	1.95	3.80	56.38
All kulams	1426	3.86	2.33	5.43	1290.13

TABLE - 7

Indices of selection potential in Irulas of Nilgiris

Kulam (clan) wise and population as a whole

Population	Im	If	I
Kalkatti	0.268	0.343	0.073
Kuppar	0.394	0.402	0.954
Sambar	0.408	0.432	1.016
Devnar	0.238	0.439	0.781
Kurunagar	0.274	0.672	1.130
Pungar	0.347	0.459	0.966
Koduvar	0.263	0.405	0.774
Peradar	0.344	0.482	0.992
Kulams put together (Irulas as a whole)	0.327	0.370	0.818

TABLE - 8

Percentage distribution of entire Irula women by age and number of children ever born

Number of children ever born	(Age Groups) 15-19	20-24	25-29	30-34	35-39	40-44	45+	Total
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
0	68.29 (28)	18.33 (33)	7.81 (10)	4.20 (5)	3.23 (2)	4.35 (4)	1.60 (3)	10.51 (85)
1	26.83 (11)	42.78 (77)	18.75 (24)	9.24 (11)	9.68 (6)	5.44 (5)	3.74 (7)	17.43 (141)
2	4.88 (2)	26.67 (48)	33.59 (43)	14.29 (17)	14.52 (9)	6.52 (6)	6.42 (12)	16.93 (137)
3		10.56 (19)	21.88 (28)	28.57 (34)	20.96 (13)	19.56 (18)	10.16 (19)	16.19 (131)
4		1.11 (2)	12.50 (16)	21.01 (25)	19.35 (12)	19.56 (18)	16.04 (30)	12.73 (103)
5		0.56 (1)	3.91 (5)	16.81 (20)	17.74 (11)	16.30 (15)	18.18 (34)	10.63 (86)
6			1.56 (2)	4.20 (5)	11.29 (7)	11.96 (11)	9.64 (18)	5.32 (43)

Contd.....

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
7				1.68 (2)	3.23 (2)	7.61 (7)	13.37 (25)	4.45 (36)
8						4.35 (4)	8.02 (15)	2.35 (19)
9						4.35 (4)	10.16 (19)	2.84 (23)
10							2.67 (5)	0.62 (5)
11+								
Total	100.00 (41)	100.00 (180)	100.00 (128)	100.00 (119)	100.00 (62)	100.00 (92)	100.00 (187)	100.00 (809)
Mean No. of children ever born	0.36	1.35	2.30	3.29	3.58	4.36	5.36	3.18

TABLE - 9

Percentage distribution of entire Irula women by age and number of children alive

Number of children alive	Age-Groups						
	15-19	20-24	25-29	30-34	35-39	40-44	45+	Total
0	73.17 (30)	21.67 (39)	8.59 (11)	7.56 (9)	6.45 (4)	4.35 (4)	2.67 (5)	12.61 (102)
1	24.39 (10)	48.89 (88)	30.47 (39)	17.65 (21)	9.68 (6)	11.96 (11)	10.70 (20)	24.10 (195)
2	2.44 (1)	22.78 (41)	32.81 (42)	20.17 (24)	25.80 (16)	15.22 (14)	13.90 (26)	20.27 (164)
3		5.55 (10)	21.88 (28)	26.05 (31)	17.74 (11)	33.70 (31)	18.72 (35)	18.05 (146)
4		1.11 (2)	4.69 (6)	17.65 (21)	20.97 (13)	13.04 (12)	17.65 (33)	10.75 (87)
5			0.78 (1)	9.24 (1)	14.52 (9)	7.60 (7)	12.83 (24)	6.43 (52)
6			0.78 (1)	0.84 (1)	3.23 (2)	8.70 (8)	10.16 (19)	3.83 (31)

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
7				0.84 (1)	1.61 (1)	5.43 (5)	8.02 (15)	2.72 (22)
8							3.75 (7)	0.87 (7)
9							1.60 (3)	0.37 (3)
10								
Total	100.00 (41)	100.00 (180)	100.00 (128)	100.00 (119)	100.00 (62)	100.00 (92)	100.00 (187)	100.00 (809)
Mean No. of children alive	0.29	1.16	1.89	2.64	3.02	3.24	3.91	2.46

TABLE - 10

Percentage distribution of entire Irula women by age and number of children dead

Number of children dead	(Age Groups) 15-19	20-24	25-29	30-34	35-39	40-44	45+	Total
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
0	92.68 (38)	85.56 (154)	68.75 (88)	60.50 (72)	66.13 (41)	48.91 (45)	41.71 (78)	63.78 (516)
1	7.32 (3)	11.11 (20)	22.66 (29)	20.17 (24)	22.58 (14)	20.65 (19)	20.86 (39)	18.29 (148)
2		2.78 (1)	7.81 (10)	14.29 (17)	6.45 (4)	15.22 (14)	14.44 (27)	9.52 (77)
3		0.55 (1)	0.78 (1)	4.20 (5)	3.23 (2)	5.43 (5)	10.16 (19)	4.08 (33)
4				0.84 (1)		6.52 (6)	5.88 (11)	2.22 (18)
5						1.09 (1)	3.21 (6)	0.87 (7)
6						2.18 (2)	0.53 (1)	0.37 (3)

Contd.....

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
7					1.61 (1)		2.14 (4)	0.62 (5)
8							1.07 9(2)	0.25 (2)
9								
10								
Total	100.00 (41)	100.00 (180)	100.00 (128)	100.00 (119)	100.00 (62)	100.00 (92)	100.00 (187)	100.00 (809)
Mean No. children dead	0.07	0.18	0.33	0.65	0.56	1.12	1.47	0.70

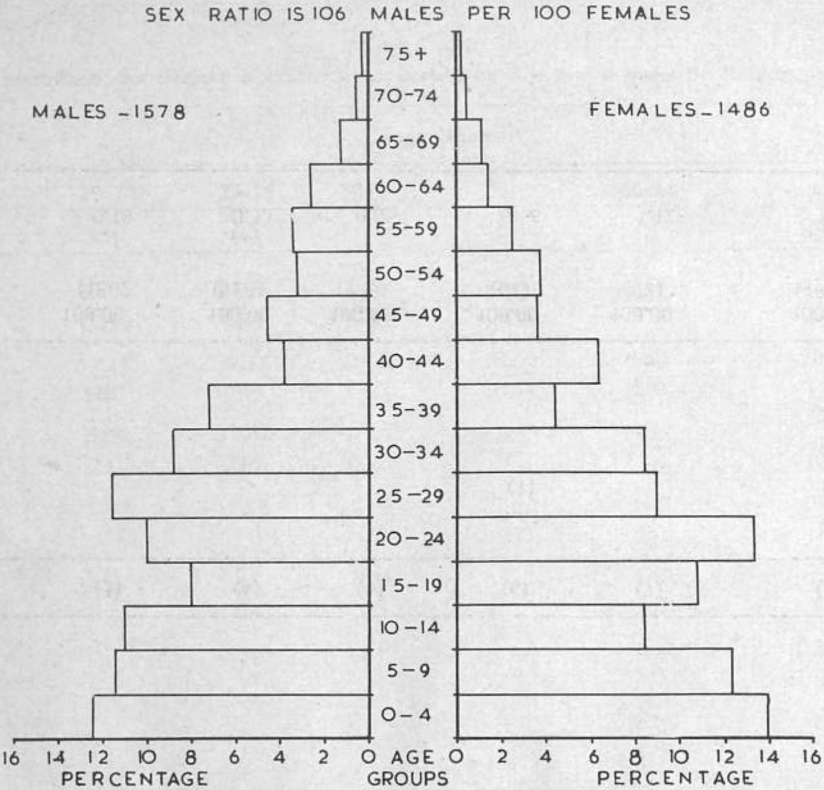

FIG-1 POPULATION PYRAMID OF IRULAS OF NILGIRIS.

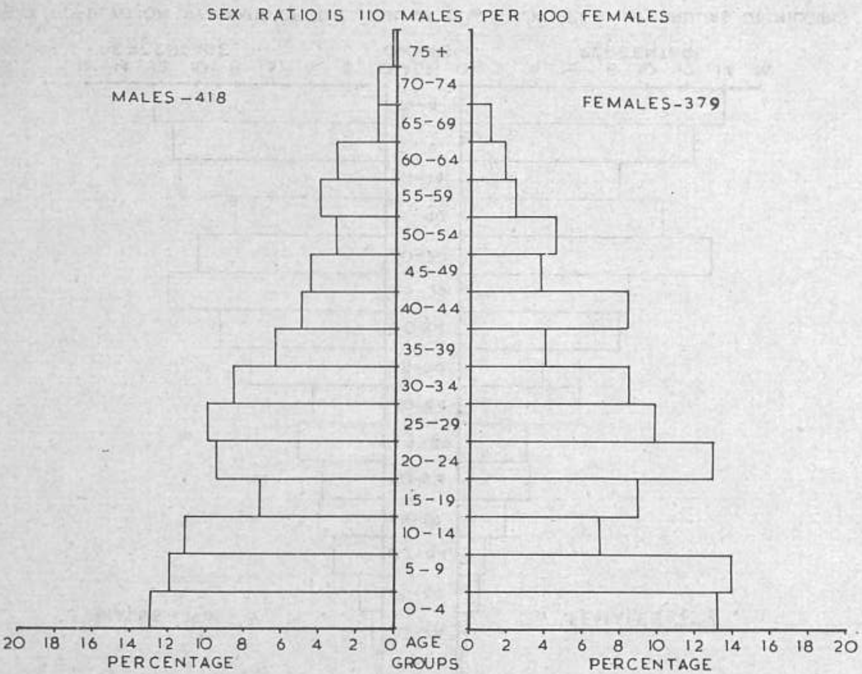

FIG-2. POPULATION PYRAMID OF THE KULAM (CLAN) KALKATTI OF IRULAS OF NILGIRIS.

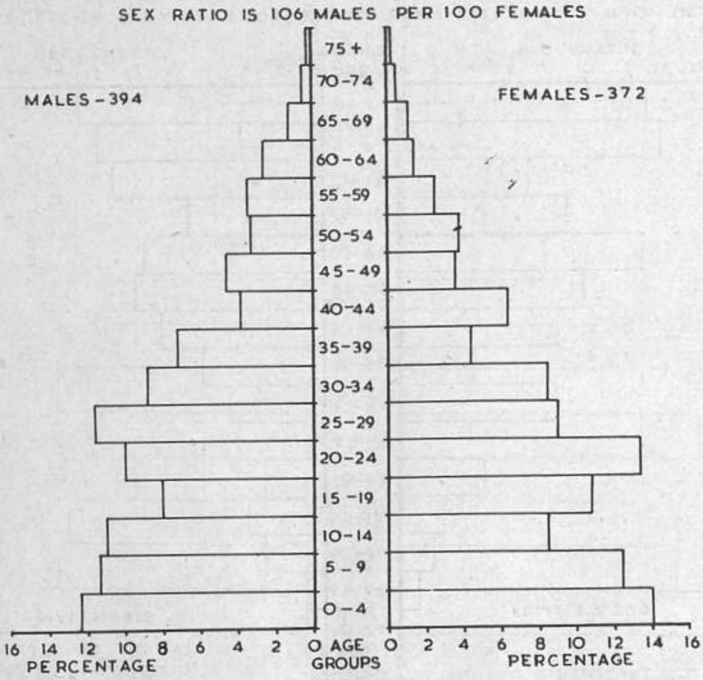

FIG. 3 POPULATION PYRAMID OF THE KULAM (CLAN) KUPPER OF IRULAS OF NILGIRIS.

132-3

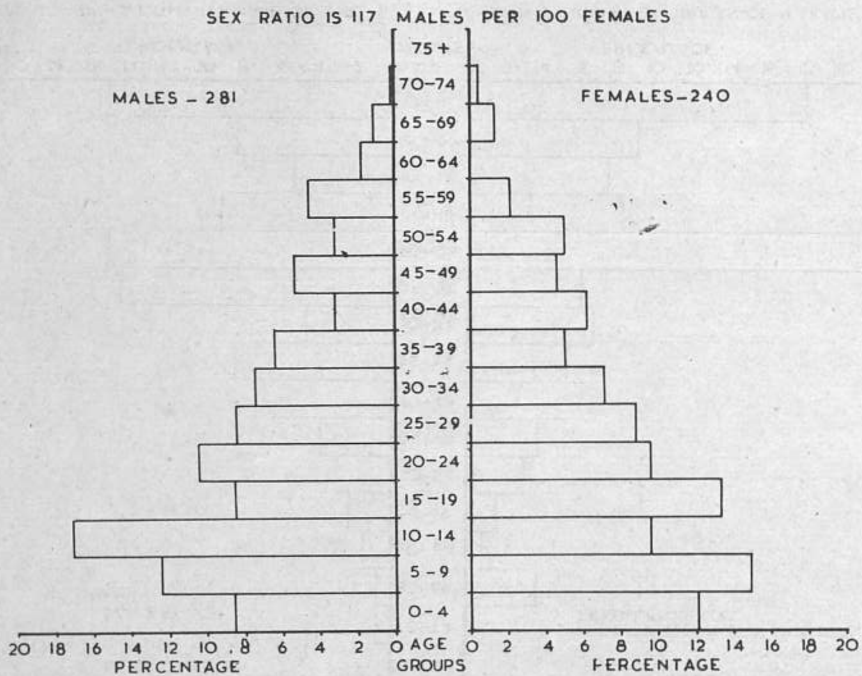

FIG- 4 POPULATION PYRAMID OF THE KULAM (CLAN) SAMBAR OF IRULAS OF NILGIRIS.

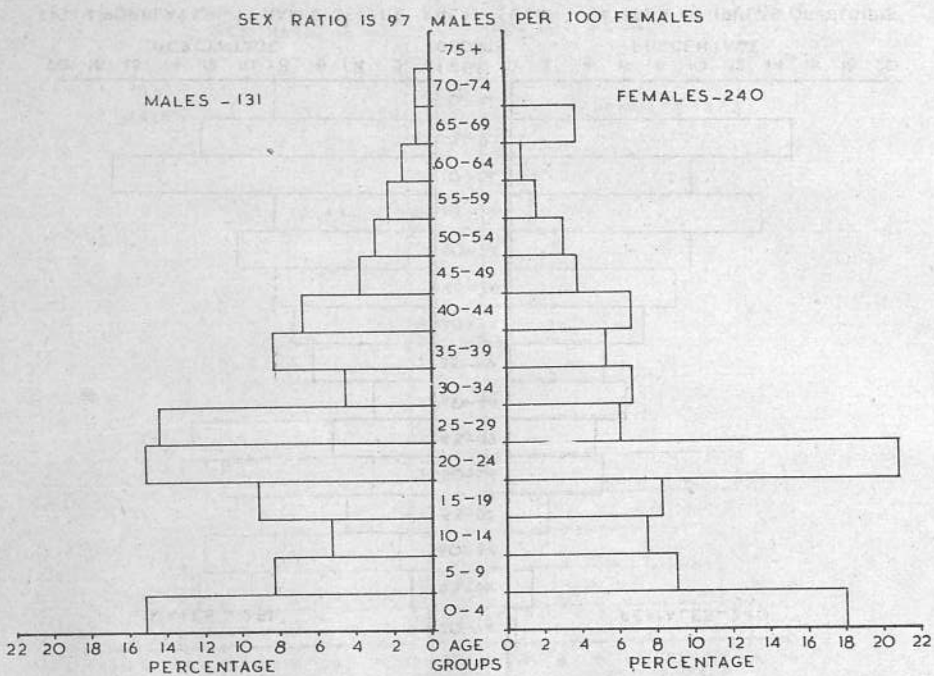

FIG- 5 POPULATION PYRAMID OF THE KULAM (CLAN) DEVNAR OF IRULAS OF NILGIRIS.

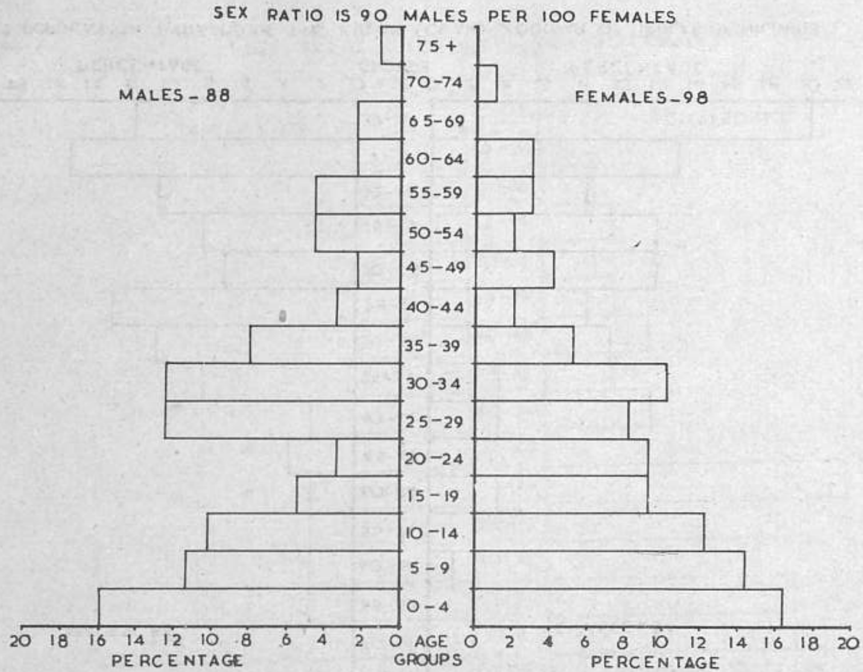

FIG-6. POPULATION PYRAMID OF THE KULAM (CLAN) KURUNAGAR OF IRULAS OF NILGIRIS

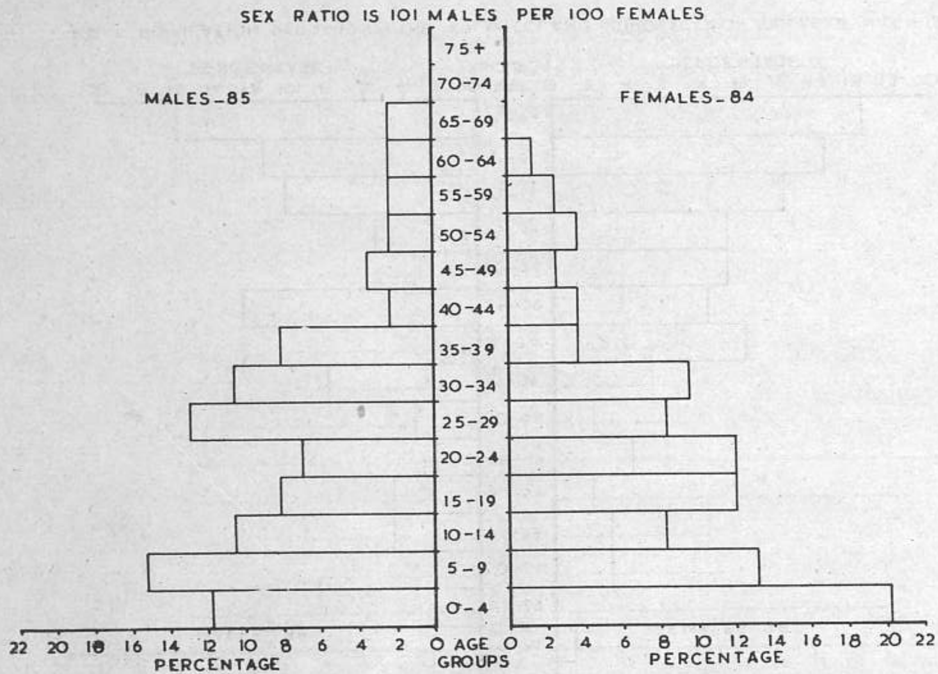

FIG. 7 POPULATION PYRAMID OF THE KULAM (CLAN) KODUVAR OF IRULAS OF NILGIRIS.

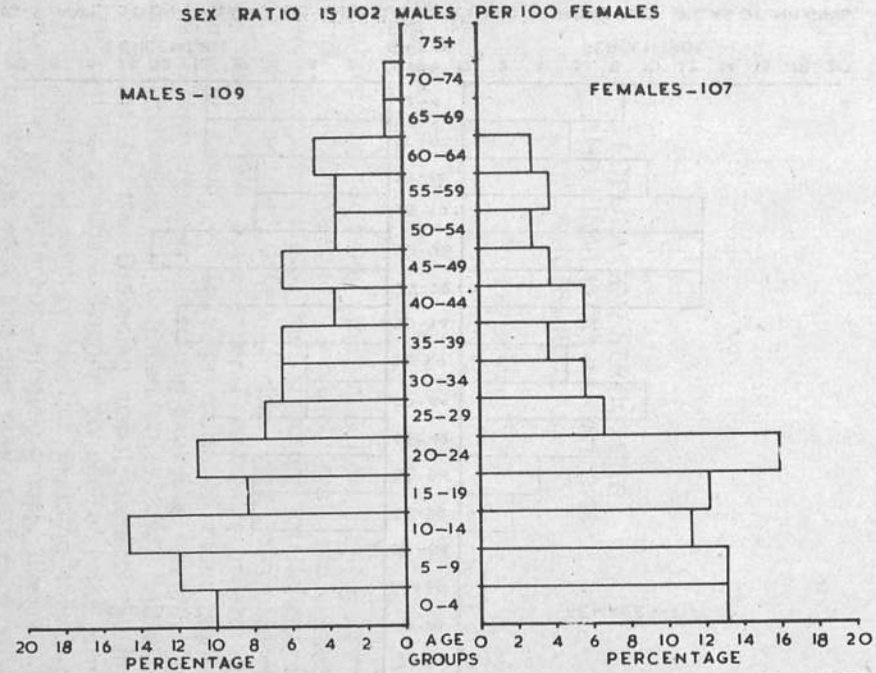

FIG- 8 POPULATION PYRAMID OF THE KULAM (CLAN) PUNGAR OF IRULAS OF NILGIRIS.

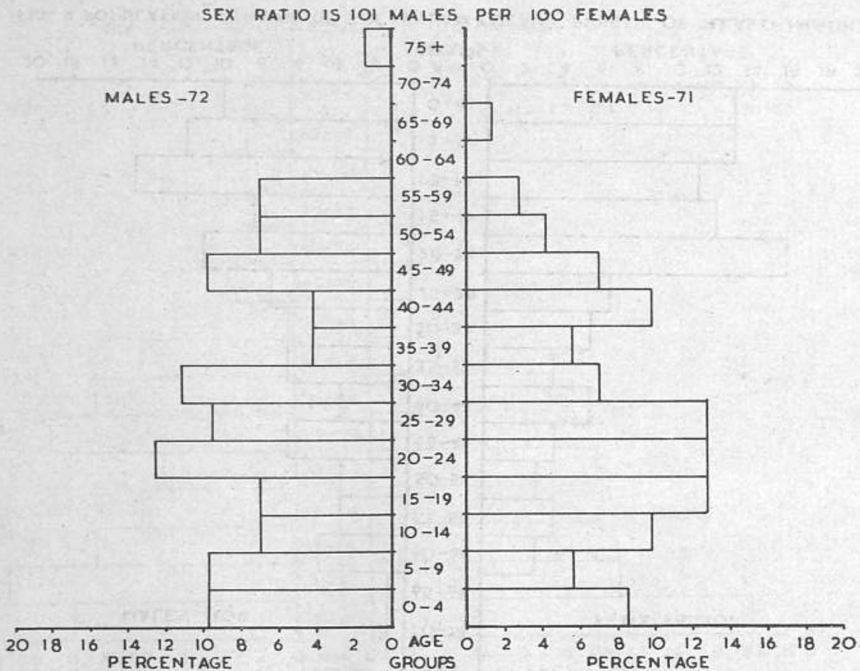

FIG 9 POPULATION PYRAMID OF THE KULAM (CLAN) PERADAR OF IRULAS OF NILGIRIS.

POPULATION STRUCTURE AND LINGUISTIC VARIATIONS AMONG IRULAS

R. Perialwar

Introduction

Anthropologists study the structure of population in terms of demographic, socio-cultural and genetic features. Linguists study the structure of languages, theory of grammar, language use etc., of different ethnic groups. We have several instances where the same ethnic group -- caste or tribe is found spread over different regions speaking varying dialects of languages. According to G.N.Reddy (1983:68) "A significant aspect of the Dravidian tribal dialects is that different ethnic groups belonging to one and the same tribe show dialectal divergence. For example the Gond tribe consists of different ethnic groups like Koya, Dorla, Maria, Muria etc., and the dialect of each group appear different from the other. A study of tribal dialects of this type is likely to show the internal movement or migration of some tribal groups besides the linguistic peculiarities of their speech." It is also observed that the different linguistic groups within the same ethnic group or tribe develop into endogamous groups in course of time. It may be therefore relevant to mention here that 'Dialectical tribe' is the central concept of Birdsell's explanation of Australian Demography (Stepen Polagar 1971:1). Any study on the structure of population, caste or tribe, would therefore be incomplete without adequate understanding of the linguistic basis of the division of that population into various endogamous sub-groups.

The Irula, a Dravidian tribe, spread over the three states of Tamil Nadu, Kerala and Karnataka is found divided into several endogamous sub-groups mainly based on their linguistic variations. The present paper endeavours to examine the population structure of the linguistically divergent endogamous sub-groups of Irulas in South India.

According to 1971 Census, Irulas account for 1,06,941 persons, spread over the three southern States of Tamil Nadu, Kerala and Karnataka. They are largely concentrated in Tamil Nadu, particularly Chingalpet and North Arcot districts.

Table - 1 shows that the population of the Irulas has increased by 29.67% in Kerala and 35.5% in Karnataka. The growth of Irula population is very low (11.5%) in Tamil Nadu which might be more due to confusion and errors in census count. Possibly, there was some confusion in enumerating the Tamil speaking Irulas and Irula language speaking Irulas.

Several terms like Irula, Erulavar, Iruliga, Illiga, Kesaba, Urali, Kadupujari and Velliyans are used to designate them in different regions of these three States. Irulas can be classified into various sub-groups based on their social, cultural and dialectical variations. They are 1. (M)elenadu (I)rulas, 2. (Ka)sabas, 3. (V)ettakkada (I)rulas, 4. (Ur)alis and 5. (K)adu (P)ujaris.

There was lot of confusion regarding the Irula dialects. Some of the earlier scholars considered Irula dialect as a form of Tamil, usually, 'bad', 'vulgar' and 'corrupt tamil.' Diffloth (1968) considered the speech of Irulas as the Irula dialect of Tamil and a Dravidian language of Tamil Malayalam group. It is Kamil Zvelebil (1973:6) who tried to show that the Irula speech is an independent South Dravidian Language, closely akin to Tamil, particularly old Tamil, with some Kannada-like features. He has also indentified four different dialects in the Irula language, namely, (a) Melanadu Irula dialect, (b) Kasaba dialect, (c) Vettakkada Irula dialect and (d) Urali dialect. The present author in the course of him linguistic study of the group, has identified eight Irula dialects including the four already identified by Kamil Zvelebil. In addition, there are Irulas spread over ten districts of Tamil Nadu who speak different dialects of Tamil language. The five social sub-groups of Irulas, the eight dialects of Irula language and their regional distribution are shown in chart 1.

Social and cultural differences among the various endogamous groups of Irulas may be due to the influence of Badaga, Tamil, Malayalam and Kannada cultures. Geographical separation, historical and socio-economic factors are the main reasons for the emergence of several varieties of Irula language. Among these five Irula sub-groups, one of the small groups called Melanadu Irulas inhabiting the Nilgiris is preserving the important and interesting linguistic features of the Irula language. So it is considered to be the norm as well as standard dialect of Irula language in comparison to other Irula dialects. For example one of the striking linguistic peculiarities of Irula dialects is Aphaeresis and sound-displacement; and this feature is preserved by a majority of the lexical items of MI dialect. The chart on the aphaeresis and sound displacement in various Irula dialects is given in the appendix. It shows that more lexical items of MI dialect have undergone sound displacement and aphaeresis process.

Section

I shall discuss below the five sub-groups and eight dialectical patterns of these Irula speaking Irulas.

Irula Speaking Sub-groups

Three Irula sub-groups namely Melanadu Irulas, Kasabas and Vettakkada Irulas inhabit the Nilgiri District. But these three sub-groups do not live together. They are found in different taluks of the Nilgiri District. Melanadu Irulas and Kasabas are found only in the Nilgiri district whereas Vettakkada Irulas are found not only in the Nilgiri district but also in other parts of Tamil Nadu and Kerala. Melanadu Irulas are found in about 37 hamlets of Kotagiri Taluk, Vettakkada Irulas inhabit seven hamlets of Coonoor Taluk and Kasabas are found in five hamlets of Udhagamandalam taluk (Table 2).

The 1971 Census have not given the figures for Kasabas. Vettakkada Irulas are returned as Irulas in 1961 and 1971 Censuses.

1. Melanadu Irulas

Melanadu Irulas speak a dialect of Irula language which they consider as a superior variety among the dialects of Irula language. They consider themselves as socially and linguistically superior to Vettakkada Irulas because the latter group has the habit of eating rats. Eventhough ethnically and linguistically these two Irula communities have evolved from a common stock, the Melanadu Irulas do not have marriage relationships with the Vettakkada Irulas. There were a few violations to this practice and such unions were traditionally disapproved and the couples were excommunicated by MI in the past (Chart 2). 'Excommunication', was a most powerful and the most serious punishment (P.K.Misra 1985:15). Inter Irula sub-group married couples carry some social stigma, even today.

2. Kasabas (Nilgiris)

Kasabas are one of the small Irula language speaking tribes. According to 1961 census their population was 391 in the Nilgiri district. Their settlements are found only in Udhagamandalam taluk. Kamil Zvelebil (1973:53) considers that the Kasaba speech is an Irula dialect. Shanmugam (1974:78-79) has treated the Kasaba speech as a separate language. Chidambaranatha Pillai (1976) who studied Kasaba speech, has not given any definite opinion on this controversy. But in my own studies, I have concluded that the Kasaba speech is in fact, a dialect of Irula language. The Kasabas have reported the same clans and same pattern of clan organisation and marriage alliances between clans as the Melanádu Irula. However marital alliances between Kasabas and Melanadu Irula, and Uralis are permitted.

3. Vettakkada Irulas (Nilgiris)

As already mentioned Vettakkada Irulas are found in small number in the Nilgiris District, but they are largely concentrated in Coimbatore district of Tamil Nadu and Palghat district of Kerala. They are also called Irula Pallars. In the Nilgiris district, Vettakkada Irulas are found in seven hamlets of Coonoor Taluk and they speak a dialect called Vettakkada Nallurpadi dialect of Irula language. Vettakkada Irulas speaking Nallurpadi dialect do not intermarry with Melanadu Irulas and Kasabas.

4. Vettakkada Irulas Sub-groups (Coimbatore District)

As mentioned earlier, Vettakkada Irulas are concentrated in Coimbatore district in Tamil Nadu. They live in the Siruvani and Vellangiri hills and adjoining plains of western ghats of Coimbatore district. Coimbatore district is located adjacent to two other States, Kerala on its west and Karnataka on its north. Out of ten taluks of Coimbatore district only two taluks namely Coimbatore and Mettupalayam are inhabited by the Vettakkada Irulas. Nearly 100 Vettakkada Irula settlements are found in the forest areas or in the deep mountainous jungles of these two taluks. According to 1961 Census their population is 10,598.

It is quite interesting to note that Vettakkada Irulas of these two taluks have developed two distinct dialects namely Vettakkada Irula Nallurpadi dialect and Vettakkada Irula Perumalkoilpati dialect. Vettakkada Nallurpadi dialect speakers are numerically predominant. The two dialect speakers live in close proximity to each other in the area. Among these two Irula dialects, Nallurpadi dialect retains more old features. One can notice more of Tamil influence in Perumalkoilpati dialect (See appendix). Linguistic peculiarities of Perumalkoilpati dialect are also unique in certain respects. One cannot attribute geographical location as a reason for the dichotomy of Vettakkadu Irula dialects but certain social factors explain the divergence of these two dialects.

Even though the speakers of the two different dialects of Vettakkada Irulas are living in close proximity with each other, they do not intermarry and have developed into two distinct endogamous groups. The clan names of these dialect speakers of Irulas are identical; yet they have developed certain cultural divergences. However, one cannot at this stage come to any definite conclusion as to why these two groups do not intermarry -- whether linguistic or cultural factors explain this divergence (Chart 3 and Table 3).

5. **Vettakada Irulas** (Palghat District, Kerala)

Attappady Valley is situated in Mannarghat taluk (adjacent to Coimbatore Taluk) in the north east corner of Palghat district of Kerala State. The major tribal communities of Attappady valley are Irulas, Mudugas and Kurumbas. The entire Attappady valley was fully occupied by tribes in the past. The fertility of the land and climatic conditions of the valley have attracted many non-tribal people from Tamil Nadu and Kerala which reduced the local tribes to a minority in the valley. Irulas are the numerically dominant and relatively advanced group among the three tribes of the area. Out of 132 tribal hamlets in Attappady Valley, Vettakkada Irulas are found in about 97 hamlets. The Vettakkada Irulas of Attappady number 13,366 according to 1971 Census.

Davassy (1966:17-19) reports that "Irulas of Attappady are of Tamil origin and formerly occupants of Coimbatore district. The history of their mass migration dates back to the end of 16th century or the beginnings of 17th century. The reason for their migration is attributed almost fairly reasonably to the aftermath of the widespread war in the Vijayanagar empire and the consequent chaos, dissolusionments, depredations and above all increasing insecurity to human lives. The ancestors of the Irulas were belived to have been forcibly thrown out from their original habitat by the invaders. They were subjected to arson, looting and large scale massacre during the course of war. The Irulas fled from the place and took to the Attappady hills as heaven clad with tangled jungles and infested with numerous wild animals."

The Attappady Irulas possibly in the course of their long exposure to an entirely different socio-linguistic and geographical situation have developed a dialect which is distinct from the Nallurpadi dialect of Vettakkada Irulas of Coimbatore. The dialect of Attappady Irulas is called Vettakkada Attappadi Irula dialect. Vettakkada Attappaddy Irulas have developed into a near endogamous group. However, this endogamous group has reported some marital alliances only with the original Nallurpadi dialect speaking Irulas of Coimbatore.

The clan organization, marriage relationships between these two sub-groups are similar. But some cultural and linguistic differences are evident between these two groups, which one may attribute to their long separation. Ultimately both these sub-groups have evolved separate dialects due to geographical isolation.

6. Uralis

Uralis are found in Sathyamangalam area of Periyar district, Tamil Nadu. Based on linguistic evidences, the Uralis are considered as descendents of the Irulas of Nilgiris who might have migrated to the Sathyamangalam area in search of food and new lands -- (Sam Mohan Lal 1981:13). They are divided into two endogamous groups based on the two distinct dialects they have developed. These two dialects, they speak, are Asanoor dialect and Kaldimba dialect.

Although Uralis are considered as the descendents of the Melanadu Irulas no marital alliances are reported between them. Uralis live in close proximity to Vettakkada Irulas, but they too do not intermarry.

7. Karnataka Irulas (Kadu pujaries)

According to 1971 Census Irulas were found in seven out of Ninteen districts of Karnataka State (Table 4).

I have not visited all the seven districts but I have collected some linguistic materials from Kanakapura taluk of Bangalore district. I found that Aphaeresis and sound displacement have not taken place in the Irula dialect of Karnataka. The Irula dialect of Karnataka is largely influenced by the local Kannada dialect.

In the words of Kempegowda (1974:11) "This dialect, lexically, phonologically and structurally resembles more with kannada than with Tamil." The clan names of Karnataka Irulas are not identical with Melanadu Irulas, Coimbatore Irulas and Attappady Irulas.

Section Two

Tamil Speaking Irulas of Tamil Nadu

Excluding the different sub-groups of Irulas found in the districts of Nilgiris, Coimbatore and Periyar of Tamil Nadu (also Attappadi Irulas of Kerala) all other Irulas found in Tamil Nadu are speaking only the local Tamil dialects (Table 5). It seems that except the common name Irula, they are linguistically and ethnically different because of the following two reasons.

1. The Tamil speaking Irulas have different clan names to those of the Irulas discussed above. 2. According to Pandit (1972:43) "The Indian language speaker whether it is Kannada or Panjabi, maintains his speech, no matter where (in India) he settles down or how long he has settled down." If one accepts Pandit's view the Irulas wherever they are, they should have spoken Irula dialects, i.e., they should have maintained their Irula dialects like Nilgiri Irula, Coimbatore Irula, and Attappady Irula. It is very doubtful that the Tamil speaking Irulas have ever spoken Irula language. As a linguist, I may come to the conclusion that except Nilgiri Irula, Coimbatore Irula and Attappady Irula, the other Irulas of Tamil Nadu never spoke Irula dialects. It is very clear that they might have spoken local Tamil dialects since beginning of their origin. These factors strengthen that Tamil speaking Irulas of Tamil Nadu are linguistically and socio-culturally different from the Irula language speaking Irulas.

The A:rumu:ppu and Po:riga clans are unique. The clan A:rumu:ppu is found only with Vettakkadu

Irulas and the clan Po:riga is noticed among the Uralis. The clans Kuppili, Uppili and Velle are found among Vettakkadu Irula/and Urali sub-groups. First eight clans which are shown in the chart 2 are prevalent with seven Irula sub-groups.

Conclusion

1. Totally 13 clans are found among various Irula speaking sub-groups. Not a single social group has retained all 13 clans. Vettakkada Irula sub-groups and Uralis have preserved 12 clans each. During my field study, I did not find any of these clan names among Karnataka Irulas. In Karnataka Irula dialect, Aphaeresis and sound-displacement have not taken place. It has however retained Irula dialect and that too, with certain peculiar characteristics and it is largely influenced by the local Kannada dialect.

2. Kasaba speech is a dialect of Irula language. Kasaba clan organisation perfectly agrees with Melanadu Irula of Nilgiris which has retained the unique features of Irula language with less interference of Tamil. But there are no marriage relationships between these two groups. Linguists and anthropologists designate them as Kasabas but the Kasabas refuse to identify themselves with that name and call themselves as Irulas. This factor reveals that the social attitudes regarding various Irula sub-groups also have to be taken into account for the objective study of the population structures of Irulas.

3. Usually in India, language maintenance is the norm among various linguistic groups. This is almost accepted as a socio-linguistic factor by linguists. According to this notion, Tamil speaking Irulas, if they had ever spoken Irula language, they too should have maintained Irula language in one form or the other. But the fact is that Tamil speaking Irulas have not retained Irula language and clan organization. I have argued

that the Tamil speaking Irulas may be culturally as well as Linguistically distinct. But it is important to note that, Tamil speaking Irulas outnumber the Irula speaking sub-groups.

4. Except in the case of Attappady Vettakkada Irulas, in all other sub-groups of Irulas, geographical and as well as socio-cultural factors are responsible for the emergence of various Irula dialects.

5. Although the Irula speaking sub-groups of Irulas may have evolved from a common ethnic stock, they are sub-divided into various endogamous sub-groups which correlate with linguistic variations and socio-geographical situations to some extent. It is therefore relevant to examine the linguistic basis of various endogamous groups in our efforts in understanding Irula population structures and demography. The concept of 'dialectical tribe' evolved by Birdsell thus appears relevant for understanding population structure among various ethnic groups.

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TABLE - 1

Distribution of Irulas in the southern states

State	1961	1971	1981
Tamil Nadu	79,835	89,025	N.A.
Kerala	11,454	14,852	17,832
Karnataka	2,242	3,062	N.A.

N.A. = Not available.

TABLE - 2

Census counts of Irula sub-groups

Irula sub-groups	1961	1971	1981
Melanadu Irulas	4,617	5,545	--
Kasaba	391	--	--
Vettakkada Irula	--	--	--

TABLE - 3

Population distribution of Kerala Vettakkada Irulas

	1961	1971	1981
Vettakkada Irulas	11,457	14,852	17,832

TABLE - 4

The distribution of Irula groups -- Irulas, Iruligas & Kadu pujaris

Districts	1971 census		
	Persons	Males	Females
1. Bangalore district	2,667	1,431	1,236
2. Chickmagalur district	10	5	5
3. Tumkur district	85	44	41
4. Hassan district	4	1	3
5. Mysore district	62	32	30
6. Kolar district	184	100	84
7. Shimoge district	50	27	23
Total	3,062	1,640	1,422

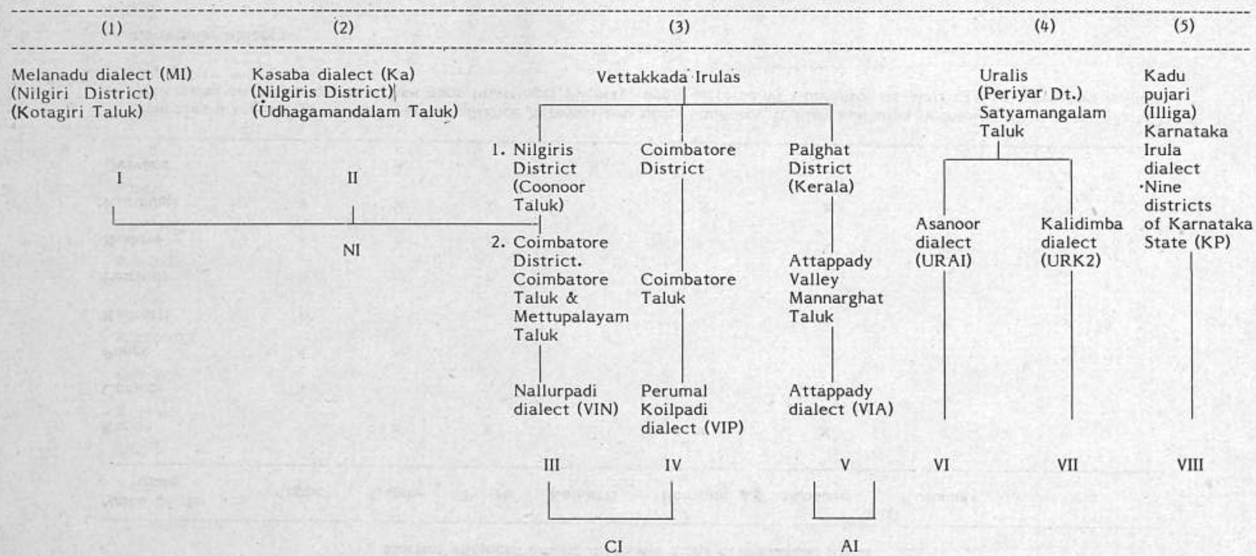
TABLE - 5

District-wise distribution of Tamil speaking Irula population in 1961 census

Districts	Persons
Madras	151
Chinglepet	24,062
North Arcot	21,411
South Arcot	12,177
Coimbatore	10,598
Nilgiris	4,502
Salem	4,641
Tiruchirappalli	2,154
Thanjavur	38
Kanyakumari	82
Madurai	2
Tirunelveli	6

CHART - I

Five social sub-group of Irulas, eight dialects of Irula language and their regional distribution



1. AI : Attappady Irulas (Kerala)
2. CI : Coimbatore Irulas (Tamil Nadu)
3. NI : Nilgiri Irulas (Tamil Nadu)

CHART - 2

Marital alliances among different clans of Melanadu Irulas

Name of the clans	Kuppe	Cambe	Punge	Kalketti	Pe:ra:da	Koduve	Kurunaga	De:vane
Kuppe	-	x	x	x	x	x	x	x
Cambe	x	-	-	-	x	-	x	x
Punge	x	-	-	-	-	-	x	-
Kalketti	x	-	-	-	-	x	x	x
Pe:ra:da	x	-	-	x	-	-	-	-
Koduve	x	-	-	x	-	-	x	-
Kurunaga	x	x	x	x	x	x	-	x
De:vane	x	x	-	x	-	-	x	-

x indicates a regular pattern of marital alliance between two clans (*kulams*). It also indicates necessity of a priest (Ja:tti) officiating on the ceremonial functions (marriage, puberty, death ceremony) Guarantor of Marriage between two *kulams* (clans).

- : no regular alliance.

CHART - 3

Name of the clans	Kuppe	Cambe	Punge	Karittige	Pe:ra:da	Koduve	Kurunaga	De:vane	Kuppili	Uppili	Velle	A:rumu:ppu
Kuppe	-	x	-	x	-	-	x	x	-	-	x	x
Cambe	x	-	-	x	-	-	x	x	-	-	x	-
Punge	-	-	-	x	x	-	-	-	-	-	x	x
Karittige	x	x	x	-	x	x	x	x	-	-	x	x
Pe:ra:da	-	-	x	x	-	-	-	-	-	-	x	x
Koduve	-	-	-	x	-	-	-	-	-	-	-	x
Kuruna:ge	x	x	-	x	-	-	-	x	x	-	x	x
De:vane	x	x	-	x	-	-	-	x	-	-	x	x
Kuppili	-	-	-	-	x	-	-	-	-	-	-	x
Uppili	-	-	-	-	x	-	-	-	-	-	-	x
Velle	x	x	x	x	x	-	x	x	x	-	-	x
A:rumu:ppu	x	x	x	x	x	x	x	x	x	x	x	-

x : indicates the regular pattern of the marriage alliance between two *kulams* (clans) found in both the horizontal and vertical columns.

- : indicates no regular pattern of the marriage alliance.

CHART - 4

Clan organisation among various Irula speaking sub-groups of Irulas

Sl. No.	Clan Names	MI	KA	VIN	VIP	VIA	URAI	URK2	KP
1.	Kuppe	+	+	+	+	+	+	+	-
2.	Campe	+	+	+	+	+	+	+	-
3.	Punge	+	+	+	+	+	+	+	-
4.	Kalketti	+	+	+	+	+	+	+	-
5.	Pe:ra:da	+	+	+	+	+	+	+	-
6.	Koduve	+	+	+	+	+	+	+	-
7.	Kuruna:ga	+	+	+	+	+	+	+	-
8.	De:vane	+	+	+	+	+	+	+	-
9.	Kuppili	-	-	+	+	+	+	+	-
10.	Uppili	-	-	+	+	+	+	+	-
11.	Velle	-	-	+	+	+	+	+	-
12.	A:rumu:ppu	-	-	+	+	+			-
13.	Po:riga	-	-	-	-	-	+	+	-

+ : indicates the presence of the clan in that particular Irulas sub-groups.

APPENDIX

A Phaeresis and vowel displacement among in Irula dialects

S.No.	Tamil	NI	VIN	VIP	VKA	URI	UR2	KA	KP	Recon-structed	Gross	Ded No.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
1.	Ural	rallu	rallu	rollu	rallu	rallu	--	--	--	rallu	mortar	560
2.	alai	le:	le:	lo:(loyyi)	le:	le:	--	--	--	le:	to call	240
3.	utai	de:	de:	do:	de:	de:	--	--	--	de:	to break	799
4.	idi:	di:	idi:	idi:	di:	di:	--	--	--	di:	to break into two to be cracked	366
5.	iranku	ra:ngu	ra:ngu	rengu	ra:ngu	ra:ngu	--	--	--	ra:ngu	to descend	439
6.	irakku	ra:kku	ra:kku	rekku	ra:kku	ra:kku	--	--	--	ra:kku	to lower down	439
7.	iruttu	kattali	rittu	iruttu	rittu	rittu	--	--	--	rittu	darkness	2102
8.	arali	ganvadige	ralli	arali	ralli	ralli	--	--	--	ralli	Oleander Neriumo-dorum	173
9.	ilantai	kolage	lande	lande	lande	lacai	--	--	--	lande	Zicyphus jujuba	402
10.	ulundu	ulundu	lundu	ulundu	uddu	uddu	--	--	--	lundu	blackgram	594
11.	uranku	rongu	rongu	rongu	rongu	rongu	--	--	--	rongu	to sleep	606
12.	urakkam	rokku	rokku	rokku	rokku	rokku	--	--	--	rokku	sleep	606
13.	urul	rullu	rullu	rullu	rullu	rullu	--	--	--	rullu	to roll	571
14.	uruttu	ruttu	ruttu	uruttu	ruttu	ruttu	--	--	--	ruttu	to roll	571
15.	ulakkai	lakke	lakke	lakka:yi	lakke	lakke	--	--	--	lakke	pestle	580
16.	ularntu	nandu	nandu	nondu	nandu	unanda	--	--	--	nandu	to dry	

Contd.......

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
17.	ularttu	nattu	nattu	nottu	nattu	lattu	--	--	--	nattu	to dry	
18.	arai	re:	re:	are:	re:	re:	--	--	--	re:	to grind	19
19.	akalam	galla	agala	agala	galla	agala	--	--	--	galla	width	9
20.	avarai	vara	vara	averayi	vare	avare	--	--	--	var	field been	224
21.	ilai	ele	ele	leyyi	ele	ele	--	--	--	leyyi	leaf	423
22.	ilaiya	liya	liya	eliya	liya	--	--	--	--	liya	younger	436
23.	ilaku	la:gu	ela:gu	la:gu	la:gu	urugu	--	--	--	la:gu	to be relaxed	433
24.	ataikka:y	dakke	dakke	pa:kku	pa:kku	dakke	--	--	--	dakke	are ca-nut	78
25.	ularu	ra:lu	olaru	olaru	olaru	olaru	--	--	--	ra:lu	clamour without sense	647
26.	alaru	la:ru	la:ru	agaru	la:ru	kirucu	--	--	--	la:ru	roar (cry)	211
27.	inanku	nangu	ena:ngu	ela:gu	enangu		--	--	--	nangu	consent to love	387
28.	anai	ne:	ene/ dabbu	ane	ne:	dabbu	--	--	--	ne:	embrace	
29.	urunju	ju:ru	runju	ru:nju	runju	urunju	--	--	--	runju	suck	
30.	aranai	ranne	ranne	aratte	ranne	ranne	--	--	--	ranne	typical lizard	170
31.	itakkai	dakkeyi	dakkeyi	edakka: yi	dakkayi	dakkeyi	--	--	--	dakkeyi	lefthand	
32.	ala	la:	la:	ala:	la:		--	--	--	la:	to measure	252
33.	alai	le:	ale:	ale	ale	le:	--	--	--	le:	to wonder roam	200
34.	alaku	langu	alangu	elangu	alangu	langu	--	--	--	langu	small insect	
35.	araippadi	arepadi	reppadi	areppadi	reppadi	reppadi	--	--	--	reppadi	half measure	192
36.	araippu		rappu	arappu	reppu	aruppu	--	--	--	rappu	soap nut	
37.	ulai	ole	ole	loyyi		ole	--	--	--	loyyi	to work	
38.	irai	reu	racce	locce	re:	--	--	--	--	re:cce	to sound	414

Contd....

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
39.	iraiceal	reccalu		locce	reccalu	racce	--	--	--	raccalu	sound; noise	414
40.	utukkai	udukku	udukku	udukka: yi	dukku	udukku	--	--	--	udukku	small drum tapring in the middle	505
41.	nirappu	rappu	rappu	rappu	rappu	--	--	--	--	rappu	to fill	
42.	nirambu	rambu	rambu	romba	ramba	--	--	--	--	rambu	to become full	3124
43.	uruntai	runde	runde	urunda: yi	runde	urunde	--	--	--	runde	roundness ball	
44.	irai	recca	recca	reccu	reccu	reccu	--	--	--	reccu	to draw water	735
45.	iravu	ra:vu	ra:vu	ra:vu	ra:vu	ra:vakka	--	--	--	ra:va	night	2102

1. MI : 36
2. VIN : 32
3. VIP : 19
4. VIA : 36

5. URAI : 28
6. URK2 : not collected
7. KA : not collected
8. KP : not collected

SLOW GROWTH OF TODA POPULATION

U.P. Sinha and Mrs. S.M. Thatte

Introduction

The Nilgiris and the Todas, both the land and the tribe are known for their exquisite qualities. The land, for its natural scenery and bracing climate, and the tribe, for prepossessing appearance and colourful dress. Their abode (hut), like the Zulu Kraals of South Africa, is also picturesque and attracting.

The Todas are fair and handsome; tall, strong built and well set-up with finely proportioned muscular limbs; long and oval face; thick, black and wavy hair; and all these together give a manly appearance. The women, on the other hand, are of proportionate stature to that of men with pleasing expression. Young women are exceedingly fair but soon become wrinkled and old looking before mid-age. This may be because of excessive indulgence in sex since teen-age.

The physical appearance of Todas is different from the other tribes inhabiting the plateau, namely, Kota, Kurumba and Irula. None in the neighbouring areas share their characters. They are considered to be a group of Proto-Aryans who share a series of similar characters with the Ainus of Japan. A few believe that they belong to the Indo-Afgan race while others think that they are Nordic. However, they belong to South Indian population, remained isolated for a long time in the Nilgiri Hills and preserved more purity than any other caste or tribe of the region.

There are many stories about the origin of the tribe. The Todas believe that they are descendants of Pandavas. They have the concept of Panch (five) Pandavas in the form of hills. They are regarded by their neighbours, and also by themselves, as *Toras*. The name Toda has possibly been derived from the word *tur*, the most sacred tree of Todas. The Badaga name for it is *tode*, and to them those are the Todas who worship *toda* tree.

The Todas differ with the other tribal communities of the country in many respects. They differ in terms of economy, marriage custom, cultural values, food habit, etc. In addition, their number till recently contained within one thousand. A full account of the social, cultural and economic aspects of the Todas along with the trend of population growth is recorded in the celebrated works of Rivers[1] and Nambiar.[2] Careful reading of these records and other literatures bring out a few facts of demographic interest, some of which are noted below:

1. Economy: pastoral, centered around dairy.
2. Marriage and sex life: polyandry, contracted at very early age, deflowered shortly before puberty, free extramarital sex relations.
3. Female infanticide: existed in the past probably till the end of nineteenth century when special legislation against the practice came into force.
4. Population: slow growth and at times even negative growth.

From the above, one gets the inkling that probably the tribe was aware of their economy which may not sustain growing population and hence adopted female infanticide as a measure to check the population growth. On the other hand, polyandry was adopted for sex satisfaction and limited procreation. To ensure that none of the husbands (brothers, clan brothers) develop psychological attachment with the wife, girls were deflowered before puberty and laxity was given for free extra-marital sex relations. The practice of polyandry might have been adopted from the concept of *Panch Pandavas* and *Panchali*, and the laxity of extra-marital and teen-age sex relations from other legends. Scholars believe that some of these practices cause high incidence of sterility resulting in slow growth and at times negative growth of population. But these appear to be hunches and are not supported by evidences to show Todas had low fertility which checked the population growth. On the contrary, the studies of Marshall (1870) and that of the Special Medical Officer (1927) show high fertility among Todas.[3] For example, Marshall's estimates bring out that the average family size for all women, including barren, was 5.7 children and excluding barren women, it was 6.7 children. In other words, around 15 percent of the women were barren. The estimate of the Special Medical Officer was 5.8 children per married woman of age 50 years. The more recent survey of Nambiar (1960) also suggest high fertility among fecund Toda women compared to that at all-India level though it was suspected that because of high incidence of sterility, fertility as a whole was relatively low. But, was the level of fertility in general low which resulted into decline in the size of Toda population in the Nilgiris ever during 1961-71? If fertility was not that low and census figures are correct, outmigration coupled with high mortality are the only other two components which explain the observed negative growth of Toda population in the Nilgiris.

The above discussion calls for factual evidences to explain the probable causes for the slow growth of Toda population. A survey was undertaken during January-May 1985 as a part of the project on the above topic. The discussion in the following paragraphs is based on the findings of the survey.

Planning of the Survey

In 1961, a total of 716 persons were enumerated in Toda community in areas where the tribe is scheduled. They numbered 945 persons in the 1971 Census. The distribution is presented in Table 1.

The Toda population, thus, increased by about 32 percent during 1961-71 and a sizeable number of them, probably families, moved to Dharmapuri from the Nilgiris during the inter-census period. Further, according to the 1971 Census, slightly more than 93 per cent of them were found to be living in the Nilgiris and Dharmapuri districts. In Dharmapuri, they were enumerated in Denkenikotta taluk. As their number is not large, it was proposed to cover the entire Toda population of the Nilgiris and Denkenikotta taluka in the survey through house visits. To study the fertility and mortality aspects of the population, the approach of children ever-born and surviving was adopted and the same was collected through genealogies. During the house visit, respondents were asked about families who had migrated to Denkenikotta and at Denkenikotta they were asked from where they had migrated. This was designed to study the migration pattern.

Findings

Enquiry in the Nilgiris, revealed that the Todas were not aware of any Toda family that has moved to Denkenikotta. On the contrary, they were surprised to hear that there were Todas living in Denkenikotta. At Denkenikotta, when moved after the completion of the work at the Nilgiris, no Toda could be located.

Even the local officials were surprised to hear that in the 1971 Census, 208 persons of the community were enumerated in Denkenikotta. On enquiry at various places, including the Anthropology Department of Madras University, revealed that probably members of some other communities with similar name, like Tode, Thode, Thoti, etc; might have wrongly been enumerated as Toda. In that case, the number of Todas in the 1971 Census in other areas down to 737 persons and the decadal growth rate to 2.9 per cent. In the Nilgiris, however, their population during 1961-71 declined by about 4.4 percent.

In the survey at the Nilgiris, four types of Todas were recorded, namely, original (non-convert), Christian, original Toda marrying Christian Toda, and Todas of mixed parentage. The original Todas are those who are non-convert. In the second type, both the spouses are converts. In third category, one of the spouses is convert and the other is original Toda. The last group, that is, the mixed group, is composed of those Todas who have married non-Toda. In counting the population of Todas, the following procedure was adopted:

1. All those with Toda parentage were counted as Toda.

2. In families where the husband is Toda and wife non-Toda, the husband and the children are counted as Toda.

3. In families where wife is Toda and husband is non-Toda, only the wife is counted as Toda.

In the paper, the group with mixed parentage is not considered for any analytical purpose except counting their number.

Distribution By Residence

Having set the module, the distribution of Todas enumerated in different munds is worked out and the same is given in Appendix I. In the survey, 1,232 persons were enumerated as Todas and 79 percent of them live in munds, and roughly 11 per cent are those with mixed parentage. It may be mentioned that those living in munds and in Indunagar (a colony near Ooty) are original Todas, the converts and those of mixed parentage live outside the munds.

A Toda settlement mund usually consists of less than 10 households and Manjukal with 14 households is an exception. Among the headmunds, Muthunad, Karsh (Kandal), Manjukal and Kulthikod are relatively more populous than other headmunds. In these headmunds, more than 100 persons were enumerated in the survey, the highest being in Manjukal with 142 persons. Among the munds, Manjukal and Taranad are relatively populous with more than 50 persons. There are also a number of munds with population less than 10 persons.

Composition of Population

Among the 1,098 persons enumerated in the survey with Toda parentage, 538 are males and 560 females. The sex ratios works out to be slightly favourable to females with 1041 females per thousand males. The sex ratio at birth in the case of children ever-born comes to around 962 female births per 1000 male births. As the sex ratio of the population is higher than sex ratio at birth, one would expect that female mortality among Todas is relatively lower than male mortality. This pattern of differential mortality by sex has also been noticed among many tribal communities in India and also for the tribal population in general.[4]

It may be mentioned that in India, specially in the northern states, sex ratio is favourable to males. The cause for the low sex ratio is attributed to female disadvantage in mortality resulting from unfavourable social and cultural values. In Toda society, on the other hand, it appears that there is no discrimination between sexes and the females are experiencing the Nature's law of longer longivity than males.

By age, nearly 36.5 per cent of the population was enumerated below age 15 years and around 4.7 per cent in ages 65 years and above (Table 2). The detailed distribution in quinquennial ages is given in Appendix 2.

A comparison of the age structure of Toda's population enumerated in the survey shows that it is relatively younger than the state's population. The difference is mainly because of the difference in the fertility levels. It may be mentioned that for Tamil Nadu the SRS estimate of birth rate during 1971-81 were around 30 per thousand population and by March 1981 around 27.6 per cent of the couples of reproductive ages were effectively protected by various methods of family planning.[5] Thus, in view of younger age structure, one would expect that for Todas the level of birth rate will be higher than that at the state level.

It was mentioned earlier that the sex ratio of Toda population is favourable to female. By age, it is estimated to be 947 for the age group 0-14, which is slightly lower than sex ratio at birth. This gives an indication but childhood mortality among Todas is slightly unfavourable to girls. There might be some differences at specific ages but finally get compensated by age 15. However, in the adult ages 15-64, the sex ratio is highly favourable to females which suggests relatively lower mortality among females than males. In old ages, the picture reverses, that is, female mortality is probably higher than that of males and hence sudden drop in the level of sex ratio. Mis-statement of ages might have also caused the sudden change in the level of sex ratio at higher ages.

Analysis of Data on Children Ever-Born and Surviving

It may be mentioned that because Toda population is not large, no effort was made to estimate the current levels of fertility and mortality through the births and deaths records. A slight error in recording the vital events will vitiate the estimates significantly. Thus, it was decided to estimate the levels of fertility and mortality through the information on children ever-born and surviving. This information was collected for all ever-married women and the details are discussed in the following paragraphs.

Parity Distribution

The distribution of the ever-married females in reproductive ages between 15-49 by children ever-born shows that about 18 per cent of them are childless (Table 3). About three-fifth of the ever-married fecund women of reproductive ages have 3 or less number of children. Among these women, nearly three-fourths are below 30 years of age. Again, slightly more than one-sixth of the ever-married fecund women of reproductive ages are having 6 or more number of children and they form the group of women with large family size. Of these women, more than 90 per cent are of ages 30 years and above.

Among the ever-married women between ages 35-49, around 8.6 per cent are childless who can be considered as primarily sterile. If, instead of ever-married women, only currently married females are considered, the percentage of primary sterile women will be even larger. This estimate of primary sterility among Todas is high compared to all-India level which is around 5 per cent. Again, among the women of ages 35-49, slightly more than two-fifths are having 6 children or more, and only one-fourth of them have three children or less. This shows that fertility among the Todas is moderately high.

Level of Fertility

The information on children ever-born collected in the survey is tabulated by the age of mother and the same is presented in Table 4. For comparison, the estimates of the 1960 survey are also presented in the table.

The table reveals that among the Todas, marriage is universal and by 30 years of age all women marry. Secondly, the completed family stize is around 5.7 children per woman. Another interesting feature is that fertility suddenly increases towards the end of the reproductive period. Though such change in fertility schedule is unlikely, probably it has been caused by some unexplained biological factors. However, for the age group 40-49, the average children ever born comes out to be nearly 5.2 per female.

Universal marriage among Todas have also been reported in the 1960 survey. The figures of the 1960 survey (Table 5) justify the statement.[6] The figures also suggest that by 23 years of age all the Toda girls are married. Again, the fertility pattern by maternal age (age at terminal of last pregnancy) shows that on an average a fertile woman of maternal age 35-39 had about 7.4 children. Further, a marked increase in the fertility level at higher ages is also noticed in the above survey. This unique experience of Toda females needs to be examined carefully.

On the basis of the average children ever-born by maternal age of the mother, it was concluded that the fertile women among Toda have a higher fertility. It was also suspected that for the community as a whole fertility appears to be lower due to high incidence of sterility. From the data on sterility shown above, the proportion of sterile women in the age group 33-42 comes out to be around 15 per cent. Thus, for all women in age group 35-39, the average number of children works out to be 6.3 children. This estimate is slightly in age group 35-39, the average number of children works out to be 6.3 children. This estimate is slightly higher than Marshall's estimate and also that of the 1985 survey.

Again, using the distribution of children ever-born by age of females, and also separately the age distribution of the enumerated population, total fertility rate (TFR) and crude birth rate can be estimated.[7] The estimates are given in Table 6.

The above estimates show that the total fertility rate of Toda population works out to be around 4.0 and the crude birth rate nearly 37 per thousand population. This estimate of CBR for Todas is higher than at State level. Moreover, fertility among the original Toda appears to be higher than the Christian Toda.

Level of Mortality

Like the fertility estimate, the estimate of mortality level is also obtained from the data on children ever born and surviving. The tabulated figures are given in Table 7.

Using the method suggested in Manual X,[8] the estimate of q(2) (probability of death from birth to exact age 2 comes out to be .8337 which corresponds to. Level 12.72 of West Model Life Tables.[9] On the basis of the age specific death rate corresponding to the above level, the death rate of Toda population in 1985 comes out to be around 18 per thousand population (Table 7).

The above estimates of CBR (=37) and CDR (=18) show that Toda population has a tendency to grow and the present natural growth comes out to be 19 per thousand population.

Family Planning

It was reported that Todas are advised not to use family planning methods to limit family size because of the slow growth of population. As such, it was proposed not to ask questions on the practice of family planning. However, while collecting the genealogies, 45 women of reproductive ages were reported to have undergone tubectomy. This gives a protection (effective) rate of 15.3 per cent for all women and 17.1 per cent for ever-married women of productive ages. It is not known whether any couple is using temporary methods of family planning for spacing the births. Some of the characteristics of the tubectomised women are given in Table 8. The table brings out a few facts that

(i) on an average the acceptors had 3.35 children

(ii) two-thirds of the acceptors were below 25 years of age at the time of tubectomy and had on an average 2.6 children per woman, and

(iii) Slightly more than three-fifths of the acceptors had three or less number of children and only 9 per cent of the acceptors had six or more number of children.

Discussion

The Todas of Nilgiris possess some unique characters which allured the social scientists to study them particularly their economic, social and cultural life and they are documented in literatures. Some of the scholars have also given account of their population and a compact updated picture of the same is given in Table 9. The figures bring out that the population of the tribe till recently contained within one thousand, the growth was slow and at times the population experienced even negative growth. It may be added that though the earlier records of Toda's population are suspected to be far below the mark, the fact remains that the population remained near static for long time. Further, it is also argued that the population of Todas is "closed" to migration and therefore any explanation for the low growth of population has to be sought only in low fertility or combined with high mortality.[10] Several postulates like low sex ratio, high incidence of sterility and wastage of pregnancy, etc. have been proposed as the possible causes for the low fertility. However, the present study indicates that the population of the tribe has a tendency to grow and therefore the causes attributed to be responsible for the low fertility require re-examination in view of factual evidences and the same are discussed in the following paragraphs.

Sex Ratio

The available figures show that till the 1931 census the sex ratio of Toda's population was below 800 females per thousand males except for the enumeration in 1847 when it was found to be more than 900. Again the level of the sex ratio suddenly increased in the 1941 enumeration and remained within a close range of 840-870 with an exception in the 1961 census. It may be noted that for the earlier years the cause for low sex ratio is attributed to the practice of female infanticide which has now become history of the past. In that situation the imbalances in the sex composition of the Todas should have recovered gradually which is not depicted in the trend. On the contrary, the trend shows a sudden recovery in the level in 1941 which cannot be attributed to the effect of the extinction of female infanticide. The other possible reason for, the low sex ratio could be incomplete enumeration which has also been apprehended earlier. It may be mentioned that for small population a slight error in the enumeration of either sex will vitiate the sex composition of the population and probably the same happened in case of Todas.

Sterility

The practice of early cohabitation and sexual excess are presumed to cause high incidence of sterility and wastage of pregnancy among Todas and therefore low fertility. Low fertility in early ages is not uncommon and it is due to adolescent sterility. As the age advances, the incidence of childlessness declines and only those who are primarily sterile remain childless till the end of the reproductive period. In the 1960 survey, out of 31 ever-married women of ages 43-52, eight women were found to be childless.[11] In other words, about 26 percent of the ever-married women of the age group 43-52 were primarily sterile. This level of sterility is no doubt very high. Again, in the same survey it has been brought out that for the maternal age period (35-39), the average number of live births for fecund women was 7.36 children. The figure suggests that for fecund women, who also had early cohabitation and sexual excess, the fertility was not low rather it was high. This gives the suspicion whether early cohabitation and sexual excess cause sterility. In fact, the above estimate of the level of sterility is based on small number and therefore it should not be taken as estimate of the correct level.

It will not be out of place to mention that in the 1972 survey of the Sample Registration System, it was observed that in Himachal Pradesh about 24 per cent of the rural women aged 49 years and over, and marital status 25 years and over, were childless.[12] Thus, high incidence of sterility is not unique for Todas only. There are other populations also where the incidence of sterility is high and the populations are growing.

Veneral Disease

It is generally viewed that the chief cause for sterility among Todas is high incidence of veneral diseases. In 1927, specimens of blood of 465 persons (about 80 percent of the enumerated population) were examined and 49 per cent of the cases had positive reaction of which about 21 per cent had strong positive reaction. In other words, out of the total cases examined, around 10.6 per cent had strong positive reaction.

In another study conducted in 1963, the Cardio -- V.D.R.L. slide test of 85 cases (finally available for serological test) yielded 68 per cent of the cases with positive reactivity.[13] On the basis of the study the author concluded, "The venture to clarify the correlation between Syphilis and polyandry on one hand and syphilis and sterility on the other may, for the present, be set aside". In the same paper the author also mentioned, "the annual additive birth figure for the latest population census of 700 is 25" which gives the estimate of birth rate as 35.7 per thousand population.

Again, in another study conducted in 1984, the proportion of reactive cases was found to be 33 per cent of 67 cases examined.[14] The cause for drastic curtailment in the incidence of V.D. during the last two surveys, conducted by the same institution, is not known. However, on enquiry it was found that though the authors claimed the sample to be "random" but the same were not selected according to statistical procedure and hence are not representative of the population.

The above studies were probably intended to estimate the extent of prevalence of V.D. among Todas and not to establish relationship between prevalence of V.D. and sterility except in one study where such relationship was suspected. As such, in the absence of emperical evidences it is doubtful that the chief cause for sterility among Todas, was high incidence of veneral diseases which itself was not established emperically.

Wastage of Pregnancy

In the 1960 survey, it was observed that out of a total of 624 pregnancies (all conceptions to Toda women living on 15.5.1960), 52 conceptions terminated as abortions and 37 still-births. In other words, about 14.3 per cent of all the conceptions terminated are abortions and still-births. The above level of pregnancy wastage among Todas is not different from the estimates of other studies. For example, in a study conducted in eleven villages of Punjab, the rate of foetal deaths was estimated to be 13.6 per cent.[15] In another study conducted in Nasik district, the level of pregnancy wastage was found to be around 21 per cent.[16] Even for advanced society like Parsi, the level of pregnancy wastage was found to be nearly 12 per cent.[17] Thus, the conjecture that the incidence of pregnancy wastage among Todas is high, does not appear to be convincing.

In order to support the hypothesis that polyandry leads to low fertility, a passing reference of Jaunsar-Bawar of Dehradun is cited. It may be mentioned that Toda society is no more polyandrous rather monogamy is mostly practiced. Polyandry among Todas has become history of the past. Further, probably Todas adopted polyandry because they practiced female infanticide which is not the case with Jaunsar-Bawar. Thus, the two tribes are not comparable.

The above discussion brings out that the cause for slow growth of Toda's population was attributed to low fertility caused by high incidence of sterility and pregnancy wastage. However, none of the propositions were supported by factual evidences. On the other hand, the available studies show that average family size among Todas was between 5-6 children per woman of completed fertility which by no standard can be called low fertility. Further, the issue of the discussion was focused only in one direction, that is, towards the fertility component. Nothing is mentioned about mortality aspect of the population except for the fact that the estimate of infant mortality, mentioned in the 1960 survey report, ranged between 100-111 per thousand live births which was lower compared to Indian standard for that time.

The present study brings out that the Toda population has a tendency to grow through natural process. This leads to suspect the earlier enumerated population figures. The experience of Denkenikotta is worth mentioning· where it is suspected that members of some other communities with similar name might have been enumerated as Toda. Similarly, there is likelihood that in earlier censuses some of the Todas were enumerated as members of other communities or might have escaped enumeration. These errors appear to have caused a decline in the enumerated population of Toda in the Nilgiris during 1961-71, or even for earlier periods.

Errors in the enumeration of Todas have also been doubted earlier. In this situation it is advisable that for small population like Toda, the components of population growth, namely, fertility, mortality and migration should be studied separately rather depending heavily on census count or population enumerated through other sources. Further, factors proposed to be associated with high/low levels of fertility and mortality should be investigated through emperical evidences rather proposing conjectures.

FOOT-NOTES

1. W.H.R. Rivers, The *Todas*, London, 1906.

2. P.K.Nambiar, *Todas*, Census of India, 1961, Vol.Ix, Madras, Part V-C, 1965.

3. See: P.K. Nambiar, *op.cit.*, p.34.

4. U.P.Sinha, "Sex composition and differential mortality among tribals of India", *The Indian Journal of Social Work*, Vol. XLIV, No.4, 1984, pp.387-392.

5. *Family Welfare Programme in India Yearbook, 1980-81*, Department of Family Welfare, Government of India, New Delhi, 1982, pp.35 and 86.

6. P.K. Nambiar, *op.cit.*, pp.3-31.

7. For details see: Basia Zaba, *Use of the Relational Gomertz Model in Analysis of Fertility data collected in Retrospective Surveys*, London School of Hygiene and Tropical Medicine, London (Undated); J.R.Rele, *Fertility Analysis Through Extension of Stable Population Concept*, International Population and Urban Research, University of California, Barkely, 1967.

8. United Nations, *Indirect Techniques for Demographic Estimation, Manual X*, ST/ESA/Ser.A/81, United Nations, New York, 1983.

9. A.J.Coale and P.Demeny, *Regional Model Life Tables and Stable Populations*, Princeton, 1966, pp.13-14.

10. P.K. Nambiar, *op.cit.*, p.30.

11. P.K. Nambiar, *op.cit.*, p.31.

12. Sample Registration System, *Fertility Differentials in India*, 1972, Office of the Registrar General, India, New Delhi, 1976, p.78.

13. P.N.Rangiah, "A Blitz Clinico - Serologic Study of Todas," *Mediscope*, December 1963, pp.559-593.

14. Study conducted by Dr. K.Vijayalaxmi, Director, Institute of Venereology, Madras Medical College,

Madras.

15. R.G. Potter, "Foetal Wastage in Selven Punjab Villages," *Human Biology*, Vol.37, No.3, 1965, p.267.

16. Malini Karkal and Rajeshri Chidanand, *Comparision between 1970 and 1980 Survey Data on Demographic and Socio-economic Condition of Contraceptors and Non-Contraceptors in Nasik District, Maharashtra*, International Institute for Population Sciences, Bombay 1986 (Mimeographed)

17. Malini Karkal, *Survey of Parsi Population of GreaterBombay - 1982*. Trustees of the Parsi Panchayat Funds and Properties, Bombay, 1984, p.98.

TABLE - 1

Distribution of Toda population in 1961 and 1971

	1961	1971
Total	716	945
Karnataka	2	15
Tamil Nadu	714	930
Dharmapuri	--	208
Nilgiri	706	675
Coimbatore	1	3
Madras	--	3
Chengalpattu	2	23
North Arcot	1	--
South Arcot	--	18
Thanjavur	1	--
Madurai	3	--

TABLE - 2

Age structure of Toda population

Age group	Toda population [1]				
	Persons	Male	Female	Sex-ratio (F/M)	Tamil Nadu [2] (1961)
0-14	36.5	38.3	34.8	947	34.9
15-49	50.8	49.1	52.5	1114	51.4
50-64	8.0	7.2	8.8	1256	13.7
65+	4.7	5.4	3.9	759	

Note: 1. Excludes Todas of "other" category.

2. Computed from *Key Population Statistics based on 5 per cent Sample Data*, Census of India, 1981, Paper - 2 of 1983, pp. 10-11.

TABLE - 3

Distribution of Ever-married women by children ever-born

Age Group	Children ever-born											No. of women
	0	1	2	3	4	5	6	7	8	9	10 +	
15-19	21	18	2									41
20-24	11	15	17	8	5							56
25-29	9	7	16	14	12	7	3					68
30-34		4	4	7	7	4			2			28
35-39	1	4	4	3	3	3	2	1		1	2	24
40-44	3		1	3	3			3	2			15
45-49	2	1	1	1	1	6	8	4	4	1	2	31
No. of women	47	49	45	36	31	20	13	8	8	2	4	263

TABLE - 4

Children ever-born by age of mother

Age Group	No. of women		No. of children ever-born	Average No. of Children		1960 Survey
	All women	Ever-married		All women	Ever-married	Average children by maternity age
15-19	60	41	22	0.37	0.54	1.76
20-24	63	56	93	1.48	1.66	2.46
25-29	73	68	182	2.49	2.68	3.73
30-34	28	28	97	3.46	3.46	4.47
35-39	24	24	96	4.00	4.00	7.36
40-44	15	15	60	4.00	4.00	NA
45-49	31	31	178	5.74	5.74	NA

TABLE - 5

Age Group	Female	Ever-married women	No. of sterile women
13-22	41	36	13
23-32	57	57	12
33-42	27	27	4
43-52	31	31	8
53 and above	27	27	12

TABLE - 6

	Total Todas		Original Todas	
	TFR	CBR	TFR	CBR
Zaba's method	3.9	36.9	4.4	39.4
Rele's method [(0-9) pop.]	4.0	37.5	4.4	41.7

TABLE - 7

Children ever-born and surviving by age of Mother

Age of mother	Children ever born	Children surviving	Proportion surviving
15-19	22	17	.7727
20-24	93	77	.8280
25-29	182	150	.8242
30-34	97	85	.8763
35-39	96	85	.8854
40-44	60	55	.9167
45-49	178	146	.8202
15-49	728	615	.8448

TABLE - 8

Characteristics of Acceptors at the time of Tubectomy

Age Group	No. of acceptors	Average No. of children	No. of live births	No. of acceptors
15-19	1	1.00	1	3
20-24	29	2.66	2	13
25-29	9	4.11	3	12
30-34	6	6.00	4	9
35-39	--	--	5	4
40-44	--	--	6	1
45-49	--	--	7	--
15-49	45	3.36	8	3

TABLE - 9

Size and growth of Toda Population

Year	Population Male	Female	Total	Sex Ratio (F/M)	Annual exponential growth rate %
1812	N.A	N.A	197	N.A	
1821	140	82	222	586	1.33
1825	190	136	326	716	9.60
1838	294	184	478	626	2.94
1847	173	164	337	948	(-) 3.88
1856	185	131	316	708	(-) 0.71
1866	N.A	N.A	704	N.A	8.01
1870	407	306	713	752	0.32
1871	405	288	693	711	(-) 2.84
1881	382	293	675	767	(-) 0.26
1891	424	312	736	736	0.86
1901	451	354	805	785	0.90
1902	419	317	736	757	(-) 8.96
1911	426	322	748	756	0.18
1921	360	280	640	778	(-) 1.56
1927	333	249	582	748	(-) 1.58
1931	340	257	597	756	0.64
1941	342	288	630	842	0.54
1951 (Provisional)	373	316	689	847	0.90
1960 (Survey)	409	353	762	863	1.12
1961*	370	336	706	908	
1971*	361	314	675	870	(-) 0.43
1985 (Present Survey)	615	617	1232	1003	

* Population enumerated in the Nilgiris district.

N.A : Not available.

Sources:

1. P.K.Nambiar, Todas, Census of India, 1961, Vol. IX, Part V-C, 1965, p. 29;
2. Census of India, 1961, Scheduled Castes and Tribes (Tables), Vol. IX, Madras, Part V-A (ii), p. 88.
3. Census of India, 1971, Special Tables on Scheduled Castes and Scheduled Tribes, Series - 19 (Tamil Nadu), Part V-A, p.270.

APPENDIX - I

Distribution of Todas by settlements (Munds and other places)

Headmund/mund	No. of households	Population Male	Female	Total
(1)	(2)	(3)	(4)	(5)
Muthunad				
1. Kulkhadi	2	4	6	10
2. Muthunad	7	17	18	35
3. Aganad	3	8	11	19
4. Kombuthukki	3	6	13	19
5. Mundupilla	1	1	1	2
6. Pennepal	2	3	6	9
7. Thalappatheri	1	2	4	6
8. Pathanakode	3	8	7	15
Total	22	49	66	115
Karsh (Kandal)				
1. Kundithol	2	6	7	13
2. Minikki	3	11	10	21
3. Kavagad	4	7	8	15
4. Kal	1	3	1	4
5. Kallicholai	2	4	3	7
6. Attakore	2	4	7	11
7. Pagalkode	1	8	2	10
8. Gadimund	2	8	6	14
9. Karsh (Kandal)	3	9	6	15
Total	20	60	50	110
Manjukal				
1. Mulli	5	11	15	26
2. Manjukal	14	25	33	58
3. Malavadi	4	9	7	16
4. Pathumund	3	7	4	11
5. Kagodi	6	12	19	31
Total	32	64	78	142

Contd.....

(1)	(2)	(3)	(4)	(5)
Tharanad				
1. Pathar	2	3	1	4
2. Kaboof	1	2	3	5
3. Kaboo	1	2	2	4
4. Pilkode	1	2	1	3
5. Taranad	8	29	24	53
6. Arthal	1	3	3	6
Total	14	41	34	75
Betta				
1. Betta	6	15	19	34
Kannaki				
1. Kannaki	4	9	7	16
2. Thuvalgod	5	12	14	26
Total	9	21	21	42
Biggapati	3	11	7	18
Nedi	4	9	13	22
Pan				
1. Pan	1	2	4	6
2. Pan Onnai	1	2	3	5
3. Kabodi	3	9	7	16
4. Kallakorai	2	2	7	9
5. Nathaner	5	14	19	33
Total	12	29	40	69
Koduthoni				
1. Nervin	3	5	7	12
2. Koduthoni	3	9	9	13
Total	6	14	16	30
Kulthkod				
1. Mekode	1	1	5	6
2. Marhali	3	12	5	17
3. Anarkal	6	13	16	29
4. Kuntrikode	4	10	9	19
5. Karia	3	6	6	12

Contd....

(1)	(2)	(3)	(4)	(5)
6. Neerkachi	1	6	4	10
7. Kenkode	2	11	10	21
Total	20	59	55	114
Thevati				
1. Thugore	4	12	9	21
2. Karimuli	4	8	7	15
3. Thavatkode	1	5	3	8
4. Andkuthkuli	3	4	5	9
5. Narikuli	3	11	8	19
Total	15	40	32	72
Ongarsh				
1. Thenad	2	4	9	13
2. Pagla	5	10	11	21
3. Omkarsh	5	16	14	30
Total	11	30	34	64
Karigad				
1. Karigad	3	9	10	19
2. Nedugodu	2	4	3	7
3. Osmu	2	5	6	11
Total	7	18	19	37
Bedgal	4	12	15	27
All Munds	186	472	499	971
Outside Munds				
1. Indu Nagar (Original Toda)	5	13	10	23
2. Cristian Toda	20	48	48	96
3. Original Toda marrying Cristian Toda	1	2	2	4
4. Mixed Parentage	48	80	58	138
Grand Total	260	615	617	1232

APPENDIX - 2

Distribution of Toda population by age and sex

Age Group	Toda Percentage			Toda of mixed % *		
	Person	Male	Female	Person	Male	Female
0-4	151	74	77	12	8	4
5-9	130	70	60	13	8	5
10-14	120	62	58	21	10	11
15-19	117	57	60	18	9	9
20-24	115	52	63	11	3	8
25-29	132	59	73	10	9	1
30-34	63	35	28	6	3	3
35-39	49	25	24	13	6	7
40-44	36	21	15	7	6	1
45-49	46	15	31	9	6	3
50-54	34	14	20	6	3	3
55-59	30	16	14	2	2	--
60-64	24	9	15	2	--	2
65-69	16	9	7	1	1	--
70+	35	20	15	3	3	--
Total	1098	538	560	134	77	57

* Toda married to non-Toda

Note: Persons who are married to non-Toda and their children are not included in the analysis.

DEMOGRAPHY OF THE KOTAS

D. Varadarajan

Introduction

Kota is a hill tribe of the Nilgiris district, Tamil Nadu. It is numerically a small tribe. Several views have been expressed regarding the origin of the Kotas but a conclusion is yet to be arrived. Rev. F. Legrand, (1955) feels that the Kotas must have come to the Nilgiris along with the Todas about the same time. He opines that as the original inhabitance of the Todas is still a mystery it is not possible to fix up the origin of the Kotas.

Mandelbum in 1938 introduced the Kotas to the world as a Polyandrous tribe. But Thurston (1909), Kapadia (1955), Vidyarthi (1978) and Verghese (1973) have reiterated that the Kotas area non-polyandrous tribe.

The Kotas were blacksmiths, silversmiths, carpenters, tanners, rope-makers, potters, washermen, cultivators and also musicians at Toda and Badaga funerals. At present, many of them have changed their occupations and taken up modern jobs and professions.

It was widely held that the population of the Kotas was diminishing and it might face extinction. This drew the attention of the researcher to conduct a demographic study focusing the composition, growth, fertility and mortality trends of the Kota tribe in 1980.

99.16 per cent of the total Kota population of the state live in the Nilgiris district. Because of the small size of the population sampling was not restored to. All the 315 Kota households within the Nilgiris district were studied by adopting census survey method.

Structured interview schedule was used as the main tool for data collection. Data were also collected through informal discussions and observations.

Results and Discussion

The age structure of a population is a product of its past history of fertility, mortality and migration. With the help of per cent distribution, the age structure of the Kota population is studied.

(i) Percentage age distribution

40.25 per cent of the male and 40.46 per cent of the female children belonged to the age group of 0-14 years. This suggests the presence of high fertility among the Kotas. In the age group of 15-44 years there were 38.32 and 42.47 per cent of the male and female population respectively. The percentage of females in this group shows the potential for high fertility. The population of the aged (60 years and above) constituted 5.75 per cent which suggests that the life expectancy of the Kotas is not high (Table 1).

The table 2 reveals that the sex ratio in the age group of 0-14 years is 931. A better picture could be obtained if this category is divided further. The sex ratios were 1010, 962, and 816 for the 0-4, 5-9 and 10-14 age groups respectively. There is a high proportion of females in the age group of 0-4 years because of a high proportion of males dying at the age of less than 1 year and 1-4 years. In the latter age groups the proportion of female children dying is high and hence the sex ratios register a decline in those age groups.

In the age group, 15-44, the proportion of females is higher than the males. This may be due to the migration of male members in search of job in recent years and also due to high male child mortality in the past.

The sex ratio is 748 for the age group of 45 years and above. The low proportion of females to males may be attributed to the high death of females in this age category.

Growth

Growth is considered as change in the size of a population, whether it increases or decreases. Positive or negative growth of population comes from only three sources, births, deaths and migration. The growth of population is measured, as an observed change in the total number of people.

Observed Change in the Total Number of People

Growth of the Kota tribal people since 1901 is analysed. To provide a comparative picture of the growth of the Kotas, it is compared with the population growth of the Nilgiris district.

The population figure for the Kotas for the year 1951 was not available from census. This handicaps giving a complete picture of the per cent variation. From the table 3, it can be seen that during the period

1901 to 1911, -8.21 per cent variation has been recorded for the Kota population. 2.49 per cent of increase is seen during 1911-1921. During the periods 1921-1931 and 1931-1941 the per cent variation is in the negative side and in 1931-41 a high per cent, 15.25 is seen. What are the reasons for such a negative variation in the Kota population? In the census prior to the year 1961 we do not have any data or evidence for the migration of the Kotas out of the Nilgiris district. The discussions with Kota people and with neighbouring non-tribals also do not provide any evidence for this. Therefore, in the absence of migration, the variation could have been caused by births and deaths. Epidemics during early part of this century took away a heavy toll of life in the Nilgiris district. Children and women in the productive age groups were much affected. The Kotas would also have been affected by some serious infectious diseases. Therefore, the mortality rates would have increased. The low birth rate and high death rate would have been caused by the absence of 'A' blood group (Narasimhan, S., 1978; 71-74) and due to high inbreeding co-efficient 0.04207, which is almost equal to the highest recorded inbreeding co-efficient, 0.043449, of the samaritans (Gosh, A.K., 1972:289). During sixties the epidemics were combated, health situation of the Kotas was improved and venereal diseases were treated. As a result of which the mortality rates have declined substantially. This is evident from the positive decadal variations observed during 1961-71 and 1971-80.

Mortality

Mortality, the negative component of population change, is a continuous force of attrition, tending to reduce population by having its effects counterveiled by the force of fertility. Mortality is not a single factor to be expressed as a simple number or index. Several measures have been used to study the mortality of the Kotas.

Crude Death Rate

The crude death rate for the Kota population, according to the present survey was 16.11.

Causes of Death

The causes for death, which occurred during the one year reference period were recorded and are presented in the Table 4.

Infant Mortality

Since only a small number of infant deaths were recorded during the one year reference period, the infant mortality rates based on the direct methods may not be reliable. Hence, the infant mortality rates were estimated by indirect methods. In this study, the techniques developed by Brass, Sullivan and Trussell are adopted for the estimation of infant mortality rates based on survivorship ratios.

Based on the data given in the table 5, the infant mortality rate is arrived at. The resultant estimate of infant mortality based on Brass method is 0.1001, if based on the "West" female model tables. The corresponding e is 53.6565.

The following values are obtained by Sullivans method:

$q_0 = 0.1041$

$^{\circ}e_0 = 52.8505$

By applying Trussell method, the following result are obtained.

$q_0 = 0.1042$

$^{\circ}e_0 = 52.8390$

The infant mortality rates estimated by the indirect methods, namely, Brass, Sullivan and Trussell were, 102.2, 116.478 and 100.00 respectively. Therefore, we can say that the infant mortality rate of the Kotas must be in the range of 100 to 117.

Child Mortality

In the developing nations of the world, deaths of children under five years of age constitute a large-fraction; sometimes, a majority of all deaths -- and hence childhood mortality statistics are therefore of considerable descriptive value (Sullivan, J.M.1972:79). The childhood mortality statistics serve as a sensitive index of any population. The child mortality is estimated using Brass, Trussell and Sullivan methods and is presented in table-6.

Reasons for High Infant and Child Mortality

Infant mortality is influenced by the prenatal and post-natal care of the mother. During pregnancy only few women undergo the medical check-ups. Large number of women do not use the services of a doctor. A high percentage of the deliveries took place in the seclusion houses only. In every Kota village there are two separate houses called *Kunpai* and *thelul*, where the women must stay during their seclusion periods. All the child births are supposed to take place in these houses only. The surroundings and the conditions of the seclusion houses are unhygenic and this may also affect the health of newly born infants. After the delivery, the young mother has to stay in the same seculsion houses for some days.

The person and practices associated with the delivery also influence the infant mortality. 82.35 per cent of the total deliveries which occurred during the one year reference period in the Kota villages were attended by the old Kota women. The umbilical cord was cut by old womenfolk with shaving blades or sharp bamboo sticks, etc. In such cases, there is a very great probability for the infant to be affected by umbilical sepsis. Further, to cure the wound, either face power or ashes of grass was applied. All these factors thwart the life of an infant.

It is a common thing to see many of the Kota children suffering from diseases of Vitamin deficiency affecting the normal development of the child and chances of survival.

The housing conditions of the Kotas are poor. The houses are built in long rows, adjacent to each other. This may facilitate the spread of communicable diseases. Poor ventilation, inadequate lighting, lack of running water facilities, presence of cowsheds just very close to the houses contribute to the poor conditions of housing pattern which may affect the child mortality.

Fertility

For the estimation of fertility both current and cohort approaches were used. Out of the 222 currently married kota women only 23 (10.36 per cent) were married more than once. Those women who are married more than once were not included in the fertility study.

Various indices of fertility have been computed basing on the data on the number of children born for the currently married women during the reference period and are shown in Table 7.

The age specific marital fertility for the Kota tribe is found increase with the age of women upto 20-24 age and then declines. The age specific marital fertility rate is highest in the 20-24 age group. From 30-34 age group onwards, the age specific marital fertility rates decline sharply and it may be due to the sterilizations that the Kotas had undergone. 68.42 per cent of the women in the age group 30-44 years have resorted to tubectomy. 75.76 per cent of the couples in the age group of 30-44 years were found sterilized.

The average order of births which occurred during the reference period is given in table 8. Out of the total births, 55.56 per cent accounted for the live births of the orders 1 to 3, while 36.11 per cent of births belonged to the order of 4 to 6.

Cohort Approach

The parity distribution of the currently married Kota women by age is shown in table 9. It reveals that 48.28 per cent of women in the age group of 15-19 years had one or more children, 50.91 per cent of the women in the age group of 20-24 years had at least 2 or more children. 77.14 per cent of women in 25-29 years of age group had at least 3 or more children, 87.09 per cent of women in the age group of 30-34 years had at least 4 or more children, 62.51 per cent of women in the age group of 35-39 years had at least 5 or more children and 64.00 per cent of women from the age-group of 40-44 years had at least 6 or more children. This clearly suggests the high fertility in Kota women.

Table 10 shows that ine mean number of children ever born to the currently married Kota women of all the ages was 3.29. The mean number of children born increase sharply from the age group of 15-19 years to 30-44 years and then the increase at a declaring rate reaching of 6.28 in the age group of 40-44 years. It can also be seen from the table that the Kota women achieve more than half of their children by the age 29 years. From 30-44 years they add on an average another 2.99 children. The more interesting feature is that they continue to bear children till the end of their reproductive life.

The average number of children ever born for a Kota women in the 40-44 years of age group was 6.28. Total fertility rate and general marital fertility rate in the current approach were 4.79 and 185.93 respectively. Total fertility rates calculated by Brass method for P_2/F_2 and P_3/F_3 were 5.75 and 5.26 respectively. The crude birth rate of the Kotas was 30.11 and the GRR (adjusted) was 2.806. Basing on these fertility estimates and by comparing them with the figures of general population of Tamil Nadu, we can say that the fertility of the Kotas is high.

Reasons for the High Fertility of the Kotas

The population of the Kotas in the year 1881 was 1067 as against 1446 persons as per the present survey conducted in 1980. This brings out an important fact that the Kota population has registered an increase of only 379 persons in a period of nearly one hundred years. Further the increase in population was not a uniform one and was characterized by fluctuations.

The Kotas are quite conscious of these facts and do not their community to face extinction. Kotas therefore want to produce as many children as possible contributing for high fertility in the tribe.

According to the Kotas, Todas, Kotas and Kurumbas were the original inhabitants of the Nilgiris. The Badagas, who were migrants from Mysore State and were small in number than the Kotas in the past had multiplied tremendously. The population of the Badagas was 1,04,392 in 1971, whereas the population of the Kotas was 1446 in 1980. The Kotas feel that the Badagas population has increased rapidly and occupied the whole of Nilgiris, while their population still remained small. This feeling also has strengthened their urge to produce more children which results in high fertility.

Further, infant and child mortality among the

Kotas are high. There is no certainity as to how many of their children will survive. They want to have more children so that atleast some will survive.

The age at consummation for the Kota women is very low, it was 13 years in the case of many women, and hence the fertility is high.

Sterility is almost absent among the Kotas and this is also responsible for their high fertility. Among the currently married Kota women in the age group of 15-44 years, married only once, only one woman (0.50 per cent) was primarily sterile.

Hardly any woman, in the productive age group, remains as a widow. There is no stigma attached to widow remarriage among the Kotas. This factor also keeps the fertility high.

Conclusion

From the foregoing discussion it is quite clear that the Kota population is not facing ...... extinction and that the prospects of population growth are bright.

After the year 1961, the Kota population has increased appreciably. This increase is not due to the increase to the birth rate but due to the fall in the death rate. The crude death rate was 16.11 in 1980, which is not very high. But the infant and child mortality rates are high. If suitable measures are taken to check the high infant and child mortality rates, the rate of positive population growth of the Kotas will increase. Based on several direct and indirect measures the fertility of the Kotas can be said to be high.

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TABLE - 3

Decadal variation in the Kota population and the general population of the Nilgiris district

Year	Persons		Decade variation		Per cent variation	
	Kota tribe	general population	Kota tribe	general population	Kota tribe	General population
1901	1267	112882	--	--	--	--
1911	1163	118618	- 104	+ 5736	- 8.21	+ 5.08
1921	1192	126519	+ 29	+ 7901	+ 2.49	+ 6.66
1931	1121	169330	- 71	+ 42811	- 5.96	+ 33.84
1941	950	209709	- 171	+ 40379	- 15.25	+ 23.85
1951	--	311729	--	+ 102020	--	+ 48.65
1961	833	409308	--	+ 95579	--	+ 31.30
1971	1178	494015	+ 345	+ 84707	+ 41.42	+ 20.70
1981	1446	628231	+ 268	+ 134216	+ 22.75	+ 27.17

TABLE - 4

Causes of death

Sl.No.	Cause	Per cent
1.	Fever	26.09
2.	Prematurity	17.39
3.	Diarrhea	13.04
4.	Dyphtheria	4.35
5.	Heart attack	4.35
6.	Liver trouble	4.35
7.	Respiratory diseases	13.04
8.	Senility	13.04
9.	Other causes	4.35
	All causes	100.00

TABLE - 5

Calculation of Infant Mortality of the Kotas based on children ever born and surviving

Age group (in Yrs)	Total No. of children ever born	Total No. of children dead	Total No. of children surviving	Total No. of Women	P_i	D_i	xq_o $(D_i x k)$
15-19	15	1	14	69	0.2174	0.0667	
20-24	97	14	83	64	1.5156	1.1443	0.1505
25-29	119	28	91	42	2.8333	0.2353	
30-34	179	44	135	42	4.2619	0.2458	
35-39	159	38	121	39	4.1842	0.2390	
40-44	190	74	116	40	4.7500	0.3895	

TABLE - 6

Child mortality

Age-groups (in years)	Average No. of childern born	Average No. of children dead	Multipliers			x9o		
			Brass	Trussell	Sullivan	Brass	Trussell	Sullivan
15-19	0.2174	0.0688	1.0406	1.0524	1.0453	0.0694	0.0724	0.0719
20-24	1.4531	0.1505	1.0428	1.0442	1.0436	0.1505	0.1572	0.1571
25-29	2.7381	0.2348	1.0119	0.9709	0.9702	0.2381	0.2280	0.2278
30-34	3.6429	0.2484	1.0159	0.9660	0.9626	0.2497	0.2400	0.2391
35-39	3.1026	0.2314	1.0259	0.9748	0.9699	0.2451	0.2256	0.2244
40-44	3.9250	0.3885	1.0039	0.9588	0.9535	0.3910	0.3725	0.3704

P1/P2 = 0.1434

P1/P3 = 0.05349

$\overline{m}$ = 28.8243

TABLE - 7

Age specific marital fertility rate, general marital fertility rate, total marital fertility rate and crude birth rate for the Kota tribe.

Age groups (in years)		Age specific marital fertility rate
15-19		137.93
20-24		327.27
25-29		200.00
30-34		129.03
35-39		83.33
40-44		80.00
General marital fertility rate	:	185.93
Total marital fertility rate	:	4.79
Crude birth rate	:	30.11

TABLE - 8

Average birth order by age of the mother for births occurring during the one year ref. period.

Age groups	Average birth order
15-29	1.25
20-24	2.47
25-29	4.43
30-34	5.00
35-39	7.00
40-44	8.50
All ages	3.47

TABLE - 9

Percentage distribution of the currently married Kota women according to the number of children ever born by current age

Age groups (in years)	Number of children ever born										
	0	1	2	3	4	5	6	7	8	9	10
15-19	51.72	44.83	3.45	--	--	--	--	--	--	--	--
20-24	12.73	36.36	25.45	20.00	5.46	--	--	--	--	--	--
25-29	11.43	11.43	--	17.14	37.14	20.00	2.86	--	--	--	--
30-34	3.23	3.23	--	6.45	29.03	22.58	12.90	16.13	6.45	--	--
35-39	8.33	4.17	--	11.67	8.33	12.50	16.67	25.00	--	4.17	4.17
40-44	8.00	--	4.00	4.00	12.00	8.00	12.00	4.00	20.00	20.00	8.00

TABLE - 10

Mean number of children ever born for the currently married women.

Age groups (in years)	Mean number of children
15-19	0.52
20-24	1.69
25-29	3.29
30-34	4.94
35-39	5.04
40-44	6.28
All ages	3.29

ENDOGAMOUS AND EXOGAMOUS GROUPS AMONG THE SAORAS

M. Suryanarayana

Introduction

Saoras are one of the important Mundari speaking tribes of India. They are widely distributed in Koraput and Ganjam districts of Orissa; Srikakulam and Vijayanagaram districts of Andhra Pradesh. The total Saora population in Andra Pradesh is 81,227 (1971 census).

Material and Methods

The present paper aims to focus on (i) how the Saora society is divided into various occupational and territorial divisions and (ii) the functioning of the lineage units which are the only exogamous groups in the society. Intensive field work was carried out on this community during the years 1965-67 and again in 1976 in Srikakulam and Vijayanagaram districts of Andhra Pradesh. The tribal blocks studied in these districts are Bhadragiri, Seethampeta and Mandasa.

Results and Discussion

Sub-divisions of the Saoras

Saoras are patrilineal. They are endogamous and

I have not come across any violation of this rule. As many as 23 endogamous groups were reported among them. The following is the list of the various sub-divisions among the Saoras as discussed by the earlier scholars (Sitapati, G.V. 1938-43; Elwin, V. 1955; Lakshminarayana Sahu, 1942 .....).

Arsid Saora	Jara Saora	Luang (Luara) Saora	Tekkali Saora
Based Saora	Jati Saora	Male Saora	Tudum Saora
Bhimma Saora	Jurai Saora	Mara Saora	
Bobbili Saora	Kampu (Kapu) Saora	Moni Saora	
Dondiya Saora	Kimsed (Kindal) Saora	Muli Saora	
Gontora Saora	Kumbi Saora	Sarda Saora	
Jadu Saora	Lambo Lanja Saora	Sudda Saora	

The interesting feature we find is the principle on which the various sub-divisions among the Saoras are formed. For a few sub-divisions there is no information in the existing literature as to how these names have come. But for other sub-divisions the name itself indicates how the sub-division is derived. A few sub-divisions are formed on the principle of the main occupation they follow -- Kindal Saora (Basketary); Kumbi Saora (Pottery); Arsid Saora (Weaving); Luara Saora (Blacksmithy); Gantora Saora (metal workers).

A few sub-divisions of the Saoras are formed on the basis of the territory they inhabit: Bobbili Saora; Tekkali Saora; Based Saora (Saoras inhabiting coastal areas). A few others are formed on different other principles: Lambo lanja (Toka) Saora - who wear loin cloth which hangs behind like a tail; Jati Saora. Saoras of par excellence, Sudda Saora, Bhimma Saora and Kampu (Kapu) Saora who are more hinduised groups. Kapu Saoras are supposed to have a Kapu (Hindu caste) origin i.e. descendants of a Kapu man and Saora woman.

An overall distinction is generally made among the Saoras as:

(a) the Saoras of the hills (who are popularly called as hill Saoras) and

(b) the Saoras of the Plains (inhabiting the Plains).

The former category are studied in the present context.

The various sub-divisions are not strictly endogamous. It is because from the genealogies, it is found that the Saoras are not strict about bringing spouses from the other sub-divisions. We also find a sort of social mobility among the Saoras as many of the hill Saoras under the present study are calling themselves as Kapu Saoras (who claim higher status among the different sub-divisions). Hence, for an investigator, it will be rather a pains-taking job to identify exactly to which sub-division they belong. Elwin (1955) also says that the distinctions between the sub-divisions are vague. Only time can say whether these sub-divisions develop into strictly endogamous groups or not.

Status Groups and Marital Relations

One important feature about the institution of marriage among Saoras was that certain persons with status in the society should select their spouses from similar status groups. For example a *gamong*[1] or a *buya*[2] were expected to marry the daughter of another *gamong* or *buya* respectively of another village but within the same sub-division. But a *gamong* or *buya* could also marry the daughter of a *buya* or *parja*.[3] On the otherhand, the *parja* was not allowed to marry the daughter of a *gamong* or *buya*. This corresponds to the hypergamous marriages of the caste Hindus. However, this rule is not strictly adhered to at present.

Exogamous Units

Unlike many other Mundari speaking tribes, unilineal descent groups like clans and septs are absent among Saoras. The *kulam marangi* unit i.e. the lineage is the principal exogamous unit controlling marriage. In the absence of a clan, the *kulam marangi* unit is operating as an exogamous unit. It is the pivot of the social organization of the Saoras. Besides being primarily an exogamous unit, it is also a corporate unit.

Saoras refer their lineage members as *kulam marangi*.[4] There is no term to refer to a Saora lineage. The *kulam marangi* represent the group of lineal descendants. There is male emphasis in the terminological designation of the term. *Kulam* among Saoras literally means lineal descent and *marangi* refers to a group of male members. It is because women members go out of the lineage after marriage due to lineage exogamy and thus leaving only male members to become active participants in lineage activities, although it actually consists of all the agnatic descendants, both male and female.

It seems, that the earlier scholars have over-looked the existence of lineage among the Saoras. Ramamurti (1931) though mentioned about the word kulam marangi, did not talk about its composition and function, perhaps he was primarily concerned with the linguistic analysis of the Saora language. It did not even catch the attention of either Sitapati (1938-43) who was more interested in giving ethnographic account of the Saoras nor Elwin (1955) who made an elaborate study on the Saora religion. As Turner (1967) has rightly pointed out, Elwin (1955) has completely overlooked Saora social structure and its relation to religion. It is infact in the religious life of the Saoras, one finds the existence of the Saora lineages.

In Saora society the lineage is primarily defined by the canon of agnatic descent. All the *kulam marangi* can trace their genealogical relationship from one another. Though all the agnatic descendants both male and female of the founder ancestor belong to the lineage group, in actual conduct of lineage affairs, the male members have the dominant role and the *defacto* corporate unit is the group of the male members, and this can clearly be noticed in the word associated with the members of the lineage group - *kulam marangi*.

A Saora lineage is not only an agnatic genealogical unit, it is also an *ipso facto* ritual unit. The importance of lineage is emphasised through the ancestral worship, which is made effective by the elaborate death rites. The *kulam marangi* have to erect menhirs in honour of the dead ancestors at one place in accordance with the age followed by buffalo sacrifices. In various other rituals associated with life crisis and harvest festivals, the lineage is a major source for integration. In marriage by negotiations *kulam marangi* have a role to play at different phases of marriage, and in other forms also their participation is necessary. In the economic and political spheres the *kulam marangi* have a respectable role to play.

Lineage Functioning in the Absence of Clan

Basic identification of an individual in the absence of clans is with the lineage. Though there is no specific name for a lineage group the members are called as kulam *marangi* and the *non-kulam marangi* members are referred to as *somandi mar* (male) and *somandi boi* (female) respectively. This distinction helps to some extent in identifying the different lineages and also helps in knowing whom one can marry. With whom one can marry are referred to as *somandi mar* and *somandi boi*. The organisation of the lineage is not only confined to intra-village level but also to inter-village level especially when a lineage is dispersed in different villages. In short, lineage is the 'pivot' in many affairs of the Saora social structure. In the absence of clans, lineages shoulder many of their responsibilities.

The simple family forms the basic unit for the lineage which is expanded through various segments over a few generations which include the agnates within the village as well as from outside. The dispersion of the lineage members to different villages leads to its inter village organization. The various members of the lineage often meet together in times of crisis situations. The solidarity of the lineage group is unique. Thus the genealogical kinship ties of the *kulam marangi* of differnt villages through a common ancestor unite them for sharing of sorrows and pleasures equally.

Saora lineages seem to be originally localized. This can be seen by the interpretations given by the earlier ethnographers about the village exogamy. Sitapati (1938-43) reported the practice of village exogamy among Saoras. Writing about the village and exogamy he states that 'there is no trace of totem or sept or barga or any other group of exogamous nature except the village. The general rule relating to exogamy is, therefore, with reference to the village community'. Elwin (1955) writes that 'neither the village nor quarter is an exogamous unit. There is no territorial exogamy among the Saoras. There may once have been, ...'.

Fawcett writing in 1888 says a Saora may marry a woman of his own village or of any other village. Razeq (1966) also did not observe village exogamy among Saoras. Out of 439 marital unions recorded in the present study 205 (46.69 per cent) marriages have taken place within the village. This shows that the village is not an exogamous unit. Probably Sitapati might have wrongly interpreted the practice of village exogamy. It can be presumed from his writings and also the continued habit of the agnatic kin living in a single village or in nearby hamlets, this might have made him to mention about the practice of village exogamy.

Sitapati (1938-43) at a later stage writes that 'The man and woman of the same village should not inter-marry because according to the conception of the Saoras they stand in the relation of brother and sister. In every village the tradition goes to say that this rule was strictly observed in the past ...'. 'But I have noted several instances where this rule is violated. A young man of Bontelda said he had married a girl of the same village and explained that he had been permitted to do so because, the girls' parents come from another village and settled there in recent times, within the memory of the elders of the villages'. But in reality the Saoras have been observing lineage exogamy only. From the above observations of Sitapati, we can conclude that Saora villages in course of time became multi-lineage settlements, thus facilitating marriage within the settlement and outside the lineage.

This fact can further be substantiated by the practice that lineage members from one village go to that village from where they have migrated to participate in *guar* ceremony which is performed in honour of the dead. All such lineages that go out of a village for such participations may be considered as immigrant lineages.

In some areas due to the influence of Dravidian language speaking tribes and castes i.e. the Jatapus as well as various Telugu castes, the Saoras began to name their lineages especially on the pattern of the Jatapus. Though by tradition Saoras have no name for lineage as well as to designate a lineage group, the Saoras of the Bhadragiri area under study have adopted the clan names of the neighbouring tribe Jatapu to designate their lineage groups. Some of the Jatapu clan names found among Saoras are: *Nimmala*, *Toika*, *Biddiki*, *Pattika*, *Kadraka*, *Mandangi*, *Mootaka*, *Yappa-raka* and *Arakollu* which are characterized by exogamy. Stray instances of marrying within the named lineage groups are recorded which may be because the adoption has not yet been fully integrated with exogamy. In Malluguda Toika Lakkai eloped with Toika Sukki of Jammu. The villagers say that they do not belong to the same *kulam marangi* unit though they have the same designation 'Toika'. This is because people in these two villages adopted the same Jatapu clan name -- Toika independently. But in Seethampeta and Mandasa areas, no such change has taken place in Saora *kulam marangi* unit. Since the *kulam marangi* units don't bear any names in these areas, a person is referred just as Saora Lakki, Saora Addei and the like.

Fission of Lineages

When a lineage is established first at a new place by the dispersion of a group of agnatic kin of one village in search of livelihood, they assume rights over all the areas suitable for cultivation under the guidance of the senior member of the group that come over to the place to settle. The later emigrants will have rights over the areas left by the original settlers. Thus a lineage among Saoras becomes corporate as in course of time, the rights over the land are passed on to descendants of the original settlers. Only after two or three generations they severe their links with the core and establish their new lineage which is marked with the erection of menhirs at their place independently.

Identification of Lineages

In Saora villages the different lineages present can be identified by enquiring where each lineage erect its menhirs. It is customary among Saoras to erect separately their menhirs. Those who got migrated to a new place invariably come to the place where they traditionally erect menhirs. Whenever *guar* is performed for the erection of menhirs to the dead, all the *kulam marangi* are informed well in advance to enable them to make necessary arrangements for participating in the *guar* ceremony. In course of time as and when the members of a lineage migrate to another village and when the members of a lineage grow sufficiently, they start erecting menhirs in their own village with a ritual sanctification and severing their ties with the parental lineage, thus resulting the fission of a lineage.

In the village Kannaiguda there are four lineages, and all settled in the village a few generations back. The different lineages are seen continuing to erect menhirs in different villages from where they have migrated to this village. Even in the same village, the cremation ground is demarcated for each lineage.

In a society like the Saoras, it will be very difficult to give in a clear cut way how the alliances take place between the exogamous groups mainly because they don't have named lineages. In such cases anthropologists who are interested in the study of marriage alliances have to depend on the folk cognition of the differentiation between the lineages and marital alliances between them. Genealogical tracing of relationships will be a more meaningful approach in this context.

FOOT NOTES

1. The *gamong* is the chief as well as the head of a village.

2. The *buya* is the religious head of a village.

3. The *parjas* are the common people in a village.

4. Kulam mar = singular, kulam marangi = plural; kulam marangi unit -- refers to the entire lineage as a corporate group.

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DEMOGRAPHIC PROFILE OF SAVARAS AND JATAPUS

V.L.N. Rao

Introduction

Demographic studies of relatively unacculturated populations are few in number due to the absence of written records and the difficulty of interview technique. Further concern has been expressed that demographic data already available for such populations may be a typical of other primitive groups (Neel and Salzano, 1967). Social and demographic structures are the fundamental determinants of the genetic structure of human populations (Cavalli-Sforza, 1967). Spuhler (1959) and Sutter (1963) have repeatedly emphasized the need for population genetics to pay sufficient attention to demographic structures of human populations. The present report on Savaras and Jatapus is a response to the population geneticists' need for further data on marriage, fertility and mortality patterns in relatively unacculturated populations.

Savara and Jatapu are the two neighbouring and predominant scheduled tribal populations of Vizianagaram District, Andhra Pradesh. Their history has been traced by several investigators and this resulted in varied opinions. Sitapathy (1943) is of the opinion that the modern Savaras are the ancient Sabaras of Puranas and finds a mention of them in 'Korni' edict. He traced their origin to 730 A.D. The language of Savaras is included by Grierson in Munda family which is largely influenced by Telugu language. Aiyyappan (1948) identified 25 sub-divisions in Savara whereas Thurston (1909) observed 8 divisions. "Jatapu are defined as a civilized section of Khonds who speak Khond on the hills and Telugu on the plains and they consider themselves superior to those Khonds who still eat beef and snakes ....." (Thurston, 1909). Rev. F.V.P.Schulze regarded Jatapu Dora as one of the five different classes of Khonds (Introduction to 'A Grammar of Kuri Language'). The author fully agrees with the opinion of Francis (1907) in calling Jatapu as a civilized section of Khonds who absorbed many elements of Telugu language and culture. Savara and Jatapu are possessing features like short stature, dolichocephalic heads, dark brown complexi on and can be placed under the Proto-australoid racial stock (Guha, 1953; Malhotra, 1978).

The demographic variables discussed in the present paper include age composition, sex ratio, marital status, marriage, fertility and mortality patterns.

Materials and Methods

Demographic data were collected on 206 Savara and 162 Jatapu households drawn randomly from different villages of Bhadragiri block, Vizianagaram District, Andhra Pradesh (Map 1). Both husband and wife were interviewed and the information was cross-checked. Demographic data were collected using interview technique and with the help of a schedule showing the demographic variables. Detailed pedigrees were collected to the possible extent. The ages of the subjects were properly assessed taking into consideration their physique and the findings were further confirmed by village elders and *ashram* school teachers.

Results

Age and Sex pattern is an important indicator of fertility level of human populations. Figures I and II indicate age and sex distribution of Savara and Jatapu. Table 1 shows the distribution of population by age, sex and marital status.

Among the married individuals, majority belongs to 30-34 years age-group in the case of males in both Savara and Jatapu; while in females, majority of married belong to 20-24 years age-group in Savara, whereas in Jatapu, majority of married belong to 25-29 years age-group. This in turn suggests an early mean age at marriage for females when compared to males in both populations. Regarding widowed individuals, 16 widowers and 14 widows were observed in Savara population. 42 widowers and 38 widows were identified in Jatapu population. Divorces and separated individuals were not observed in both males and females in Savara while in Jatapu two males and two females were known to be separated without any legal sanction. It is further observed that in Savara population, about 42% of the total population is below 14 years of age, about 54% between 15 and 49 years and about 3% in 50 years and above which designates the population as of the progressive (increasing) type according to Sundberg's classification; while in Jatapu, about 35% of the total population is below 14 years of age, about 58% between 15 and 49 years and about 4% in 50 years and above. This situation also confirms Jatapu population to the progressive type. There are 961 males per 1000 females in Savara, whereas 1018 males per 1000 females are observed in Jatapu (Table 2).

The marital status of Savara and Jatapu is presented in Table 3. It is observed from the table that among males the proportion of unmarried persons is slightly less than that of married persons in Savara but in Jatapu the proportion of unmarried males is higher than that of married persons. Among the females, the proportion of unmarried persons is much less than the married persons in both populations. In Savara, the proportion of widowers is slightly higher than widows and in Jatapu also similar condition is being noticed.

The marriage types recorded among Savara indicate that among consanguineous marriages (44.66%), patrilateral cross-cousin type is predominant (29.13%) followed by matrilateral cross-cousin type (9.71%). In Jatapu also among the consanguineous marriages (29.63%) observed, patrilateral cross-cousin type is predominant (14.81%) followed by matrilateral cross-cousin type (9.26%) (Table 4).

The mean age at marriage indicates, near similarity among Savara (21.31) and atapu (21.98) males, while among females lower mean age at marriage is reported in Savara (15.61) compared to Jatapu (16.85) (Table 6).

An examination of mean menarcheal age shows that Savara women (14.19 ± 0.08) exhibit slightly lower mean menarcheal age compared to Jatapu women (15.10 ± 0.12).

The fertility ratio (number of children under 5 years of age per 100 women of age 15-49 years) is observed to be 66.16 and 66.52 in Savara and Jatapu populations respectively.

Regarding mean fertility rate, Savara showed lower mean fertility rate (2.80) compared to Jatapu (3.15). Mortality is found to be considerably significant in both the study populations. In Savaras, out of 141 deaths reported, a major proportion is constituted by neo-natal deaths (55.32%) and the rest include infantile (36.88%) and juvenile (7.80%) deaths. In Jatapu, out of 145 deaths observed, 34.48% constitute neo-natal deaths, 55.17% infantile and 10.35% juvenile deaths (Table 5). The mean mortality rate is observed to be slightly lower in Savara (0.75) compared to Jatapu (0.99).

ACKNOWLEDGEMENTS

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TABLE -1

Distribution of population by age, sex and marital status

SAVARA

Age in years	Total popula-tion	Savara									
		Sex		Unmarried		Married		Widowed		Divorced	
		M	F	M	F	M	F	M	F	M	F
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
0-9	331	171	160	171	160	--	--	--	--	--	--
10-14	137	66	71	66	65	--	6	--	--	--	--
15-19	118	27	91	17	26	10	65	--	--	--	--
20-24	125	56	69	9	--	46	69	1	--	--	--
25-29	107	44	63	1	--	41	62	2	1	--	--
30-34	122	69	53	--	--	66	45	3	8	--	--
35-39	61	32	29	--	--	29	26	3	3	--	--
40-44	46	30	16	--	--	29	15	1	1	--	--
45-49	23	16	7	--	--	16	6	--	1	--	--
50-54	23	18	5	--	--	16	5	2	--	--	--
55-59	12	9	3	--	--	6	3	3	--	--	--
60-64	4	4	--	--	--	3	--	1	--	--	--
65-69	3	3	--	--	--	3	--	--	--	--	--
Total	1112	545	567	264	251	265	302	16	14	--	--

Sex Ratio = 961

Contd......

Jatapu

Age in Years	Total Population	Jatapu									
		Sex		Unmarried		Married		Widowed		Divorced & Separated	
		M	F	M	F	M	F	M	F	M	F
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
0-9	289	154	135	154	135	--	--	--	--	--	--
10-14	103	60	43	60	43	--	--	--	--	--	--
15-19	108	43	65	41	32	2	33	--	--	--	--
20-24	125	41	84	17	14	24	68	--	1	--	1
25-29	125	52	73	7	--	46	69	2	3	1	1
30-34	94	62	32	--	--	53	28	7	4	--	--
35-39	78	43	35	--	--	33	30	8	5	1	--
40-44	47	21	26	--	--	18	14	2	12	--	--
45-49	49	24	25	--	--	14	14	10	11	--	--
50-54	22	15	7	--	--	10	5	5	2	--	--
55-59	14	11	3	--	--	10	3	1	--	--	--
60-64	8	8	--	--	--	4	--	4	--	--	--
65-69	4	4	--	--	--	1	--	3	--	--	--
Total	1066	538	528	279	224	215	264	42	38	2	2

Sex Ratio = 1018

TABLE - 2

Distribution of sex ratios for Bhadragiri block, Vizianagaram district, Andhra Pradesh, India (1971)

Bhadragiri*	Vizianagaram District	Andhra Pradesh	India
961 (Savara) 1018 (Jatapu)	1004	1023	1072

* Bhadragiri refers to its Savara and Jatapu population under the present study, not of its other populations.

TABLE - 3

Marital status

Population	Sex	Unmarried	Married	Widowed	Divorced & Separated	Total
Savara	Male	264 (48.44)	265 (48.62)	16 (2.94)	--	545 (100.00)
	Female	251 (44.27)	302 (53.26)	14 (2.47)	--	567 (100.00)
	Total	515	567	30	--	1112
Jatapu	Male	279 (51.86)	215 (39.96)	42 (7.81)	2 (0.37)	538 (100.00)
	Female	224 (42.11)	264 (49.62)	38 (7.89)	2 (0.38)	528 (100.00)
	Total	503	479	80	4	1066

(Figures in paranthesis indicate percentages)

TABLE - 4

Marriage Types

Population	Affinal	Consanguineous						Grand Total
		UN	PatCC	MatCC	2nd Pat CC	2nd Mat CC	Total	
Savara	114 (55.34)	12 (5.82)	60 (29.13)	20 (9.71)	--	--	92 (44.66)	206 (100.00)
Jatapu	114 (70.37)	9 (5.56)	24 (14.81)	15 (9.26)	--	--	48 (29.63)	162 (100.00)

(Figures in parenthesis indicate percentages)

Savara: $F = 0.031$
$F_1 = 0.037$

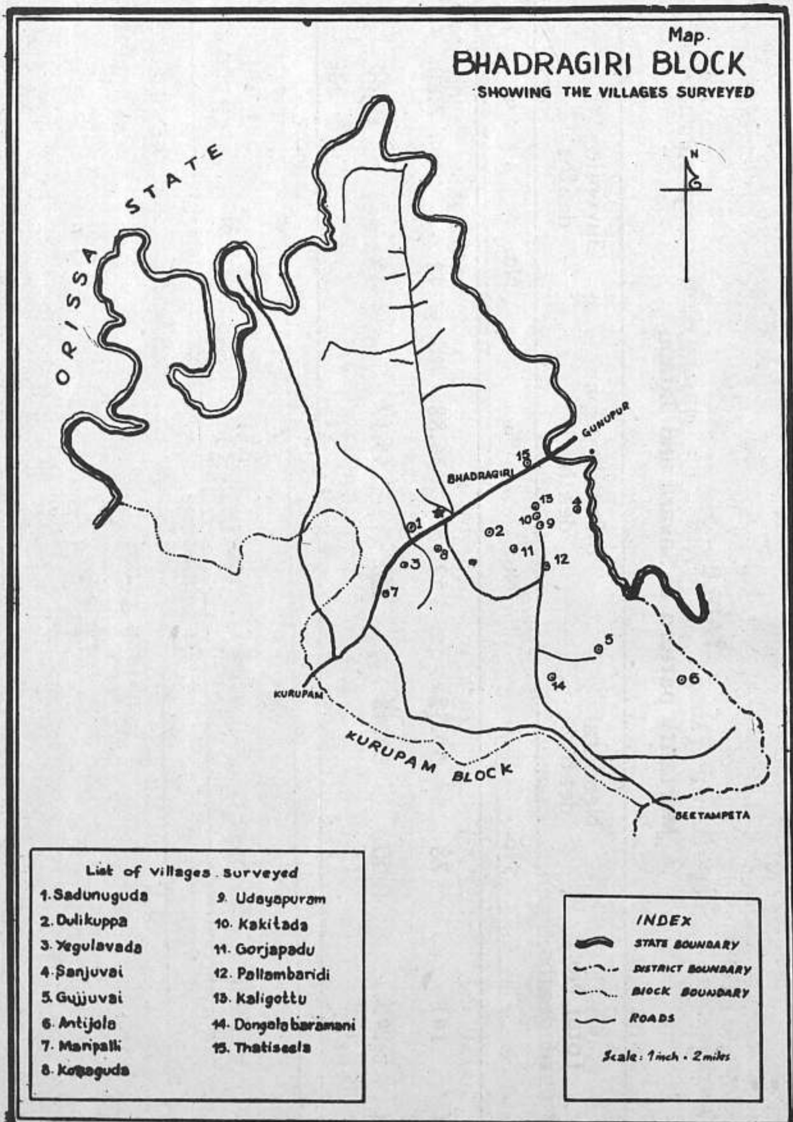
Jatapu: = $F = 0.022$
$F_1 = 0.028$

Pat CC: Patrilateral Cross-cousin Type; Mat CC: Matrilateral Cross-cousin Type;
UN: Uncle-Niece Type

TABLE - 5

Mortality pattern in Savara and Jatapu

Population	Total No. of deaths	Neonatal deaths		Infantile deaths		Juvenile deaths	
		No.	%	No.	%	No.	%
Savara	141	78	55.32	52	36.88	11	7.80
Jatapu	145	50	34.48	80	55.17	15	10.35


Map.
BHADRAGIRI BLOCK
SHOWING THE VILLAGES SURVEYED
N
ORISSA STATE
GUNUPUR
BHADRAGIRI
KURUPAM
KURUPAM BLOCK
SEETAMPETA
List of villages surveyed
1. Sadunuguda
2. Dulikuppa
3. Yegulavada
4. Sanjuvai
5. Gujjuvai
6. Antijola
7. Manipalli
8. Kottaguda
9. Udayapuram
10. Kakitada
11. Gorjapadu
12. Pallambaridi
13. Kaligottu
14. Dongola baramani
15. Thatiseela
INDEX
STATE BOUNDARY
DISTRICT BOUNDARY
BLOCK BOUNDARY
ROADS
Scale: 1 inch - 2 miles

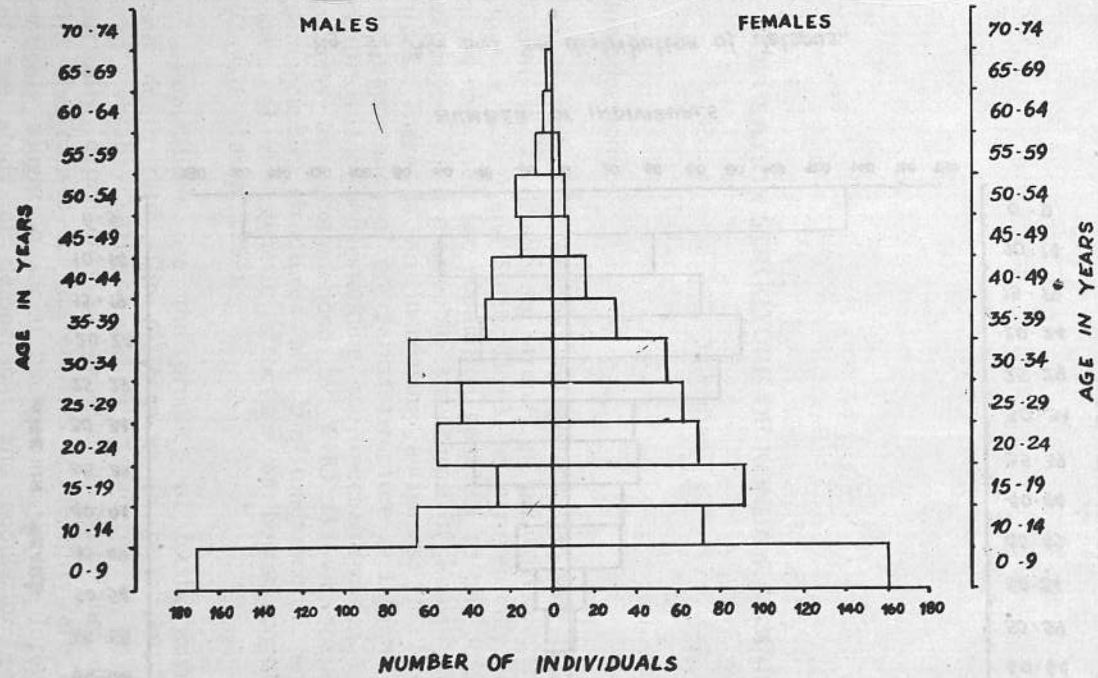


Fig. I: Age and Sex distribution of Savaras.

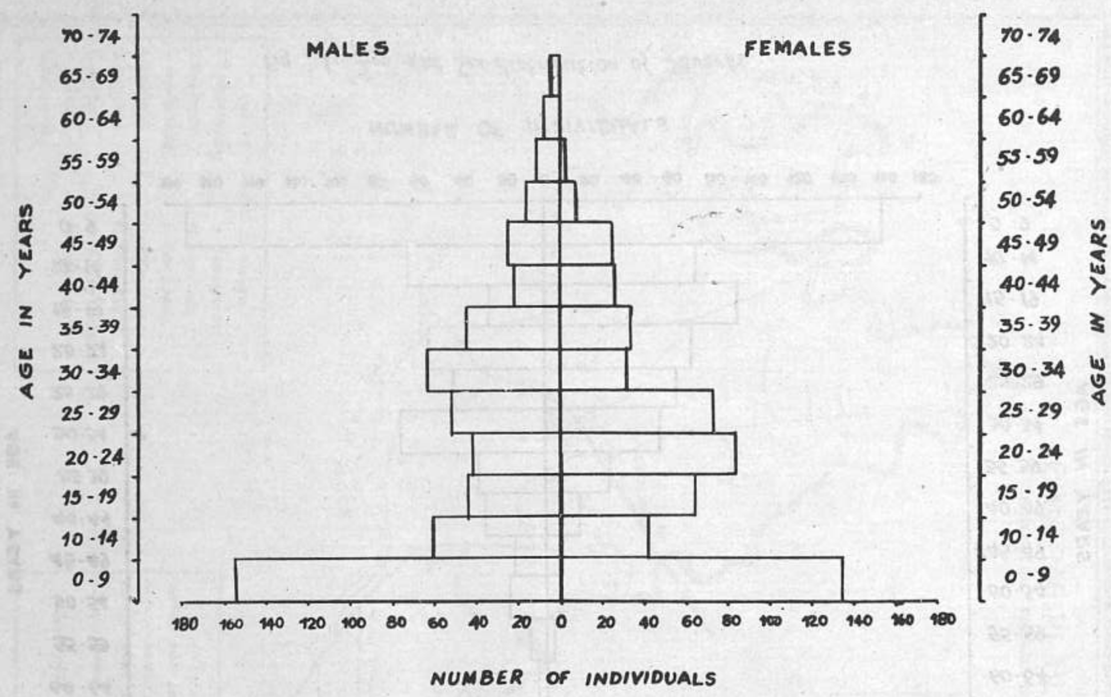


Fig. II: Age and Sex distribution of Jatapus.

POPULATION STRUCTURE OF KONDA KAMMARAS

G. Jaikishan

Introduction

Genetic demography and genetic analysis of population is a developing trend in population genetics. Spuhler (1959) and Sutter (1963) have repeatedly emphasized the need for population genetics to pay sufficient attention to demographic structures of human populations. There is an increasing awareness in India of the importance of population structure and demographic realities for understanding the mechanisms of genetic process as recommended by WHO (1964). Social and demographic structures are the fundamental determinants of the genetic structure of human populations (Cavalli-Sforza, 1967).

Populations are the product of birth, migration, and death rate. The differences in birth, sex ratio, and mortality patterns can be considered to be atleast partially dependent on genetic factors and disease. But the causes for differences in fertility are almost entirely sought in social background so far. Integration of the study of demography and population genetics will provide a sound basis for the analysis and prediction of population trends.

Andhra Pradesh is the fifth largest State in India and it provides a fertile field for population genetical investigations as it supports with 34 major tribes and hundreds of castes and other populations. Further, this state is a fertile field with its high rates of inbreeding in its populations.

The present Konda Kammara population belongs to the Maredumilli Block of East Godavari District, Andhra Pradesh. These people comprise approximately 7% of the total tribal populations in the block and are scattered around 40 villages. The Konda Kammara, whose language is Telugu, belong to the South Indian tribal populations. Their geographical distribution is mostly confined to East Godavari District. The word "Konda Kammara" means "Hill Blacksmith". They mainly live on making agriculture implements to supply to the neighbouring agricultural populations (Jaikishan, 1982).

Materials and Methods

The data for the present paper constitute demographic information pertaining to age composition, sex ratio and marital status, consanguinity and inbreeding, age at menarche, age at marriage, fertility and mortality patterns from a total of 118 Konda Kammara households. Among these households, 39 families have undergone sterilization. So, in order to avoid the effect of sterilization on certain demographic factors, the remaining 79 families were considered. Again out of 79 households, 69 families have been found with their respective family heads and their spouses. The present study deals with 69 households for all purposes. The information regarding these demographic aspects was collected by interview schedule method.

Results and Discussion

The age structure of the Konda Kammara population reveals that (Fig. 1) about 40% of the total population is below 14 years of age, about 55% between 15 and 49 years and about 3% in 50 years and above (Table 1) which designates the population as of the progressive or increasing type according to Sunderberg's classification. The sex ratio shows 1056 males per 1000 females, which is more than that of Andhra Pradesh (1023 Census, 1971), but less than that of India (1072-Census, 1971). With regard to marital status it is observed that 'unmarried' men are more (53.62%) as compared to 'unmarried' women (49.49%) which indicates the early age at marriage of Konda Kammara Women (Table 2).

Andhra Pradesh, with its high incidence of inbreeding provides a rich field for studying the biological effects of consanguinity in populations, which are valuable in a practical way to genetic counselling. In Konda Kammara population, consanguineous marriages are slightly higher (53.62%) than affinal marriages (Table 3). Among the consanguineous marriages, the matri-lateral Cross-Cousin type (27.54%) is predominant. The value of autosomal inbreeding coefficient (F) for the present study comes out to be 0.030 and sex-linked inbreeding coefficient (F_1) is 0.050.

The distribution of menarcheal ages of 69 women interviewed is presented in Table 4. It is observed that the range for menarcheal age varies from 11 to 15 years. The mean age at menarche with its standard error is 13.57 ± 0.12 years. The mean age at marriage for males and females is found to be 20.25 and 14.88 years respectively (Table 5).

The fertility of a woman varies from population to population and also within the members of the population of the same group. Various demographic characteristics such as age at menarche, age at marriage as well as different socio-economic factors may play a significant role in the variability of Konda Kammara women is found to be 3.93 per woman.

In the present sample, it is observed that of 271 live births born to these women of all ages, 49 children are dead. Further categorisation of 49 dead issues (live births) is shown in the Table 6. It has been found that, of 49 deaths, neonatal (38.78%) and infantile (48.98%) deaths occupies a major portion. The mortality before the age of reproduction (Juvenile death), a genetically important measure of mortality, is 12.24% of all live births.

Mortality of children (0.75) is found to be very low among the Konda Kammaras. It is observed (Table 11) that Yerukulas recorded highest mortality (2.04), while the lowest mortality (0.70) rate is seen in Konda Reddis.

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TABLE - 1

Distribution of population by age, sex and marital status

Age group (years)	Total Population	Total		Un-married		Married		Widowed		Divorced and separated	
		M	F	M	F	M	F	M	F	M	F
0-9	88	46	42	46	42	--	--	--	--	--	--
10-14	76	44	32	44	32	--	--	--	--	--	--
15-19	42	16	25	15	23	1	2	--	--	--	--
20-24	37	17	20	6	--	11	20	--	--	--	--
25-29	30	14	16	--	--	14	15	--	1	--	--
30-34	29	5	24	--	--	5	23	--	1	--	--
35-39	43	28	15	--	--	26	14	2	1	--	--
40-44	24	14	10	--	--	14	10	--	--	--	--
45-49	22	11	11	--	--	11	11	--	--	--	--
50-54	7	7	--	--	--	7	--	--	--	--	--
55-59	5	4	1	--	--	4	1	--	--	--	--
60-64	--	1	--	--	--	1	--	--	--	--	--
Total	403	207	196	111	97	94	96	2	3	--	--

TABLE – 2

Marital status

Sex	Unmarried	Married	Widowed	Divorced & Separated	Total
Male	111 (53.62)	94 (45.41)	2 (0.97)	--	207 (100.00)
Female	97 (49.49)	96 (48.98)	3 (1.53)	--	196 (100.00)
Total	208 (57.62)	190 (47.15)	5 (1.24)	--	403 (100.00)

TABLE – 3

Distribution of marriage type

Affinal	Consanguineous						Grand Total
	UN	Mat C.C.	Pat C.C.	2nd Mat C.C.	2nd Pat C.C.	Total	
32 (46.38)	3 (4.35)	19 (27.54)	13 (18.84)	1 (1.45)	1 (1.45)	37 (53.62)	69 (100.00)

(Figures in parenthesis indicate percentages)

$F = 0.030$; $F_1 = 0.050$

TABLE - 4

Distribution of women according to age at Menarche

Age at Monarche (Years)	Number of women	Percentage
11	3	4.35
12	5	7.25
13	20	28.98
14	32	46.38
15	9	13.04
Total	69	100.00

Mean ± S.E. = 13.57±0.12
Standard Deviation ± S.E. = 0.96±0.02
Coefficient of Variation ± S.E. = 7.00±0.60

TABLE - 5

Mean age at Marriage

Age group	Mean age at Marriage (Yrs)	
	Males	Females
25 and below	20.00	15.45
26-35	20.37	15.13
36-55	20.50	14.97
56 and over	20.13	14.00
All ages	20.25	14.88

TABLE - 6

Mortality of Children

Total No. of deaths	Neonatal deaths		Infantile deaths		Juvenile deaths	
	No.	%	No.	%	No.	%
49	19	38.78	24	48.98	6	12.24

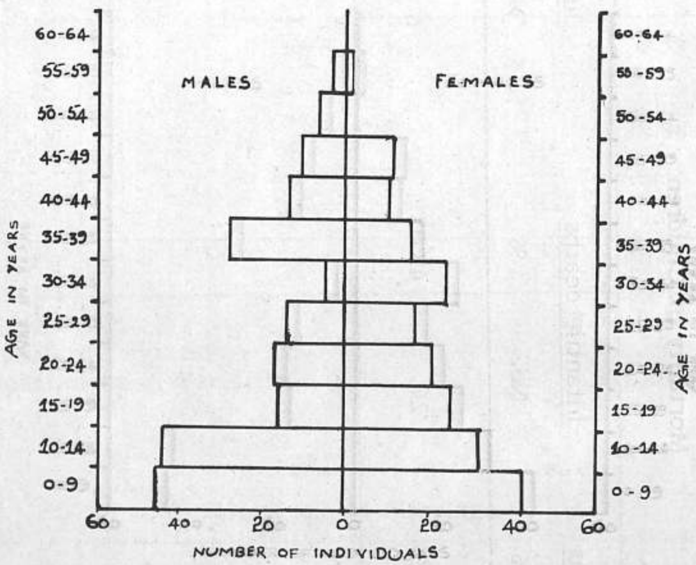

Fig 1. AGE AND SEX DISTRIBUTION OF KONDA KAMMARAS

POPULATION STRUCTURE OF THE SUGALIS

P. Chengal Reddy and
M. Ramachandra Reddy

Introduction

An understanding of population structure is basic to an understanding of the evolutionary processes at work in all human populations. Physical anthropology today has developed fresh interest in demography, because, births, deaths, migration, population size and composition are of fundamental importance in the study of changes in gene frequency (Sphuler, 1973). The implications arising out of this broader view have led to the formulation of a distinct subfield of population genetics, "Demographic genetics."

The present study is undertaken on the Sugalis, a tribal population of Andhra Pradesh with an aim to study their demography in relation to the population structure.

Materials and Methods

The demographic data are collected from all the 300 households of eight Sugali villages of Chinnagottigallu taluk of Chittoor district of Andhra Pradesh.

The data are collected in the interview schedules. The pregnancy history of each woman is ascertained from the elders of the concerned family. In collection of the age data much care is taken.

Results and Discussion

The age, sex and marital composition of the Sugalis is presented in table 1. It is obvious that the present age and sex composition of a population is influenced by the growth trends of the past demographic processes, namely fertility, mortality, migration and marriage patterns. Fertility change has larger impact on the age and sex composition over the others. It is clear from this table that marriage is an universal phenomenon in the Sugalis, since no unmarried female beyond 20 years and no unmarried male beyond 35 years of age is observed. The population below 15 years of age is about 44 per cent with 22 per cent of each sex. In 15-49 age group males represent 25 per cent and females represent 23.5 per cent, whereas in the age group of 50 years and over, very small frequency of males (4.6%) and females (2.3%) is represented. From this one can understand that the growth trend of the Sugalis is very potential. Again it is corroborated from the age distribution, as according to Wertheim's 'forty per cent test' (UN, 1955), there is an indication of birth rate of more than 40 per thousand population. The population pyramid (Fig. 1) of the Sugalis shows the tendency of the distribution of a population becoming narrower from infancy to old age with troughs or constrictions at 15-19 and 35-39 age groups in males and at 10-14 and 20-24 age groups in females. This is probably due to either deliberate mis-statement of age before and after marriage or due to the occurrence of epidemic diseases such as cholera, plague etc., in the past, because of which a good proportion of individuals might have been eliminated. The base of the pyramid is less in the female side only. There is no impact of family planning programme which is in operation for the last 20 years. The general trend of the sex ratio high in the younger ages, equal in the middle ages and less in the older ages is not observed here. The discrepancy in the sex ratio is even more in the older ages. It is always high throughout the age axis. This is due to the differential mortality in the sexes. This differential mortality is due to the fact that males are considered to be valuable and so immediate attention is being paid when males fall ill.

The fertility pattern over a period of one year for the Sugalis and other tribal populations is shown in table 2. In the Sugalis of the present study, the highest fertility rate is observed in the 20-24 age group, whereas in the other studies it is in the 25-29 age group. The fertility trend is similar in all these studies but the fertility rates are low in the Yanadis. The Yanadis low fertility rates may be due to their frequent marital dissolution. The crude birth rate, the general fertility and the total fertility rates are 52.26, 247.49 and 6488.75 respectively and these are comparable to the highest levels observed by Bogue (1969) for any population. So it can be said that the fertility performance of the Sugalis is at its biological maximum.

The cumulative fertility and mortality performance of the Sugalis of the present study and of the other Sugalis studied earlier is shown in table 3. The mean of pregnancies is more or less equal for the Sugalis of the present study and the Sugalis of Kurnool district (Pandurangaswamy 1983), whereas the other study (Subramanyam Naidu 1978) shows lower value. Similar is with respect to the prenatal mortality. In live births it is in the middle whereas in living children it is the lowest. The distribution of different fertility measures for the mothers aged 40 years and over is presented in table 4. There are considerable number of mothers who have more than 6 pregnancies. The completed fertility is high in this population (4.42) and confirm the potential growth trend of the Sugalis.

The absolute and percentage frequencies of different types of marriages and inbreeding coefficients for each type of marriage are presented in table 5 and in figure 2. Out of 353 total marriages, 209 are non-consanguineous type (59.21%), in which one marriage is contracted between the Sugali male and a female of Yerukala tribe. This indicates that a small amount of gene flow from Yerukalas to another tribe of this area and the admixture rate is very low (0.0028) which is negligible. The consanguineous marriages include five types, the most common of which is first cousin type (27.48%) of which patrilateral cross-cousion marriages are more preferred. There are 26 marriages of uncle-niece (7.37%). The marriages beyond first cousin are represented by 5.94 per cent. The mean autosomal inbreeding coefficient is estimated to be 0.028. The proportions of consanguineous and non-consanguineous marriages, consanguinity index and mean autosomal inbreeding coefficient for tribal populations are given in table 6. The gradient of inbreeding coefficient and consanguinity indices are shown in figures 3 and 4.

The percentage frequencies of consanguineous marriages range from 6.5 in the Mathuras to 72 per cent in the Savaras. The mean autosomal inbreeding coefficient ranges from 0.005 in the Mathuras to 0.058 in the Konda Kammaras. The Sugalis' values are in the middle of the range observed for the tribal populations of Andhra Pradesh. There are three other Sugali studies of which two show similarity with the present study and the other one shows lower value. The consanguineous marriages with the number of non-consanguineous marriages. Though it shows the same pattern of percentages, it is more sensitive. The consanguinity index of the Sugalis (0.689) is in the lower of the range 0.069 to 2.571 observed for the tribal populations of Andhra Pradesh. The data on fertility and mortality is analysed to see the consanguinity effect. The results are presented in table 7. In all the measures the values are lower for consanguineous couples and are against the expected results.

The distribution of marital distance in the Sugalis is shown in table 8. About 70 per cent marriages are taken place within the radius of 10 km. The mean marital distance is 8.80 km. Since the population is living in poor economy, it is not possible for them to go to distant places and so their neighbourhood knowledge is very much limited and another possible reason for low marital distance is that they are not uniformly distributed and are found in certain pockets only.

The index of opportunity of selection according to Crow (1958) and Crow's modified method of Johnston and Kensinger (1971) are shown in table 9. The index of selection due to fertility is lower than the index of selection due to child mortality. The prenatal mortality selection index is even low. The percentage of fertility component is lower than the percentage of mortality component. The index of selection intensity in tribal populations ranges from 0.61 in the Sugalis of the present study to 1.19 in the Paradhans (Murthy and Ramesh 1978). The selection is acting with moderate intensity in the Sugalis.

The effective population size and genetic drift are calculated for this population (table 10). The breeding size of the Sugalis is 579 and the mean number of living children for the couples who are in active reproduction is 2.45 with a variance of 2.66. The effective population size (496.59) is lower than the breeding size, because the variance is higher than the mean of living children. The variance due to drift is very low and so it will have no influence in the Sugalis.

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TABLE - 1

Age, sex and marital composition

Age group	Unmarried		Married		WDS*		Total (%)			Sex ratio
	M	F	M	F	M	F	M	F	M+F	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
0-4	117	112	--	--	--	--	8.26	7.91	16.17	1.04
5-9	102	114	--	--	--	--	7.20	8.05	15.25	0.89
10-14	98	81	--	6	--	--	6.92	6.14	13.06	1.13
0-14	317	307	--	6	--	--	22.38	22.10	44.48	1.01
15-19	53	19	7	74	--	--	4.24	6.57	10.81	0.65
20-24	22	--	49	54	--	--	5.01	3.81	8.83	1.31
25-29	4	--	61	63	--	--	4.59	4.45	9.04	1.03
30-34	1	--	45	40	--	1	3.25	2.90	6.14	1.12
35-39	--	--	39	40	--	1	2.75	2.90	5.55	0.95
40-44	--	--	47	21	--	5	3.32	1.84	5.16	1.81
45-49	--	--	27	15	--	--	1.91	1.06	2.97	1.80
15-49	80	19	275	307	--	7	25.07	23.52	48.59	1.08

contd......

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
50-54	--	--	17	6	1	3	1.27	0.64	1.91	2.00
55-59	--	--	20	9	1	1	1.48	0.71	2.19	2.10
60-64	--	--	8	3	1	4	0.64	0.49	1.13	1.29
65-69	--	--	8	3	--	1	0.57	0.28	0.85	2.00
70+	--	--	9	1	--	2	0.64	0.21	0.85	3.00
50+	--	--	62	22	3	11	4.60	2.33	6.93	1.97
Total	397	326	337	335	3	18	52.05	47.95	100	1.09

* W: Widowed; D: Divorced; S: Separated

TABLE - 2

Fertility pattern in some Andhra Populations

Fertility measure	Sugalis (Present study)	Sugalis (Naidu, 1978)	Yanadis (Naidu, (1978)	Chenchus Gangadharam, (1979)
Crude Birth Rate (CBR)	52.26	51.22	46.92	54.33
General Fertility Rate (GFR)	247.49	237.11	166.67	215.90
Age Specific Fertility Rate (ASFR)				
15-19	297.30	230.77	135.14	102.94
20-24	351.85	294.12	200.00	322.58
25-29	317.46	370.37	350.00	394.74
30-34	195.12	250.00	133.33	250.00
35-39	97.56	87.96	71.43	260.00
40-44	38.46	--	--	55.55
Total Fertility Rate (TFR)	6488.75	6161.10	4449.50	6933.35
Mean Total Fertility Rate (MTFR)	6.49	6.16	4.45	6.93

TABLE - 3

Fertility and mortality among the Sugalis of Andhra Pradesh

	Sugalis (353) (Present study)			Sugalis (262) (Panduranga swamy,1983)			Sugalis (205) (S.V.U.Diss. 1978)		
	N	%	Mean	N	%	Mean	N	%	Mean
Pregnancies	1417	100.00	4.01	1146	100.00	4.37	733	100.00	3.58
Prenatal deaths	89	6.28	0.25	33	2.88	0.13	25	3.41	0.12
Live births	1328	93.72	3.76	1113	97.12	4.25	708	96.59	3.45
Postnatal deaths	320	22.58	0.91	244	21.29	0.93	50	6.82	0.24
Living children	1008	71.14	2.86	869	75.83	3.32	658	89.77	3.21

Figures in parentheses represent number of mothers.

TABLE - 4

Cumulative fertility in the mothers aged 40 years and over

Fertility measure	No.of mothers	0	1	2	3	4	5	6	7	8	9	10	11	12	N	Mean+s.e		S.D+s.e	
Pregnancies	73	1	3	2	2	8	9	12	8	16	7	2	1	1	462	6.33	0.29	2.47	0.20
Live births	73	1	2	4	5	5	11	12	11	9	9	2	2	-	444	6.08	0.29	2.46	0.20
Living children	73	1	5	6	14	11	13	11	8	3	1	-	--	-	323	4.42	0.23	2.00	0.17
Survivors (Up to 15 yrs of age)	73	3	6	9	18	16	10	5	4	2	-	-	-	-	266	3.64	0.22	1.84	0.15

TABLE - 5

Consanguinity and inbreeding coefficient

Type of marriage	N	%	Inbreeding Coefficient
Non-consanguineous	209*	59.21	0.00000
Consanguineous	144	40.79	0.02800 (α)
1. Uncle-niece	26	7.37	0.00921
2. First Cross cousin	97	27.48	0.01717
Matrilateral	39	11.05	0.00691
Patrilateral	58	16.43	0.01027
3. First cousin once removed	16	4.53	0.00142
4. Second cousin	4	1.13	0.00018
5. Second cousin once removed	1	0.28	0.00002
Total	353	100	

* include one inter-tribe marriage.

TABLE - 6

Consanguinity, Inbreeding Coefficient and Consanguinity Indices in Tribal Population of Andhra Pradesh

Population	Total marriages	Consanguineous		Non-consanguineous		α	CNI	Source
		N	%	N	%			
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Sugalis I	353	144	40.79	209	59.21	0.0280	0.6890	Present study
Sugalis II	107	61	57.01	46	42.99	0.0275	1.3261	Naidu, 1978
Sugalis III	205	71	34.63	134	65.37	0.0249	0.5299	Pandurangaswamy, 1983
Sugalis IV	262	32	12.21	230	87.79	0.0095	0.1391	Purushotham, 1978
Yanadis I	101	54	53.47	47	46.53	0.0415	1.1489	Naidu, 1978
Yanadis II	422	119	28.20	303	71.80	0.0234	0.3927	Prasad, 1977
Yanadis, III	328	100	30.48	228	69.52	0.0171	0.4386	Srinivasalu, 1980
Yanadis IV	100	23	23.00	77	77.00	0.0169	0.2987	Srinivasalu, 1980
Chenchus I	249	124	49.74	125	50.26	0.0387	0.9920	Gangadharam, 1979
Chenchus II	206	75	36.40	131	63.60	0.0187	0.5725	Murthy, 1979
Konda Kammaras	150	98	65.56	52	34.44	0.0580	1.8846	Veerraju, 1978
Koya Doras I	154	79	51.30	75	48.70	0.0470	1.0533	Veerraju, 1973
Koya Doras II	140	99	70.60	41	29.40	0.0400	2.4146	Veerraju, 1978

Contd...

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Bagathas	123	77	62.70	46	37.30	0.0430	1.6739	Veerraju, 1978
Konda Reddis I	152	94	61.84	58	38.16	0.0400	1.6207	Veerraju, 1978
Konda Reddis II	137	71	51.80	66	48.20	0.0390	1.0758	Veerraju, 1973
Gadabas	128	77	60.17	51	39.83	0.0390	1.5098	Veerraju, 1978
Valmikis I	119	62	52.11	57	47.89	0.0360	1.0877	Veerraju, 1978
Paradhans I	114	61	53.50	53	46.50	0.0330	1.1509	Pingle, 1983
Paradhans II	170	51	30.00	119	70.00	0.0120	0.4286	Murthy, 1979
Kolams I	283	129	45.60	154	54.40	0.0290	0.8377	Pingle, 1983
Kolams II	1282	483	37.70	799	62.30	0.0239	0.6045	Murthy, 1979
Kolams III	680	136	20.00	544	80.00	0.0150	0.2500	Chakravarti, 1968
Yerukalas	492	210	42.68	282	57.32	0.0285	0.7447	Narahari, 1982
Rajgonds I	397	137	34.50	260	65.50	0.0220	0.5269	Pingle, 1983
Rajgonds II	337	114	33.79	223	66.21	0.0173	0.5112	Murthy, 1979
Andhs	99	22	22.20	77	77.80	0.0140	0.2857	Pingle, 1983
Mathuras	93	6	6.50	87	93.50	0.0050	0.0693	Pingle, 1983
Chenchus III	213	70	26.89	143	73.11	0.0170	0.4895	Sirajuddin, 1984
Yanadis V	400	122	30.50	278	69.50	--	0.4388	Janardhana Rao, 1977
Valmikis II	119	82	69.17	37	39.83	--	2.2162	Veerraju, 1978
Savaras	100	72	72.00	28	28.00	--	2.5714	

α = Coefficient of inbreeding; CNI = Consanguinity Index

TABLE - 7

Fertility and mortality in consanguineous and non-consanguineous couples

Measure	Consanguineous (144)						Non-consanguineous (209)						t-Value (d.f=351)
	Mean±s.e.		S.D.±s.e.		C.V.±s.e.		Mean±s.e.		S.D.±s.e.		C.V.±s.e.		
Pregnancies	3.85	0.21	2.55	0.15	66.23	3.90	4.12	0.19	2.71	0.13	65.78	3.22	0.9534
Prenatal deaths	0.22	0.04	0.53	0.03	240.91	14.20	0.27	0.05	0.69	0.03	255.56	12.50	0.7809
Live births	3.64	0.22	2.59	0.15	71.15	4.19	3.85	0.19	2.71	0.13	70.39	3.44	0.7224
Infant deaths	0.67	0.09	1.03	0.06	153.73	9.06	0.62	0.08	1.17	0.06	188.71	9.23	0.4152
Child deaths	0.19	0.05	0.56	0.03	294.74	17.37	0.31	0.05	0.67	0.03	216.13	10.57	1.6971
Living children	2.82	0.16	1.88	0.11	66.67	3.93	2.86	0.13	1.90	0.09	66.43	3.25	0.1940

TABLE - 8

Distribution of marital distance

Kms	Consanguineous		Non-consanguineous		Total	
	N	%	N	%	N	%
0-4	72	50.00	109	52.15	181	51.27
5-9	35	24.31	32	15.31	67	18.98
10-14	14	9.72	19	9.09	33	9.35
15-19	9	6.25	21	10.05	30	8.50
20-24	7	4.86	8	3.83	15	4.25
25-29	1	0.69	1	0.48	2	0.57
30-34	2	1.39	3	1.44	5	1.42
35-39	0	0.00	0	0.00	0	0.00
40-44	1	0.69	0	0.00	1	0.28
45-49	1	0.69	0	0.00	1	0.28
50-54	2	1.39	10	4.78	12	3.40
55-59			0	0.00	0	0.00
60-64			1	0.48	1	0.28
65-69			0	0.00	0	0.00
70-74			0	0.00	0	0.00
75-79			0	0.00	0	0.00
80-84			5	2.39	5	1.42
Total	144	99.99	209	100	353	100
Mean±s.e.	7.19±0.82		9.91±1.14		8.80±0.75	
S.D.±s.e.	9.79±0.58		16.47±0.81		14.18±0.53	

TABLE – 9

Index of opportunity of selection

Number of mothers aged 40 years and over	:	73
Number of pregnancies	:	462
Number of live births (N)	:	444
Mean of live births ($\overline{X}$)	:	6.08
Variance of live births (V_f)	:	5.97
Number of survivors to reproductive age	:	323
Number of embryonic deaths	:	18
Number of premature deaths	:	121
Proportion of survivors to reproductive age (P_s)	:	0.7275
Proportion of premature deaths (P_d)	:	0.2725
Proportion of embryonic deaths (P_{ed})	:	0.0390
Proportion of survivors to birth (P_b)	:	0.9610
Index of selection due to prenatal mortality (I_{me})	:	0.0406
Index of selection due to child mortality (I_{mc})	:	0.3746
Index of selection due to fertility (I_f)	:	0.1615
I_f/P_s	:	0.2220
I_f/P_bP_s	·	0.2310
I_{mc}/P_b	:	0.3898

	I	% fertility component	% mortality component
Crow's method	0.6056	36.66	63.34
Johnson & Kensingar method	0.6614	34.93	65.07

TABLE - 10

Effective population size and genetic drift

Breeding Size (N)	Mean of living children	Variance	N_e	Variance due to drift ($\sigma^2_{d q}$)	$\sigma_{d q}$
579	2.4464	2.6638	496.59	0.00025	0.0159

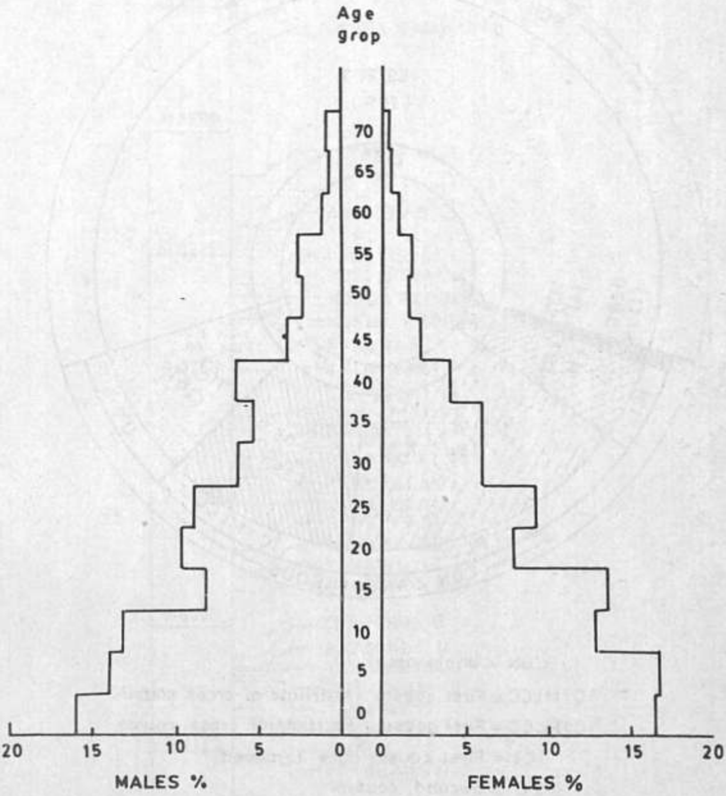
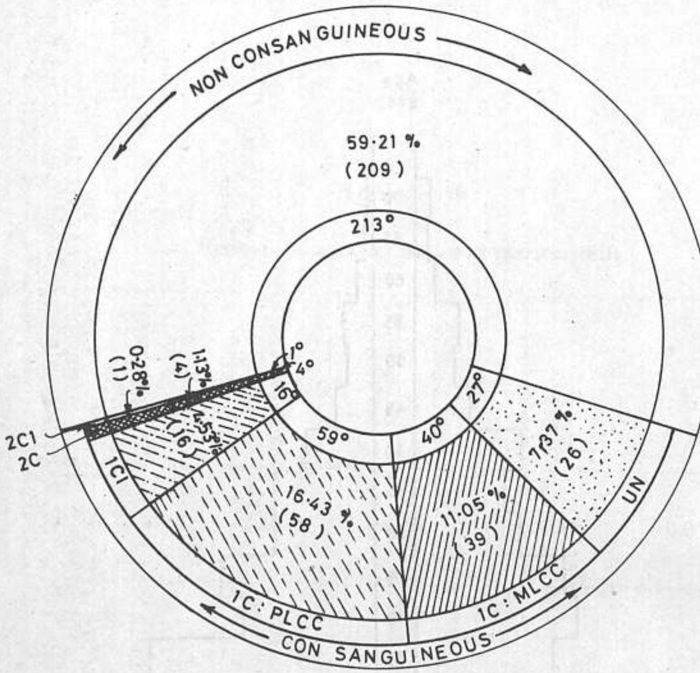


FIG.1 Population pyramid of the Sugalis



UN = Uncle-nice

1C : MLCC = First cousin : Matrilateral cross cousin

1C : PLCC = First cousin : Patrilateral cross cousin

1C I = First cousin once removed

2 C = Second cousin

2C I = Second cousin once removed

FIG.2 Diagram showing proportions of different types of marriages

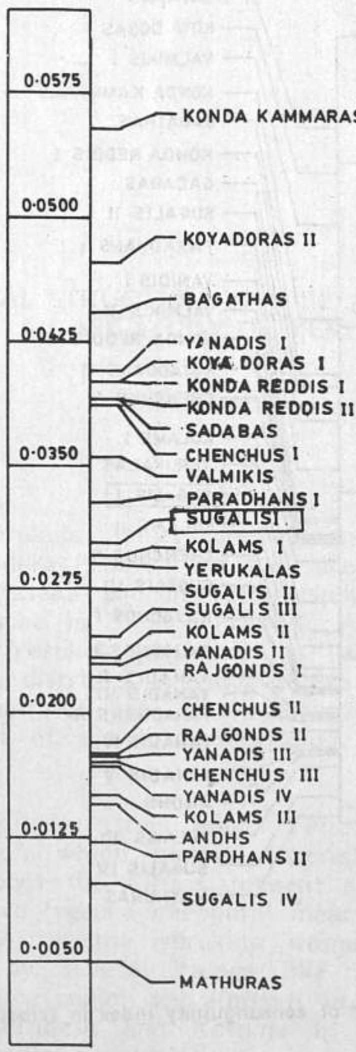


FIG · 3 Gradient of inbreeding coefficient in tribal populations

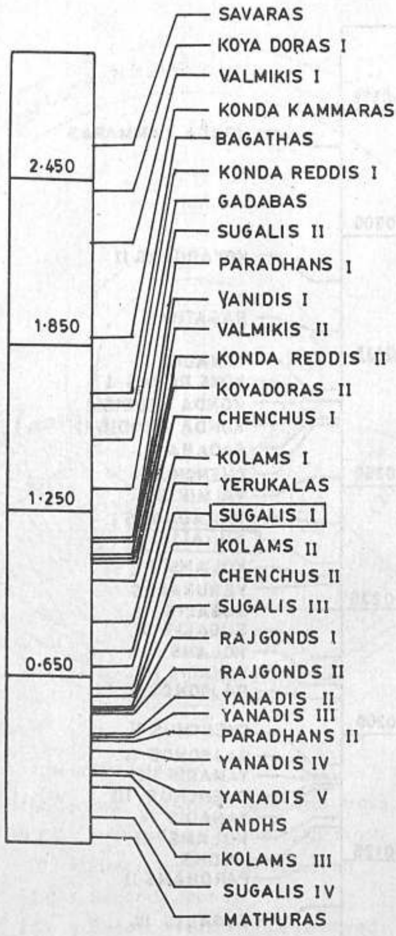


FIG. 4 Gradient of consanguinity index in tribal populations.

SOCIAL STRUCTURE AND BELIEF SYSTEMS: A CASE STUDY OF YERUKULAS

Jakka Parthasarathy

Introduction

The Yerukuḷa tribe, predominantly live in the plains of Andhra Pradesh but they are also found sparsely in Karnataka and in Tamil Nadu states. It is a Scheduled Tribe in Andhra Pradesh. According to 1971 Census, the Yerukula population is 1,62,560 and spread over eleven districts in Andhra Pradesh. They form 0.31 per cent of the total general population and 9.8 per cent of the total scheduled tribal population of the state.

Etymologically the word *Yerukula*, is derived from 'yeruka', which means 'foresight' or disclosing the facts about the future, present and past of one's life. The word 'yeruka chepputa' means fortune telling. This is done by the yerukula women. The yerukula are known by several names like *Koracha*, *Korava* in Rayalaseema region and *Kaikadi* in Telangana region of Andhra Pradesh and *Korama* in Karnataka. They were a nomadic population who are gradually settling down now. They were classified as a criminal tribes during 1871-1952. Although the criminal Act was 'repealed in 1952 as per the strong the stigma on yerukula as ex-criminal tribe is still continuing. They speak a dialect called 'yerkali basha', which according to a few linguists, belongs to one of the Dravidian family of languages i.e., Tamil. They have multifarious economic pursuits. Their primary occupation is collecting the minor produce from their immediate ecological setting and selling it in the nearby villages which is still practised. Besides, they also make mats, baskets, ropes, twines, slings etc.,

The yerukula society is generally compact. The cohesion and solidarity among its people are chiefly maintained by the unwritten law which is systematic and integrated. The dominant feature of the yerukula political organisation is its *Kula* Panchayat consisting of the elders of the yerukula settlement and headed by 'Berumonusha'. The *Kula* panchayat adjudicates on all disputes within the yerukula settlement. At times, it subjects the suspected culprits to various sorts of ordeals like dipping fingers in boiling oil and lifting a red hot crowbar, in search of truth. They believe that an innocent person will not be harmed by these acts whereas the guilty would get hurt and thus exposed. The kula panchayat punishes the guilty by fines and may even ex-communicate the guilty (Parthasarathy:1979).

Yerukula is a patrilineal and patrilocal society. Family is the smallest basic kin unit in the society. The elderly male member forms the locus of authority in the family. The yerukula religion can be viewed along a continuum which has Hinduism at one end and tribal ritual practice at the other.

The Yerukula and their Endogamous Groups

At its most basic level the yerukula population with a reasoning and with a inquisitive nature developed a sort of realistic belief systems which lead them towards different social groups by recognizing related ties and habits within such groups. The interaction within these groups are patterned to form a factual social structure. Thus, the yerukula population are divided into three large social groups which are endogamous and are continuing their existence with the conceptions of a general social order. These social groups have the characteristic of internal organization; that is, their members relate to one another according to particular pattern of status and role. They possess self-recognition of their common group membership. The type of groups that compose a yerukula society are important because they heavily influence its character. These groups among the yerukula are:

1. Bidari yerukula
2. Dabba yerukula and
3. Kuṇchi yerukula.

Bidari Yerukula

Bidari means a wandering merchant. Bidari yerukula's traditional occupation is trading. They engaged in trade, carrying salt, tamarind, curry leaf and pulses. They moved into the neighbouring states like Tamil Nadu and Karnataka in south and Maharashtra in north. In olden days these Bidari yerukula moved from place to place in sale of their commodities which were carried by pack animals like asses and bullocks. These pack animals owned by them in large numbers were also engaged as carriers of other goods. While mentioning about the occupation of this yerukula, Ramesan (1961) wrote, "before the advent of British in India, these tribes were also used by the Transport Department of the then governments, to supply cattle to the regiments in the frequent disturbances that occurred in the country ...... The introduction of the railways proved a curse to them, since their traditional job, transport, was taken away by the railways, and hence they had to sell away their animals, and reduce themselves to object poverty." Now the Bidari Yerukulas also engage themselves in other traditional occupations such as business, making basketary of date palm, ropes and twines from forest fibers, slings and ropes for drawing water and tethering animals. In certain places a few of them are musicians also. The Bidari Yerukula who settled in plain villages and have taken to agriculture are also referred to by the other caste people as 'Uri yerukula' (village yerukula). The Uri Yerukula think that they are culturally superior to Bidari Yerukula, who still live in remote areas with traditional wandering trade.

Dabba Yerukula

Dabba means bamboo stick. They are called Dabba Yerukula, because this group prepares baskets, tattis and cradles from bamboo sticks. They are mostly nomadic. But now-a-days some of them have settled in certain towns. They possess self-recognition of their common group and their behaviour is completely governed by their social structure. They built their structure by believing that the bamboo stick would never allow them to mix culturally with the other social groups like Bidari yerukula. Their mode of economy, in some places, are still on barter system.

Kunchi Yerukula

Kunchi means brush. Their main occupation is pig rearing and preparation of *Kunchelu* (long and big brushes used by local weavers for preparing the warp) and selling them. This group is otherwise, known as *Gadde yerukula*, as their women are engaged in 'gadde' i.e., fortune-telling. Their women generally go around the streets, calling out 'yeruko amma yeruku ...." i.e., prophecies-mother-prophecies. This group of yerukula also prepare baskets and toys out of the palmyrah leaves. A few of them are also beggars. Though this group is also nomadic in nature, some of them are found to have settled permanently in some places. These Kunchi yerukula are also called by other caste people as *Jakkala* yerukula, *Pamula* yerukula and *Kothula* yerukula, because of their different ways of livelihood. The women of the 'Jakkala yerukula' are proficient in tattooing and they move from place to place to earn their livelihood. Males rear pigs and sell pigs and pig-manure. They are also called as *'Pariki muggula vandlu'*. "The *pamula* yerukula" also nomadic and they catch snakes. These yerukulas are in the habit of performing magic locally known as 'modi'. They are also referred as *'Peddinti golla vandlu'*. Yerukula of this group, who engaged in monkey-shows are referred and called as *"Kothula yerukula"*.

Though the Bidari yerukula and Dabba yerukula consider the Kunchi yerukula as culturally an inferior group, but the Kunchi yerukula people relate to one another within their group through a system of recognized ties and habits, their interaction is patterned to form a self-recognized social group. They believe that the palmyrah leaf can denote them and differ them from other social groups. Thus, among the yerukula population, these social groups or societies differ markedly in the ways they organize their social life. Now I describe briefly a particular social group of the yerukula i.e., the Bidari yerukula, located in two different ecological settings and their demographic and social structure.

Demography of Bidari Yerukula

The present study on the Bidari yerukula is based on the data collected from two villages namely Epilapalli and Ananthasagaram of Anantapur district in Andhra Pradesh in the year 1982.

Demographic data shows that males and females of both the villages show higher frequencies in younger age-groups and the frequency gradually falls down as the age advances. This indicates a characteristic feature of a population. The sex ratio is 95 and 91 males per 100 females among Epilapalli and Ananthasagaram yerukulas, respectively. When the yerukula population of both villages are classified into broad age groups by age and sex i.e., pre-reproduction, reproduction and post-reproduction age groups, the Epilapalli yerukula show marginal variation in between males and females in all the three categories (Table 2). While there is significant difference in the frequencies of males and females of Ananthasagaram yerukula in prereproductive and reproductive age groups. The pooled yerukula sample show fluctuatious in frequencies in both the sexes in different age groups. The sex-wise total population of the yerukula of both villages are given in table 1. The sex ratio in each age group of yerukulas of both villages have been presented in table 2.

The child:women ratio is the best relative measure to compare the fertility performance of the population. The fertility ratio is the total number of children under 5 years of age per 100 women in reproductive age group i.e., 15-49 years. As shown in the table 3, the fertility ratio is 81.66 in Epilapalli and 87.88 in Ananthasagaram yerukulas. When compared with the other Indian populations, the yerukulas of both the villages show the highest values than the Kota (56.26); the Pahira (72.40), the Carnicobarese (52.50), the Yanadi sub-populations (52.00 in Insular yanadi and plain yanadis range from 34.48 to 44.22) and the Chenchus (71.83).

Social Organisation

As stated earlier, the society of the Bidari yerukula is generally compact. The cohesion and solidarity among its people are chiefly maintained by the unwritten social norms which are systematic and integrated. Now let me analyse the rules and restrictions of one of the social institutions i.e., marriage with reference to their clan organisation. Marriage is an institutionalized mating arrangement between man and woman and thereby works as a cultural precondition of universal family organization of human beings and their development in certain given order. According to yerukula belief system, life is meaningless without marriage and it is parents' moral duty to arrange marriage for their sons and daughters within their social boundary by following gotra (clan) and intiperu (family name).

The clan can be defined as an exogamous division of a group, the members of which are held to be related to one another by some common ties, derived by culturally given belief in descent traced to a mythical ancestor who may be human, human like, animal, plant or even inanimate. Thus the clan organization is an important regulator of the marital ties within the social group. Here it is essential to note about the Bidari yerukula gotra (clan) and intiperu (family name) to know their notion of social structure and belief systems.

Gotra (clan)

The Bidari yerukula are divided into three exogamous divisions, as 'gotramulu' (plural for gotra) which are unilateral groups of relatives, multilocal in settlement, the members of which are determined by unilateral descent. Table 4 shows the exogamous divisions or clans of the yerukula.

The yerukula established a kind of close relationship between them and the religion. Though the yerukula are partly Hinduized, but under the thin layer of tribal religious systems, they follow Hinduization fully which is based on and rooted in Sanskritization. Their present Hindu religion may be irregular and occasional but instrumental and purposive. They have full faith and belief on Lord Venkateswara -- seven hill god of Tirupati. Through this strong belief, the yerukula clans, as shown in the Table 4 have developed in years and stand still as a structural regulators. The three exogamous divisions clearly show that the yerukula obtained their gotra names from the particular religious services offered to their beloved god. It is said and believed that the people who belong to *Kavadi* are so called because they carry their offerings in *Kavadi* to Lord Venkateswara to Tirupati, a town in Andhra Pradesh. *Kavadi* is a carrying device in which at each ends of a pole, a basket is suspended. According to yerukula informants people who belong to *Satpadi* clan are so called because they adorn their God with flowers and jewels in Tamil style called *Satpadi*, which is equivalent to *Samarpane* in Sanskrit language. The people who belong to *Mendragutti* or *Menapadi* clan sing songs before God, stitch shoes to the idol and drag the temple cart at Tirupati on specific ceremonial occasions. According to the belief, these *Mendragutti* yerukula are in practice of doing magic by using soil which, the local Telugu people call them as '*Nelabotula vandlu*'. As per the above services, there are some cultural differences between the clans. The first two clan members of yerukulas treat third clan members i.e., *Mendragutti* clan as inferiors, because of their practice of 'soil magic'.

Intiperu (Family name)

The family name is known as *intiperu* or literally the house-name. The *intiperu* is a characteristic feature of the Bidari yerukula family. When the two yerukula of the different villages meet they enquire what his *intiperu* is. The *intiperu* acts as an exogamous unit. The *intiperu* is attached as a prefix to one's personal name. Since the yerukula society is patrilineal, the *intiperu* of a boy remains the same throughout his life, but a girl changes her family name when she marries and it becomes that of her husband's family name. The family names are usually vary from those of plants and animals to those of inanimate things and artifacts. Therefore, it is better to categorize the *intiperu* of yerukula as under:

1. Named after some distinguished ancestors.

2. Named after the acts of the ancestors.

3. Named after the place where the family once lived before emigrating to their present abode,

4. Named after the objects with which the ancestors have been in close association like, animal, plant and plant products and artifacts and other such things.

Those who have the same *intiperu* also constitute the pollution group and hence they are a matronymic grouping of agnates. In both the villages though the yerukula have different pattern of economy and political organization but they both continue their identity with similar clan and *intiperu* organization. In table 5 the details of *Gotra* and *intiperlu* are shown.

Summary

In this study an attempt has been made to delineate the belief system of the yerukula with reference to their social groups and social structure. The data, on the whole, lend support to the assumption that the humans cannot exist without order, meaning and understanding, which are provided for them by the culturally given belief system. Thus the invisible frame work is culture. In any human group, every person is considered as normal, lives within a culture and guides his life according to it. Culture influences people so profoundly, constantly and pervasively that we usually do not realize it is there. Culture is something that every person takes part in. As Clifford Greertz said, man within his culture seeks conceptions of a general order of existence, which seems uniquely realistic.

The yerukula is one of the largest tribes of Andhra Pradesh. They believe that they were the original inhabitants of the state, Andhra Pradesh. They were a nomadic population and like many other nomadic groups they are also gradually settling down. All the social groups of the yerukula have their distinct common dialect *'yerukula basha'* which is reported to belong to one of the Dravidian family of languages i.e., Tamil. They have multifarious economic pursuits. The British government categorized the yerukula as a criminal tribe, because they were said to be earning their livelihood by steeling, robbery and looting the villages. In due course of time, the government of India, with the initiation of the then Madras Govt. repealed the criminal act and the legal stigma of 'criminal tribe' was removed, but still the yerukula are referred as ex-criminal tribe.

At its most basic level, the yerukula population with a reasoning nature developed a sort of realistic belief system which lead them towards different social groups by recognizing related ties, and habits within such groups. The interaction within these groups are patterned to form factual social structure. Thus, the yerukula population are divided into three large social groups which are endogamous and are continuing their existence with the conceptions of a general social order. They possess self-recognition of their common group membership. Each social group of the yerukula distinguishes from other with different types of sets and patterns. The culturally given beliefs around date palm, bamboo stick and palmyrah leaf led them to retain their self identity. Even a change in their traditional occupation never made them to loose their identified social structure with belief systems.

The demography of the Bidari yerukula shows high fertility in both the villages. When compared with the other Indian populations the yerukula show the highest fertility ratio.

The clan and *intiperu* among the yerukula are the significant elements in organizing their social organization. Data shows that their clans and *intiperu* developed through one of the types of belief systems i.e., Religion. The yerukula are in close relationship with the religion. They follow Hinduization which is based on and rooted in sanskritization. Their religion may be irregular and occasional, but instrumental and purposive. It is found that the systematic and integrated unwritten law channelizes the deviant behaviour of the yerukula towards their meaningful belief systems.

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TABLE - 1

Yerukulas population of Epilapalli and Ananthasagaram villages (according to my Census 1981).

Villages	Total No.of households	Population				
		Persons	Male	%	Female	%
Epilapalli	55	291	142	48.80	149	51.20
Ananthasagaram	25	176	84	47.73	92	52.27

TABLE – 2

Age and sex structure of Yerukulas

Village & Population	Sex	Pre-reproduction age group (0–14 years)		Reproduction age group (15–49 years)		Post reporduction age group 50 years and above		Total
		No.	%	No.	%	No.	%	
Epilapalli Yerukulas	Males	68	44.89	63	44.37	11	7.75	142
	Females	70	46.98	69	46.31	10	6.71	149
	Total	138	47.42	132	45.36	21	7.22	291
	Sex ratio	97.14		91.30		110.00		95.30
Ananthasagaram Yerukulas	Males	34	40.48	40	47.62	10	11.90	84
	Females	48	52.17	33	35.87	11	11.96	92
	Total	82	46.59	73	41.48	21	11.93	176
	Sex ratio	70.83		121.21		90.91		91.30
Pooled Yerukulas	Males	102	45.13	103	45.58	21	9.29	226
	Females	118	48.96	102	42.32	21	8.71	241
	Total	220	47.11	205	43.90	42	8.99	467
	Sex ratio	86.44		100.98		100.00		93.78

TABLE - 3

Child : Women ratio in Yerukulas

Villages & Population	Number of children in 0-14 age group	Number of women 15-49 age group	Fertility ratio
Epilapalli Yerukulas	56	69	81.16
Ananthasagaram Yerukulas	29	33	87.88
Pooled Yerukulas	85	102	83.33

TABLE - 4

Clans of the Yerukula

Sl. No.	Name of the clan in yerukali dialect	Equivalent name in Telugu language (according to yerukulas)
1.	Kavadi	Gujjula
2.	Sathpadi	Sake
3.	Mendragutti or Menapadi	Nelabotula

TABLE - 5

Details of the intiperlu under each gotra among the Bidari yerukula. (On the basis of genealogical information)

Sl. No.	Gotra name	The names of intiperlu under the corresponding gotra
1.	Kavadi	1. Kampa 2. Kedri 3. Lokineni 4. Munga 5. Pannars 6. Poojari 7. Rageeri 8. Vallaga.
2.	Sathpadi	1. Etta 2. Gopu 3. Kommeri 4. Koneru 5. Manka 6. Mota 7. Parsenu 8. Pololla 9. Pola 10. Rangula 11. Sampathi.
3.	Mendragutti or Menapadi	1. Devarakonda 2. Gajjela 3. Katari 4. Surusuru 5. Uligitti 6. Vollabayi.

POPULATION STRUCTURE AND GENETIC DEMOGRAPHY IN FOUR YERUKALA GROUPS

S. Narahari

Introduction

Population Structure and Genetic Demography is a developing branch of Physical Anthropology which promotes better understanding of the processes involved in biological variation of a population. Nomadism happened to be a means, in the early part of human evolution when man was in hunting and gathering stage. With the advent of agriculture and developing technology, Human Populations have adopted settled life-ways. Accordingly, variation in the demographic profile of human populations has been noticed i.e., smaller to larger population size. Yet there are some populations, even today, practicing nomadic life to earn their livelihood. Study on such populations certainly provide pertinent information on the gene frequency change among the contemporary populations. Further the importance of sub-populations in demography in the context of culture as well as biology enhances the knowledge to probe deep into some of the unsolved problems of Human Population Genetics (Basu, 1969; Frisbe & Bean, 1979). Unfortunately very few studies exist in India on these lines and particularly from Andhra

Pradesh to the best of author's knowledge.

Hence an endeavour is made in the present paper to present a comprehensive demographic picture of four sub-populations/divisions/groups of a nomadic tribe of Andhra Pradesh viz., Yerukala.

The Yerukalas trace their origin from Mahabharatha and believe that 'Ekalavya' was their ancestor (Thurston, 1909). Their language is called 'Oodra' or 'Yerukala Bhasha', or 'Kurratha', a polyglot of Tamil, Telugu and Canarese. They are non-vegetarians. Basketry and pig-rearing are their traditional occupations while their women-folk are experts in sooth-saying and tattooing. Their present day distribution in the state shows that they inhabit 12 out of 22 districts belonging to Rayalaseema and Coastal regions only (Census, 1971) and number about 1,62,560; they form 0.31% of the total population and 9.8% of total scheduled tribal population of Andhra Pradesh. They are known by different names such as *'Koracha'* in Tamilnadu, *'Korava'* in Karnataka and *'Kaikadi'* in Maharashtra. There are as many as 15 groups among them named after a particular occupation they profess as means of livelihood, of which four are found to be numerically dominant and form the basis for present report. They are *Suvvi Yerukala* (SY), *Badda or Dabba Yerukala* (BY), *Uppu Yerukala* (UY),[1] and *Kunchi* or *Kunchapuri Yerukala* (KY).

The first two groups of Yerukalas are found more in Guntur and Anantapur districts and practice semi-nomadic[2] way of life. Their occupation is Wild-date Basketry and Bamboo Basketry. The UY are salt traders and highly concentrated in Nellore District while the KY are makers of weavers' brushes and found in small number widely distributed in almost all the Districts of Andhra Pradesh. Both these latter groups are true nomads.[3] The KY is considered to be the lowest in social rank among the Yerukalas. Such a distinct localization or geographical setting of these groups has some bearing on the type of occupation they profess, raw material they employ and the like.

The structure and mating pattern of these groups is in congruence with most of the Dravidian Tribal groups of Andhra Pradesh indicating four phratry system and several clans in each population.

Each group of Yerukalas is split up into four common exogamous phratries viz., *Kavadi*, *Satpadi*, *Manapadi* and *Mendragutti*. They are non-totemic in nature but have obscure connections with the various services performed to the God, Lord Venkataramana Swami (Thurston, 1909). Each phratry in each group consists of a number of clans, locally known as *intiperlu* (surnames), that precede the personal names. The mating patterns are governed by phratries which form into two broad mating groups *Pothu* (Male) and *Penti* (Female) (Narahari 1982).

Material and Methods

Demographic information pertaining to age, sex and marital composition, age at menarche, age at marriage, pattern and prevalence of consanguinity, fertility and mortality was collected by direct interview scheduled method from a total of 474 Yerukala families (SY=175; BY=118; UY=99; KY=82) from Guntur, Nellore and Anantapur Districts of Andhra Pradesh. Standard techniques and procedures were adopted during the collection and analysis of the data. Detailed pedigree and history of the families were recorded to the possible extent.

Although getting an accurate and exact age of the individual among the illitrates (eg. tribals) is a major hurdle, the author tried his level best to gather adequate information on this aspect with reference to certain important events like war, flood, famine and other incidents. Some anatomical (dentition etc.) and somatoscopic observations are also made to estimate and judge the ages approximately. Moreover, the error s minimised by categorizing the individuals into different age-groups.

Results and Discussion

Age Structure

Age composition among the four groups (Table 1) reveals that there is a high proportion of child population (34.98%) in lower age-groups (0-14) followed by adults (55.35%) in middle ages (15-44) and the lowest proportion of elders (9.67%) in old age-groups (45+) -- a characteristic of potentially growing population noticed in less developed countries like India (Krishnan, 1971). The estimated average ages of the four groups, though not reveal significant sex and inter-group differences, are relatively lower compared to Indian Populations in general (Census, 1971) and also hunting and gathering tribes elsewhere -- a feature of young population. The constrictions in the age-group of 0-4 suggests a recent trend of either drop in fertility or an increase in infant mortality (Table 1). A high infant mortality could be presumed among the Yerukala groups in view of the absence and ignorance of proper medical facilities, aversion to birth control methods, exposure to varied environmental conditions and diseases during their nomadic way of life.

Sex Composition

The sex ratios are distorted in each and every age-group (Table 1) among the four groups and fail to reveal any definite trend. In general, the Yerukala depicts the feature of masculine population wherein males outnumber the females. This may be due to the fact that females are relatively more susceptible to disease, or being neglected during their ill-health or the nomadic life itself which might have affected the female mortality rates (Samarakkody & Malhotra, 1978). An excess of females over males in 15-44 years age-group tends to indicate the possibility of high contribution to fertility component, a necessary condition of stable and continued vigor of a group (Nag: 1954). The preponderance of males in (old) age-group of 45 years and above reveal not only the greater life-span of males but also their relative biological capacity which is rarely observed in most of the populations excepting the Hutterites (Eaton & Mayor, 1953).

Marital Status

A high proportion of males and females in 'married,' category and a small number of 'widowed', 'divorced' and 'separated' individuals (Table 2) indicate the universality of marriage, possibility of early marriage for girls, easy remarriage for men and marital stability - conducive for high fertility (Nag. 1980).

Multiple Marriages

The Yerukalas value and practice polygyny besides widow remarriages. The KY shows a higher number of males (about 10%) married more than once than SY (7%) and UY (6%) and the lowest of it in BY (2%). Of these, five males in SY are having two wives simultaneously, and one male each from UY and KY living with three wives at the same time (Table 3). In all there is about 6% of males married more than once among the yerukalas thereby making provision for addition of variability in genetic contribution by different parents to the gene pool of next generation leading to important selection effect in specific situations (Neel & Salzano, 1967).

Age at Menarche

The Mean Age at Menarche among the Yerukalas though not revealed any statistically significant difference the BY girls attain puberty relatively at later ages (13.26 ± 0.11) compared to other groups (Table 4).

Age at Marriage

The Age at Marriage (Table 4) ranges from 14 years (KY) to 16 years (BY) showing an average of 14.77 ± 0.10 years for females while it ranges in males from 19 years (KY) to 21 years (BY) with an average of 20.11 ± 0.13 years. It is interesting to note that the BY shows late marriageable age for both males and females compared with other Yerukala groups. It may be due to semi-nomadic way of life, tendency to have a settled life, and relative increase in literacy rates.

Consanquinity and Inbreeding

Yerukalas prefer and practice consanguineous marriages, i.e., mating between two individuals is who have at least one common ancestor. The frequency of consanguineous marriages ranges from 40.48% in BY to 44.44% in KY (Table 4). The highest value of consanguineous marriages observed in KY group may be due to relatively small population size, and true nomadism practiced by them. No significant intra-group difference has been discerned among the four groups of Yerukalas.

The coefficient of inbreeding among the Yerukalas tends to reveal that the autosomal inbreeding coefficient (F_A) ranges from 0.0274 (KY) to 0.0307 (UY) while that of the sex-linked (F_X) from 0.0177 to 0.0279 (UY). It is interesting to note that excepting the BY all the three groups show relatively lower F_X than F_A (Table 4) which in turn depends upon variety of factors like an appreciable reduction in the frequency of matrilateral cross-cousin and uncle-niece marriages or an elevation of patrilateral cross-cousin marriages and an excess of males rather than females along the relationship paths connected to husband or wife in the structure of consanguineous marriages (pedigrees) of Yerukalas. A similar finding is also reported by Marcello et al. (1964) for South Brazilian population and by Ramesh (1979) for the Kolam tribe of Andhra Pradesh (India). However, the intra-group difference is found to be statistically significant for all combinations in F_A but in F_X the exceptions are SY x BY; SY x UY and BY x UY.

Fertility

The fertility rate as measured in terms of mean number of live born children (Table 5), is higher in BY (6.85 ± 0.41) followed by KY (5.67 ± 0.79). Significant intergroup differences have been observed between BY and that of SY and UY.

The average number of surviving offspring per mother in all the four groups of Yerukala is more than 2, suggesting the feature of a numerically expanding population and whatever the differences observed between these groups especially BY with SY and UY, appear to be arising from differential survival rate of the live born children (Table 5).

Mortality

The mean number of total deaths from early embryonic stage upto reproductive age (Table 5) per woman, in general, is 2.04 ± 0.17 but the highest value of it is observed in KY (2.67 ± 0.48) when compared with other groups. A similar tendency is discerned when the reproductive wastage treated separately into Still Births, Abortions/Miscarriages and also in per cent Offspring Mortality (POM). Thus the Yerukalas with an average value of 2.04 ± 0.17 deviate much from most of the Andhra Tribal Groups like Konda-Kammara (0.75), Savara (0.75) and Jatapu (0.99) in mortality rate.

Genetic Implications of Demography

Isolation

One of the powerful mechanisms to cause different gene pools in a population is isolation while the effective breeding size tend to reflect the processess of genetic variation involved in each of the isolates. Four endogamous groups/sub-populations identified in the Yerukala tribe based on social structure clearly points out the mechanics of reproductive isolation. Unfortunately the four groups lack census figures. Yet it could be said (based on the present field work) that Suvvi and Badda Yerukaḷas are larger (about 20,000) than Uppu and Kunchapuri Yerukalas (hardly about 5,000).

Natural Selection

Any differential in fertility or mortality is Natural Selection. It is based on the differences in fitness among the individuals, more specifically genotypes, measured both by their capacity to survive and capacity to leave descendants. Fitness of the individual genetic characters (Genetic Selection) is bereft of methodological complexity and hence only the total opportunity for phenotypic selection, through differential fertility and mortality among the groups of Yerukala is calculated according to Crow's original (1958) and modified method (Johnston & Kensinger, 1971). It is evident that selection operates with high intensity in all the groups except the BY in whom it is moderate (Table 6).

Breeding Size

Breeding Size (N) of the four groups of Yerukalas has been estimated by a careful demographic analysis wherein age-groups are distinguished, mating behaviour is documented and reproductive histories are elicited. It is smaller to that of their actual (sample) population size. It accounts for about 37% in general, but varies from 35% in BY to 42% in UY of their total (sample) population (Table 6). These values, however, are slightly higher than the rough estimate, usually obtained from the census figures of human populations (Freire-Maia, 1974).

Effective Size

Due to a series of factors like differential fertility, progeny distribution, distorted sex ratio and high inbreeding rate (Freire-Maia, 1974), the estimates of breeding size for the Yerukalas may be biased. Therefore, effective size (N_e) has been calculated, correcting the breeding size (N) for the said reductive situations, by applying certain formulae mentioned in Li (1963). The effective size is generally smaller than the breeding size in human populations because the variance of the mean number of gametes per person to the following generation in general is larger than the mean. The N_e of Yerukalas in general form around 26% of the population size slightly lower than the Kotas (Ghosh 1976). Among the four groups, it varies from 23% in KY and SY to 31% in UY, thus reveal considerable reduction (about 12%) from N to N_e (Table 6).

Random Genetic Drift

Because of the absence of migration and marked variation in N_e the opportunity for drift has been calculated among the four groups of Yerukala assuming the allele frequency as 0.5 using the formula

$$dq^2 = \frac{q(1-q)}{2N_e}.$$

The estimates show appreciable variation among the four groups of Yerukalas (Table 10) and being the highest in KY (0.00143). The other populations show 0.0006868 (SY) to 0.0008929 (UY). Indeed, these values are extremely higher than those reported for the Kota (Ghosh 1976), populations of South India, the three sub-populations of Pahira (Basu 1969) and two Dule Bagdi demes (Talukdar 1979) of West Bengal. Hence it could be possible to state that the gene pool of KY followed by UY are more prone to the operation of drift in the absence of other micro-evolutionary forces in view of their small N_e.

In the light of the above discussion it could be stated that the individual large population groups segmented either vertically or horizontally or both ways by 'fission' or 'lack of fusion' model into subpopulations are the best suitable units to understand the operation of micro-evolutionary dynamics instead of large single endogamous population. The Social (Population) Structure coupled with demographic information guides the investigator to identify such small isolates in large populations. India provides an arena for such attempts, if meticulous methodology is evolved, since she bears a conglomeration of tribal and non-tribal folk each in turn differ in their socio-economic, cultural, linguistic, ethnic and ecological backgrounds. Nevertheless, the way of life and type of nomadism can also be not ignored.

The Yerukalas of the present study, at the outset, are presumed to be a single endogamous tribal population. But, in fact, this presumption becomes invalid when examined in relation to their population structure and demography. The tribe consists of four distinct sub-populations who in turn speak common dialect *Codra* or *Yerukala Bhasha*, bear more or less similar cultural characters; yet they are isolated not only by their occupation but also in varied nomadic life ways and reproductivity. This isolation has brought in recognizable changes of the individual group of Yerukala tribe as could be seen from their differential demographic picture that may have profound influence of its genetic structure.

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FOOT NOTES

1. Bidari Yerukalas in some places (Parthasarathi, 1985).

2. Otherwise known for Season Nomadic.

3. According to Bacon (1954) the true nomads are those people who dwell round the year without any permanent abodes and practise no agriculture.

TABLE – 1

Age and sex distribution in four groups of Yerukalas of Andhra Pradesh

Population Sex	Age Group (Yrs.) 0–14	15–44	45+	Total (All ages)	Estimated average age ($\bar{X}$ ± S.E.)
SUVVI (SY)					
Male	131	204	49	384	25.18 ± 0.89
Female	128	246	35	409	23.18 ± 1.14
Total	259	450	84	793	24.02 ± 0.56
Per cent	32.66	56.75	10.59	--	
Sex Ratio	102	83	140	94	
BADDA (BY)					
Male	132	160	33	325	26.72 ± 0.75
Female	105	172	24	301	22.11 ± 0.83
Total	237	332	57	626	22.04 ± 0.59
Per cent	37.86	53.04	9.10	--	
Sex Ratio	126	93	138	108	
UPPU (UY)					
Male	73	124	27	224	24.32 ± 1.10
Female	78	129	27	234	24.07 ± 1.02
Total	151	253	54	458	24.13 ± 0.75
Per cent	32.79	55.24	11.79	--	
Sex Ratio	94	96	110	96	
KUNCHA-PURI (KY)					
Male	72	100	12	184	22.49 ± 1.13
Female	69	112	11	192	20.96 ± 1.01
Total	141	212	23	376	21.71 ± 0.81
Per cent	37.50	56.38	6.12	--	
Sex Ratio	104	89	109	96	
POOLED (PY)					
Male	408	588	121	1117	24.06 ± 0.49
Female	380	659	97	1136	22.63 ± 0.43
Total	788	1247	218	2253	23.11 ± 0.32
Per cent	34.98	55.35	9.67	--	
Sex Ratio	107	89	125	98	

TABLE - 2

Marital status among Yerukala populations

Marital Status	Population									
	SY		BY		UY		KY		PY	
	No.	%	No.	%	No.	%	No.	%	No.	%
MALES										
Unmarried	159	41.41	170	52.31	110	49.11	83	45.11	522	46.73
Married	216	56.25	152	46.77	111	49.55	99	53.80	578	51.75
Widowed	7	1.82	3	0.92	3	1.34	2	1.09	15	1.34
Divorced/Separated	2	0.52	--	--	--	--	--	--	2	0.18
Total	384		325		224		184		1117	
FEMALES										
Unmarried	133	32.52	111	36.88	86	36.75	73	38.02	403	35.48
Married	257	62.84	177	58.80	136	58.12	115	59.90	685	60.30
Widowed	14	3.42	12	3.99	10	4.27	4	2.08	32	2.82
Divorced/Separated	5	1.22	1	0.33	2	0.86	--	--	8	0.70
Total	409		301		234		192		1128	

TABLE – 3

Frequency of multiple marriages among the four groups of Yerukalas

Population	Individual Married								Total	More than once married % all married			Percentage of widowed Remarriages @
	Once		Twice		Three Times		Total						
	M	F	M	F	M	F	M	F		M	F	Total	
SY	144	175	6+ 5*	1	-	-	157	176	333	7.01	0.57	3.60	42.86
BY	109	120	2	-	-	-	111	120	231	1.80	0.00	0.87	33.33
UY	78	95	4	-	1**	-	83	95	178	6.02	0.00	2.81	66.67
KY	56	77	2	-	3+ 1**	-	62	77	139	9.68	0.00	4.32	100.00
PY	387	467	14+	1	3+	-	413	468	881	5.81	0.21	2.84	53.33

* Men having two wives at the same time.

** Men having three wives at the same time.

@ No widow remarriages are noticed in the present study.

This table is based on living married individuals.

TABLE - 4

Some demographic variables in four groups of Yerukalas

Yerukala	Age at Menarche (Yrs.)	Age at Marriage (Yrs.)		Consan-guinity	Inbreeding Coefficient	
		Male	Female		Autosomal (F_A)	Sex-linked (F_X)
	Mean ± S.E.	Mean ± S.E.	Mean ± S.E.	%	Mean ± S.E.	Mean ± S.E.
(1)	(2)	(3)	(4)	(5)	(6)	(7)
Suvvi (SY)	12.85 ± 0.10 (162)	19.47 ± 0.20 (158)	14.13 ± 0.14 (179)	43.96 (182)	0.0289 ± 0.0003	0.0275 ± 0.0002
Badda (BY)	13.26 ± 0.11 (114)	21.37 ± 0.23 (117)	15.96 ± 0.19 (121)	40.28 (126)	0.0263 ± 0.0004	0.0278 ± 0.0003
Uppu (UY)	12.86 ± 0.13 (92)	20.40 ± 0.33 (86)	15.00 ± 0.24 (96)	41.75 (103)	0.0307 ± 0.0004	0.0279 ± 0.0002

contd........

(1)	(2)	(3)	(4)	(5)	(6)	(7)
Kunchapuri (KY)	12.83 ± 0.15 (76)	19.21 ± 0.32 (66)	14.15 ± 0.17 (81)	44.44 (81)	0.0274 ± 0.0004	0.0177 ± 0.0001
Pooled (PY)	12.95 ± 0.06 (444)	20.11 ± 0.13 (427)	14.77 ± 0.10 (477)	42.68 (492)	0.0284 ± 0.0017	0.0262 ± 0.0001

Note: Figures in parenthesis indicate sample size

t-value for intra-group comparison

SY ×	BY =	5.22*	0.98
	UY =	3.42*	1.56
	KY =	3.01*	46.02*
BY ×	UY =	8.16*	0.38
	KY =	1.99*	40.06*
UY ×	KY =	5.77*	35.77*

* Significant at 5% probability level.

TABLE - 5

Reproductive performance and selection potential among the four groups of Yerukala

Yerukala	Number of Mothers *	Fertility		Mortality		Reproductive Wastage,	
		Live Births	Surviving offspring	Total	Percent offspring Mortality	Still Births	Abortions
		Mean ± S.E.	Mean ± S.E.	Mean ± S.E.		Mean ± S.E.	Mean ± S.E.
SY	51	4.63 ± 0.43	3.27 ± 0.34	1.71 ± 0.23	36.86	0.29 ± 0.11	0.04 ± 0.03
BY	33	6.85 ± 0.41	4.64 ± 0.41	2.58 ± 0.39	37.61	0.33 ± 0.12	0.03 ± 0.03
UY	39	4.62 ± 0.52	3.18 ± 0.35	1.79 ± 0.35	36.67	0.23 ± 0.10	0.13 ± 0.06
KY	15	5.67 ± 0.79	4.07 ± 0.63	2.67 ± 0.48	44.94	0.60 ± 0.28	0.47 ± 0.25
PY	138	5.27 ± 0.26	3.66 ± 0.21	2.04 ± 0.17	38.03	0.32 ± 0.07	0.11 ± 0.04

* Completed Families (40 Yrs. and above)

TABLE - 6

Values of selection potential, breeding and effective sizes, and variance due to drift

Population	No. of Mothers	Selection potential(I) (Crows Methods)		Sample size	Breeding Size(N)		Variance* (K^2)	Effective Size (N_e)		Variance due to random drift
		Original	Modified		No.	%		No.	%	
SY	51	1.0394	1.1915	793	291	36.70	4.38	182	22.95	0.0006868
BY	33	0.6510	0.7414	626	217	34.66	3.67	153	24.44	0.0008169
UY	39	1.1642	1.3387	458	191	41.70	3.43	140	30.57	0.0008928
KY	15	0.7965	1.1701	376	136	36.17	4.23	87	23.14	0.0014367
PY	138	0.9415	1.1057	2253	835	37.06	3.79	577	25.61	0.0002166

* Corrected Variance

DEMOGRAPHIC PROFILE OF KOLAMS

A. Ramesh and J.S. Murty

Introduction

The biological evolution of human populations can be better understood only when the forces of evolution are viewed in the context of the structure of concerned populations, through time. The concept of population structure includes all the demographic parameters like population size, density, age-structure, growth of the population, patterns of migration, breeding structure and mating behaviour of individuals, etc. (Salzano, 1975). Since the demographic structure provides the "milieu" within which the agents of genetic change operate, one expects their effects to be reflected, in some form through the demographic parameters (Ward and Weiss, 1976). Therefore, we require a complete knowledge of the demographic processes that had operated during the bulk of species' evolutionary history. Unfortunately, we do not possess sufficient knowledge about the demographic processes of the historical populations from which the present complex human societies are known to have emerged. This problem to a certain extent can be mitigated by making an analogy with the tribal populations, which exists to-date in certain reasonably isolated pockets scattered in all parts of the world (Ward and Weiss, 1976). It is probable that the present complex human cultures must have evolved from some form of simple societies through various "tribal level" organisations. Then, it is more relevant from the point of biological evolution, to know how the demographic profiles of the present day tribal groups differ from the complex societies. Therefore, it is imperative to study the demographic profiles of the tribal populations belonging to various shades of cultural antiquity for understanding and reconstitution of evolutionary sequence of *Homo-sapiens.*

We present the demographic characteristics of the Kolams of Andhra Pradesh based on our field studies conducted during the period from February 1975 to June 1977.

The Kolams, in Andhra Pradesh number around 26,000 individuals (Census 1971) and are confined to Adilabad district in north-western parts of Andhra Pradesh. They are known to be incipient agriculturists practicing a form of shifting cultivation with the help of digging sticks or hoes till the first quarter of the present century. A few of them still continue this type of farming in interior forests. In Adilabad district, they live along with the other tribes like Gonds, Naikpods, Pardhans and Thotis with whom they are known to have historical relations. All these tribal groups belong to pre-dravidian populations.

Kolam is an Urdu word. They call themselves as *Kolavars.* The Gonds call them as poojaris and Telugu speaking people as *Manne varlu* or *Mannepodu* or simply *Manne.* The origin of Kolams is not known but for centuries they are known as the hereditary priests to the Gonds who were once the rulers of a kingdom known as *Gondwana* (Haimendorf, 1945, 1948).

The Kolams are organised into four exogamous clans or phratries, similar to the exogamous units of the Gonds.

The Kolams speak Kolami dialect and is classified as an intermediary group of Dravidian language. According to Haimendorf (1945), the *Kolami* dialect and that of the *Naikpod* dialect seem to have evolved from another dialect spoken by the people who practiced the most primitive form of hoe cultivation.

The present Kolami population had undergone the process of fission when one segment of this tribe left the traditional habitat on the hills and migrated towards the eastern parts of the Adilabad district (Sirpur, eastern parts of Asifabad, Chinnur and Lakshettipet Taluks), closer to the big villages of caste populations. This group of migrants are known as *Telugu Kolams* or *Mannevarlu* or *Manne* (referred hereafter words as Manne Kolams or MK). This sub-population still sustains the surname pattern and some religious and cultural practices in common with the "original" Kolams (referred as Hill Kolams or HK). The HK sub-population speaks their own dialect *Kolami*, while the MK have adopted Telugu, the language of their neighbours, as their own. Both HK and MK sub-populations maintains endogamy, but a few intermarriages have been noted at points of close proximity in the Asifabad Taluk. This was occurring either by way of the HK forgetting the Kolami dialect or by way of the MK learning the Kolami dialect.

The sample and field methods

A total of 1004 households were visited from 93 villages/hamlets spread over five taluks of the Adilabad district, viz., Adilabad, Boath, Utnur, Asifabad and Sipur (Fig. 1). Almost all households in a village are included in the study but non availability of some people resulted in partial coverage in some of the villages studied. The sample represent about 25 per cent of the Kolam population (1971 census). All information was collected by interview method. The respondents were usually males. All the information collected was recorded on a standard research schedule.

Results and Discussion

1. Population Size

The Kolams in Adilabad district number around 26,000 individuals and constitute about 2 per cent of the total district population. They are the second largest group next only to Gonds (69.4%) in the district.

2. Population Growth

During 1951-71 period, the Kolam population has increased at an annual growth rate of 4.4 per cent as against 2.5% for scheduled Tribes in the district and only 1.5% for the general population of the district (Table 1).

3. Distribution of Kolams in Adilabad District

Table 2 presents the distribution of Kolams in the Adilabad district. About 96 per cent of the entire Kolams are distributed within the four taluks of Adilabad district, viz., Adilabad, Utnur, Asifabad and Sirpur, which form the Northern boundaries of the Adilabad district (Fig. 1).

4. Age-Structure

Ascertainment of age among the primitive populations, where no documentary evidences exist coupled with high rate of illiteracy, presents many problems. In Kolams, the ages of women members were estimated on the basis of important landmarks in the reproductive phase of the woman as they were known to occur at some specified age. An uniform age of 14 years was taken as the standard age at menarche after birth. By careful matching of menarche, marriage, number of pregnancies and children and their probable age interval and the onset of menopause, the probable ages of women were determined. For males, the ages were determined on the basis of their physical appearence, of their children's age, of their birth in relation to some familiar events (such as police action during 1948-50) and on the basis of relative age differences among their contemporaries who were born with few years on either side of the respondent's birth. For children, the ages were estimated on the basis of the number of crop rotations that occurred after birth and on the basis of physical appearence of infant or adolescent characteristics. Thus, the ages so estimated are only approximate and should be born in mind while interpreting the data. The data on age structure of the Kolams are shown in Table 3. The important observations are:

(i) About 2 per cent individuals among HK are in excess of MK sub-population in the age class 0-15 years corresponding to the pre-reproductive phase of females.

(ii) Males are slightly in excess of females (about 97 females per 100 males) in the pre-reproductive age group but do not differ significantly.

(iii) There is a sudden fall in the number of males (by about 50%) from the age class of 0-15 years to the age class of 15-30 years, while the corresponding decrease among the females is only 25 per cent. An almost reverse trend is found in the age class of 30-45 years, in which females are less by about 50 per cent over the preceeding class of 15-30 years.

(iv) In the post-reproductive phase (i.e., 45 years age) there are fewer females compared to the males (about 8% females and 15% males).

Since both HK and MK have the same fertility rate (Table 5), the excess individuals in the HK over MK sub-population in the age class 0-15 years could be the result of a higher child mortality in the MK sub-population (Table 7).

The significant excess of females in the reproducing age class of 15-30 years in Kolams may be the result of either higher male mortality or higher female survival during the pre-reproductive period. A higher proportion of prereproductive deaths among males as compared to females in both the HK and MK sub-populations of Kolams suggests the above. It is also possible that an over-estimation of the age of girls, who may have attained menarche much earlier than 14 years (the standard taken in the present study) might have partly resulted in the estimation of an excess females in this age group. Similar interpretation was also made by Neel and Weiss (1975) among the Yanomama tribe of Northern Latin America. This phenomenon of more females than males in the reproductive age groups was also reported in tribes like Kota of Nilgiris and Caingang Indian tribe of Northern Latin America (Arabinda Basu, 1972; Salzano, 1961). Although there is a significant excess of females in the 15-30 years age group, polygyny is not of a correspondingly large magnitude among the Kolams (2.8%). In Xavante, a nomadic Indian tribe of Northern Latin America, about 42% of the males were reported to be polygynous and even there, in one of the three villages an excess of females were observed in the age-class of 15-30 years (Salzano, et al., 1967).

The excess of males in the age group of 45 years or over may be due to the higher mortality among reproducing women, especially in the late reproductive phase. Since in most of the developed societies females have higher longevity, it may be worth persuing the factors responsible for greater longevity of the males in Tribal communities like Kolams. Arabinda Basu (1972) and Anadipal (1976) also observed similarly among the Kota and Terressa populations of India.

5. Polygyny

Of the 1324 ever married Kolam males, 37 (2.8%) were polygynous. Polygynous males are more in HK (3.8%) than in MK (1.9%) sub population. The capacity to pay for attractive bride price, in addition to other factors appears to be important in deciding the competitiveness among males. Xavante and Yanomama tribes of Northern Latin America were reported to be highly polygynous (Salzano, *et al.*, 1967, Neel, 1976).

6. Widow Remarriages

Widow remarriages are permitted among both the sexes, though it is less frequent among females. Of the 1324 ever married males, 4.7 per cent had been married more than once whereas only 1.45 per cent of the females married more than once. Widow remarriages are more common in MK (Males: 5.5%; Females: 1.3%) than in HK (Males 3.9%; Females: 1.6%).

7. Twinning Frequency

In Kolams, the frequency of twins is 4.15 per thousand conceptions. The twinning frequency is more in MK (4.50/1000 conceptions), than in HK (3.76/1000 conceptions) sub-population. The frequency among the Indian populations has been found to range between 10-15 per thousand conceptions (Sarkar and Sarkar, 1967; Goswami and Wagh, 1975). It has been pointed that twinning rate depends on ethnic, socio-economic factors, maternal age and parity. Dizygosity was more influenced than monozygosity (Goswamy and Wagh, 1975; Cavalli-Sforza and Bodmer, 1971).

8. Sterility

Sterility affects the variability of fertility and provides greater scope for the action of natural selection via, fertility differential (Jacquard and Ward, 1976). Among Kolams, about 9 per cent of the women are reported to be sterile and it seems to be greater in HK (9.61%) than MK (8.00%) sub-population (Table 4). The sterility in Kolams is fairly high next only to the Kotas (23%). In contrast, sterility in populations like pahira, Jaintias of Eastern and North-Eastern India and in Xavante and Yanomama of Northern Latin America was reported to be either absent or almost infrequent (Amitabha Basu, 1969; Anee Deka, 1978; Salzano, *et al.*, 1967; Neel and Weiss, 1975).

9. Fertility and Survival

The data on fertility and postnatal mortality are presented in Table 5. There is no significant difference in all the fertility indices, viz., the number of pregnancies per woman, the number of live births per woman between HK and MK sub-populations. The number of conceptions per woman on completed fertility (WCF) is 5.72 and that of live births, 5.65. In case of woman of all ages (WA), the respective values are: 3.82 and 3.78. The mean number of live births per WA estimated at 3.78 among Kolams is fairly higher as compared to Pahira of Eastern India (Northern Pahira: 3.4; Southern-I pahira: 3.2; Southern-II pahira: 3.7; (Amitabha Basu, 1969), Kota of South India (3.1; Arabinda Basu, 1972), Dorla of Central India (3.3; Rakshit, 1972) and also those reported for the Andhra Pradesh State (Rural: 3.0; Urban: 3.3; Pakrasi, 1975). However, some tribes like Khasi of Meghalaya State (4.6; Nag. 1965). Durla of Central India (4.0; Rakshit, 1972), Tharu of Uttra-Pradesh (5.4; Kumar and Maitra, 1975) and caste populations like Jaintias (4.8; Anee Deka, 1978) and punjabi sonars (3.9; Jaswal and Duttachoudhuri, 1978) of Northern-Eastern India show higher mean live births compared to Kolams. Salzano, *et al.*, (1967) reported an average of 3.1 live births per women of all ages in Xavante -- a nomadic Indian tribe of North Latin America. In another Indian tribe Caingang, Salzano (1961) reported a higher value (4.5 live births per woman) than in Kolams.

In the case of WCF, the mean live births per woman among Kolams seems to be fairly higher as compared with many tribal populations of India. However, a few tribes like Pardhan (6.2), Chenchu (6.5), Sugalis (6.8) (Murthy, 1978), Irula of South India (6:5; Basu, 1968) and Pahira of Eastern India (Northern Pahira: 6.4: Southern:I Pahira: 6.4, Southern-II Pahira: 6.1; Amitabha Basu, 1969) do have higher mean live births than Kolams. Salzano *et al* (1967) report moderate to high value for Xavante (5.7) and Caingang (6.6) tribes of Latin America. The mean live born children per WCF among Kolams is higher than many of the tribal, state and national populations reported by Spuhler (1962) excepting Hutterites, in which a very high mean value was recorded (7.8 live births/woman).

Kolams thus could be regarded as a fairly highly fertile population.

10. The Average Number of Surviving Children

Table 6 presents the data on the average number of surviving children and its ratio to the mean live born children. The number of surviving children per WCF is 3.90 and per WA is 2.79. The corresponding values in HK (4.30 and 2.89) are higher than in MK (3.57 and 2.69) sub-population.

In general, in Kolams, about 74 per cent of all live born children survive to the age of first reproduction. In case of MK, the proportion of surviving children is less as compared with the HK sub-population by about 5 per cent. In HK, about 76 per cent live born children survive to the age of first reproduction. In the case of WCF, the proportion of surviving children is 69 per cent. The differences in sub-populations are more apparent (See Table 6).

In Kota of Nilgiri, 44 per cent of the live born children among WCF and 52 per cent among WA survive to the reproductive age. The number of surviving children to the age of 15 years per family among WA is slightly less than two and the population is barely able to maintain at the replacement level (Arabinda Basu, 1972). Gomilla (1975) also reported a similar situation in the Bedik population of Western Senegal, which is characterized by low fertility and high infant mortality.

On the other hand, according to Gomilla (1975), the Canadian French populations were generally characterized with high fertility and low infant mortality. In a large community, in Quebec the number of successful offspring were estimated to be 4.8, constituting about 55 per cent of the live born children (Jacquard and Ward, 1976). A similar situation was also reported by Anne Deka (1978) in caste population -- Jaintias of Meghalaya State in which an average of 5.56 children survive to the reproductive age and constitute about 69 per cent of the total live born. According to Neel and Weiss (1975) and Salzano, et al., (1967) the Yanomama and Xavante tribes of Latin America with moderate to high fertility rate present a picture of expanding population.

Kolams in the present study, with moderately high fertility rate and with moderate mortality, present a picture of expanding population and is more similar to the Yanomama and Xavante tribes of Latin America (Neel and Weiss, 1975, Salzano, *et al.*, 1967) than to the nearer home tribes of Kota and Pahira (Arabinda Basu, 1972; Amitabha Basu, 1969).

11. Mortality

The total mortality rate which includes both pre-natal and post- natal deaths in Kolams is shown in Table 7. In case of WCF, 30 per cent of all conceptions fail to reach the age of first reproduction and in WA, about 26 per cent of all the foetuses die before reaching the age of first reproduction. Irrespective of the age class of the women (WCF & WA), the mortality rate in MK is significantly higher than in HK sub-population.

12. Variance of Fertility and the Index of Variability of Fertility

Table 8 presents the variance and the index of variability of fertility (ratio of variance to the mean) among women of completed fertility. The observed variance of fertility in Kolams is 9.43 and when infertile women are excluded the value is 6.99. Thus, infertility, in Kolams accounts about 26 per cent of the fertility variance. The contribution of infertility to the variance is more in HK (about 31%) than in MK (about 22%) sub-population.

The index of variability of fertility (variance/mean) in Kolams is found to be 1.7 and the two sub-populations do not differ.

It is generally believed that the variance of progeny size is larger than the mean (Fisher, 1929; Cavalli-Sforza and Bodmer, 1971). When results are based on census data or on interview, and conducted in such populations, where fertility differences are correlated with socio-economic and professional factors, a larger ratio of variance to the mean could be expected (Imaizumi, *et al.*, 1970). Although it is difficult, to involve such factors in case of Kolams, it appears that infertility contributes substantially to the variance and renders it greater than the mean. In tribes studied by Neel and Chagnon (1968) and Amitàbha Basu (1969), where the mean and variance have been more or less similar, infertility has been found to be negligible. On the other hand, in Kota (Arabinda Basu, 1972) and Kolams the sterility is found to be quite appreciable (about 23% in Kota and 9% in Kolams).

13. The Index of Total Selection

Natural selection, through fertility and mortality plays an important role in the evolution of populations.

Estimates of the selection intensity in Kolams are presented in Table 9. In Kolams, the amount of selection intensity is fairly high (0.87) with an almost equal contribution of fertility and mortality components. The higher index in MK as compared with HK sub-population is mainly due to larger contribution of mortality differential (53%) and to a small extent due to fertility differential.

Highest indices are found in Kota (2.25; Ghosh, 1972), Chenchu (1.33), Pardhan (1.18) (Murty and Ramesh, 1978) and Pahira (1.13; Amitabha Basu, 1969).

One interesting aspect is that of the relation between the relative contribution of fertility and mortality on one hand and sterility on the other. In populations with high mortality and infertility rates, selection operates mainly through differential fertility. In Kota, more than half the live born die before reaching reproductive age, but fertility differential plays dominant role because 23 per cent of the women are infertile (Arabinda Basu, 1972). In populations with moderate to high mortality rate and sterility either absent or of negligible frequency, selection operates mainly through differential mortality. In Pahira, more than one third of live born die before reaching the reproductive age and selection operates mainly through differential mortality, because sterility reportedly is almost absent (Amitabha Basu, 1979). Such a situation is also reported by Neel and Weiss (1975) and Anee Deka (1978) among Yanomama of Latin America and Jaintias of North Eastern India.

In contrast, Kolams present an intermediate picture to the above two extremes. In Kolams, fertility and mortality are equally involved in the action of natural selection with moderate mortality rate among the pre-reproductive age groups (about 30%) and moderate infertility among the reproducing women (about 9%).

Conclusions

Demographically, the Kolams present a picture of expanding population at a rate more than twice that of the entire district population. Among the four demographic models presented by Gomilla (1975), the Yanomama model in which the population numerically and geographically expands with moderate to high fertility and moderate mortality rate is very much similar to Kolams, who were known to be incipient agriculturists doing a form of shifting cultivation with the help of digging sticks. The Yanomama practice slash and burn agriculture, gathering, hunting and fishing. In Bedik model, the population is barely able to maintain at the replacement level with low fertility and mortality rates. The Bedik population was also known to practice shifting cultivation. Nearer home, the Kota of Nilgiris, demographically seems to be similar to the Bedik population rather than to the Kolams. It remains to be seen whether the numerical expansion observed at current rates will be continued in view of stiff competition from the other populations who are socially and economically far better placed.

The two sub-populations of the Kolams have shown considerable differences with respect to many of the demographic parameters studied. Although the fertility rate is similar, the mortality rate seems to be having a differential role in the evolution of these sub-populations. The level of selection intensity and its mortality component is higher in MK than in HK sub-population. The implication is that demographically the HK who continue to inhabit the hilly forest tracts and have lesser chance to come into contact with the immigrant population, have a higher potential for numerical expansion and demographic evolution as compared with MK sub-population. The higher rates of mortality as observed in MK sub-population might be the result of their exposure to 'new environment' into which they have migrated subsequent to their fission from the parent population, resulting in more severe competition with the relatively advanced populations and possible exposure to new diseases, etc.

It is apparent that the Kolam population has undergone a fission and that the two sub-populations are isolated both linguistically and as a breeding group. As could be seen, this isolation brought considerable changes in their demographic profiles. One could expect these differences in their demographic profile to be reflected in their genetic structure also.

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TABLE - 1

Growth rate of the Kolams, 1951-71

Year	Size	% growth rate (r) per year*
1951	10,886	--
1961	16,459	4.13
1971	26,277	4.68
1951-71	--	4.41

Source: Census 1951, 1961, 1971 - District Directory Adilabad District, Govt. of Andhra Pradesh.

* Growth rate calculated after Barclay (1958)

$e^{rn} = P_2/P_1$ Where : P_2 = Population size at time 2

P_1 = Population size at time 1

r = rate of growth per year

n = number of years between P_1 and P_2

TABLE - 2

Distribution of Kolams in Adilabad district

Taluk	Kolams		Density (No.Km^2)		
	No.	%	Total Population	ST	Kolams
Adilabad	3872	14.8	100	15.1	2.6
Utnur	5087	19.4	50	25.3	2.7
Asifabad	5897	22.5	65	11.3	2.7
Sirpur	10513	40.2	79	10.0	4.7
Chinnur	578	2.2	63	5.5	0.3
Lakshettipet	119	0.5	92	6.0	0.6
Khanapur	--	--	82	7.3	--
Boath	99	0.4	62	14.00	0.2
Nirmal	2	--	117	3.5	--
Mudhole	3	--	118	0.6	--
Total	26277	100.0	80	10.5	1.6

source : Census 1971: District director - Adilabad District, Government of Andhra Pradesh, India.

ST : Scheduled Tribe.

TABLE - 3

Age structure of Kolams

(% of the total sample)

Age in Years	Hill Kolams (HK)		Manne Kolams (MK)		All Kolams	
	Males	Females	Males	Females	Males	Females
0-15	48.15	44.05	42.83	42.07	44.46	43.02
15-30	22.93	33.20	23.72	33.12	23.33	33.16
30-45	16.60	14.96	18.00	16.44	17.35	15.73
45+	14.32	7.79	15.37	8.37	14.86	8.09
n	1326	1310	1366	1366	2962	2696

TABLE - 4

Sterility among women of completed fertility*

Population	No.of Couples	Sterile couples	
		n	%
HK	104	10	9.61
MK	125	10	8.00

* Women of age 45 Years and above

HK Hill Kolams;

MK Manne Kolams.

TABLE – 5

Measures of fertility and pre-reproductive Mortality in Kolams

Indices	Hill Kolams (HK)		Manne Kolams (MK)		All Kolams	
	$\overline{X}$	SE	$\overline{X}$	SE	$\overline{X}$	SE
Fertility indices						
1. No.of pregnancies						
WCF	5.87	0.30	5.60	0.26	5.72	0.20
WA	3.81	0.11	3.83	0.11	3.82	0.08
2. No.of Live births						
WCF	5.81	0.31	5.51	0.27	5.65	0.20
WA	3.78	0.11	3.78	0.10	3.78	0.08
Pre-reproductive mortality						
3. Total mortality						
WCF	1.51	0.15	1.94	0.15	1.75	0.11
WA	0.89	0.07	1.09	0.06	0.99	0.04
Sample size						
WCF	104		125		229	
WA	628		696		1324	

WCF : Women of completed fertility, i.e., women of age 45 years

WA : Women of all ages, ever married

X : Mean; SE: Standard Error.

TABLE - 6

The proportion of surviving offspring to the live born offspring in Kolams

Population	Women of completed fertility (WCF)			Women of all ages (WA)		
	n	$\bar{X}_s$	$\bar{X}_s / \bar{X}_L$	n	$\bar{X}_s$	$\bar{X}_s / \bar{X}_L$
Hill Kolams	104	4.30	0.74	628	2.89	0.76
Manne Kolams	125	3.57	0.65	696	2.69	0.71
All Kolams	229	3.90	0.69	1324	2.79	0.74

$\bar{X}_s$ = Average number of surviving children to the age of first conception

$\bar{X}_L$ = Average number of live born offspring

TABLE - 7

Components of mortality in Kolams

Components	Hill Kolams (610)			Manne Kolams (700)			All Kolams (1310)		
	% of total pregnancies	Sex ratio	X^2_1	% of total pregnancies	Sex ratio	X^2	% of total pregnancies	Sex ratio	X^2_1
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Women of completed fertility									
Foetal deaths (FD)	1.0	--	--	1.0	--	--	1.0	--	--
Neonatal deaths (ND)	8.0	69	1.6	8.0	62	3.6	8.5	65	5.1
Infant deaths (ID)	5.6	79	0.5	8.0	154	3.1	6.8	122	0.9
Juvenile Deaths (JD)	12.1	64	3.4	16.8	55	9.8*	14.6	59	13.0*
FD+ND+ID+JD	26.7	--	--	34.8	--	--	31.0	--	--

Contd....

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Women of all ages	(2394)			(2665)			(5059)		
Foetal deaths (FD)	1.1	--	--	1.8	--	--	1.5	--	--
Neonatal deaths (ND)	6.9	49	19.7*	10.5	83	2.4	8.8	69	14.8*
Infant deaths (ID)	6.7	102	0.1	6.8	90	0.5	6.8	96	0.1
Juvenile deaths (JD)	9.9	95	0.1	11.1	87	1.4	10.6	91	1.3
FD+ND+ID+JD	24.6	--	--	30.1	--	--	27.7	--	--

Sex-ratio : Number of females/100 males

* Significant at 5% level

X^2: Chi-square for deviation from 1:1 sex ratio

Figures in parenthesis refers to total no. of pregnancies.

TABLE - 8

Variance (V_x) of fertility and index of variability of fertility (I) in women of completed fertility

Population	V_x	$I = V_x/\bar{x}$
Hill Kolams	9.52(6.56)	1.6(1.0)
Manne Kolams	9.32(7.26)	1.7(1.2)
All Kolams	9.43(6.99)	1.7(1.1)

Figures given in parenthesis refers to the values of V_x and I when women with zero live births are excluded.

TABLE - 9

Indices of selection intensity among Kolams

Population	N	I	I_m	If/Ps	% of If/Ps to I
Hill Kolams	104	0.723	0.348	0.380	52.2
Manne Kolams	125	1.020	0.548	0.472	46.3
All Kolams	229	0.870	0.443	0.427	49.1

I = Total selection index

Im = Selection index due to mortality differential

If/Ps = Selection index due to fertility differential

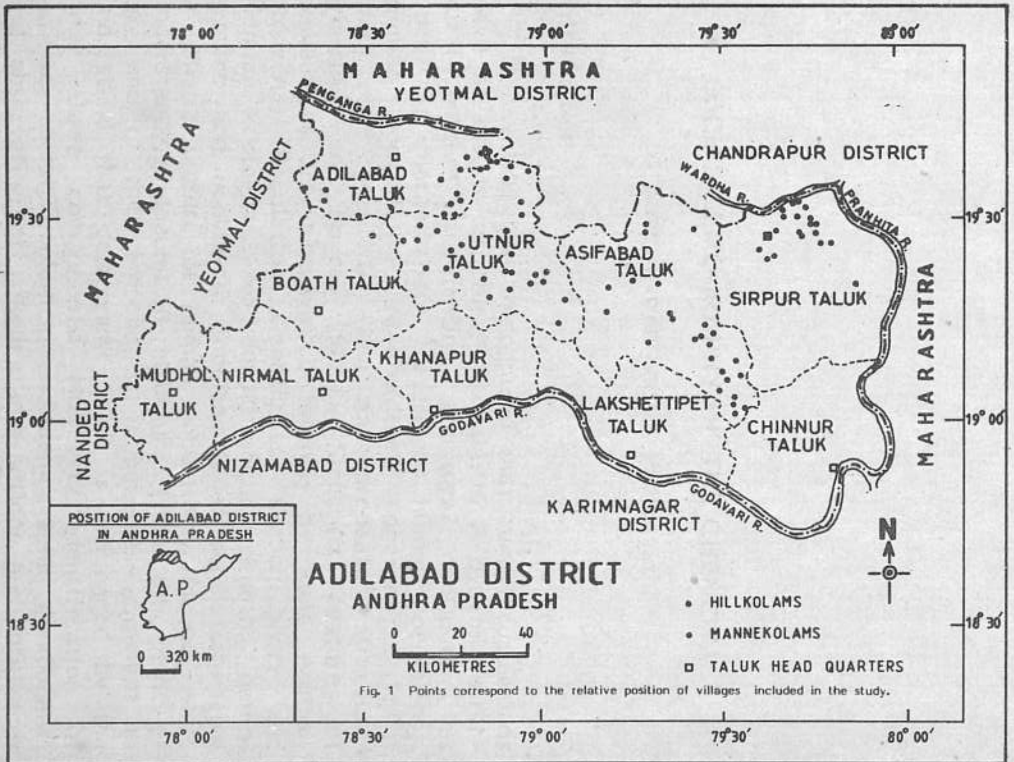

Fig. 1 Points correspond to the relative position of villages included in the study.

SOCIAL DEMOGRAPHY OF THE CHENCHU

V. Gangadharan and D. Padmavathi

Introduction

It has long been recognized that human populations have an inbuilt structural mechanism. A dynamic structural pattern manifesting structural continuity has been the characteristic feature of human populations. Human populations are "ordered coherent systems" and "each population has an unrepeated structure" (Harrison and Boyce, 1972:1). Structural features of populations are conceived differently by Social Anthropologists, Population Geneticists, Demographers and Human Ecologists. No doubt, social, genetic, demographic and ecological components of populations give a holistic picture of human populations. Hence, while understanding population structure from the point of any one of the components, it becomes imminent to understand that component as it is influenced by the other three components. However, identification of genetic, social, ecological and demographic components and observation of complex interactions and influences between these components, and perception of the consequential unified picture of human populations become extremely difficult.

Population and Data

An attempt is made in the present paper to understand population structure of a hunting and gathering tribe viz., Chenchus of Andhra Pradesh, from the social, ecological and demographic points of view. Field work was conducted in 12 Chenchu villages[1] during the years 1982-1984. Chenchus are found throughout Andhra Pradesh, though their major concentration (80% in 32000) is found in the Nallamalai forests and adjoining rural areas of Mahabubnagar, Kurnool, Prakasam and Guntur districts (1981 census).

Nallamalai forest is considered to be the abode of Chenchus. Chenchus belong to proto-Australoid stock with slender bodies, medium stature and coarse wavy hair. Beard and body hair is scanty. Skin colour is generally black or copper brown. The men are scantily dressed, though, of late, they imitate the neighbouring caste people. The women wear sari and choli.

The Chenchu families are generally of neolocal nuclear types. Hunting and gathering continue to be the main stay of their economy. Some people are also engaged in forest based wage labours. Chenchus also earn a livelihood by selling minor forest produce.

Chenchu settlements are scattered throughout the Nallamalai forest. Each settlement owns a catchment territory where the people exploit the forest resources. Each such territory is owned by the village community and enchroachment from people of other village is prohibited. However relatives are always permitted to exploit the resources.

Social Organisation

Chenchus inhabiting the Nallamalai forests fall into a culturally and linguistically (with an indigenous form of Telugu dialect) identifiable endogamous social unit viz. tribe. This endogamous unit comprises a number of non-local (dispersed) exogamous descent groups with moderate emphasis on patrilineality. According to the authors' enumeration, 44 such descent groups[2] are found in the Nallamalai forests. Each descent group is known by a specific name. Though the Chenchu themselves proclaim in a logical fashion that all the members in each descent group are descendants of a single ancestor, such an ancestor is neither traced nor traceable. The descent groups lack totemistic affiliation and an element of corporatedness. Chenchus call these exogamous groups as *Kulam* and use at par with the term *intiperu* which is commonly seen among the caste Hindus of Andhra Pradesh.

The Chenchu prefixes his individual name with the name of his *kulam*. To justifiably designate these exogamous units with the term clan is very difficult. Though the people apparently believe in an unknown common ancestry of all the members of each exogamous groups, no other features of clan such as totemism, corporatedness, localization and a definite hierarchy, or a defined relationship with other exogamous groups are noted.

We should expect under these circumstances, localization of groups of closely related individuals who identify themselves under one *kulam* because such a conglomeration facilitates exploitation of the forest resources and smooth maintenance of the social life. Such closely related groups of individuals are agnates who can trace out the true kinship relations. These groups of closely related agnates, can be termed as lineages. Unlike the bigger unit *kulam* the lineage is not identified with any name. Depending upon the resource availability, even the lineages are found dispersed over small contiguous areas. They are dispersed within a range of 10 miles, though exceptions do occur with much larger disperson. The members of each lineage have to observe certain social obligations concerning 'rites de passage'. Besides, inheritance of property and succession of authority operate within these members. Though family is the most basic and fundamental social group among the Chenchu, it operates through lineage linkages in all day-to-day activities. The emergent social organisation of the Chenchu is illustrated below:

Tribe

Kulam (clan)

Lineage

Family

Distribution and Size of Exogamous Groups

Table 1 presents the distribution of *kulams* in the 12 villages along with sex-wise population figures for each *kulam*. Out of total 44 *kulams* found in the Nallamalai region, 25 *kulams* were present in all the 12 sample villages.

Kudumula kulam is widely distributed (seen in 9 sample villages) followed by *Uttaluri* (observed in 8 villages), *Bhumani*, *Dasari* and *Pulicherla* (in 7 villages) *Arthi*, *Chigurla* and *Nimmala* (in 6 villages) and *Damsam* (in 5 villages). Certain other *kulams* such as *Bangi*, *Raya*, *Nallapothula*, *Thota* and *Topi* are seen each in single villages. Seven *kulams* are numerically predominant. They are *Arthi*, *Bhumani*, *Dasari*, *Gulla*, *Kudumula*, *Pulicherla* and *Uttaluri*. The largest *kulam* is *Kudumula* with a population of 418 distributed over 9 sampled villages. This *kulam* seems to have the largest extension of its members covering all the three districts of Kurnool, Prakasam and Mahabubnagar. *Kudumula* is followed by *Bhumani* (334), *Uttaluri* (192), *Dasari* (178), *Arthi* (141) and *Gulla* (112).

It is very difficult to draw *kulam* boundaries and to decide their population composition. Data suggests the occurrence of concentrated zones, at least in case of five *kulams (Kudumula, Bhumani, Arthi, Uttaluri* and *Gulla)*. Besides, the location of the villages around the resource base, existence of other *kulams* and wide distribution of *kulams* (irrespective of numbers) further suggest a more complex network of overlapping *kulam* zones. We do not get an exclusively isolated picture of *kulam* concentration due to the fact that the *kulam* members of any village are only representation of a part of the whole *kulam* and also that the members of both the village community and that of the *kulam* are in a constant state of flux. It can be speculated that the *kulam* members in the distant past could have stayed closely together inhabiting a particular locality and inter-marrying with its neighbours. However, we have no concrete proof to that effect. Demographic and ecological forces tend to influence in an anti-direction the formation of isolated groups basing on *kulam* affiliations.

Fig. 1 provides schematic representation of *kulam* distribution. The framework of this figure is drawn from Turnbull (1972-297). Turnbull has used this figure to show the market, initiation and marriage horizon of a set of villages located in Ituri forest of the Congo. Similar pattern is conceived here with respect to kulam distribution of the Chenchu tribe. However, overlapping distance of *kulams* of the Chenchu tribe occur much more widely than it is seen in case of Ituri villages. Hypothetically, it is possible to demarcate *kulam* boundaries (shown by dotted lines). Wide distribution of the *kulams* which is a reality in case of Chenchus is shown by an uninterrupted line which symbolizes the Chenchu enclave.

Generally, Chenchu villages are small in population size. However, they are comparatively larger than hunting and gathering populations like the Bushmen and the Australian Aborigines. Among the sample villages, three villages consisted of less than 75 individuals, two villages with less than 125 people, one village with less than 150 individuals, two villages with less than 175 individuals, two villages with less than 250 individuals and one village with less than 300 individuals. Marripalem had largest population size of 371 individuals.

Kulam wise population composition of the villages indicate that despite the occurrence of numerically dominant *kulams*, their contribution to the total size of the village is not all that significant. In four villages (Abbarajukunta, Byrluti, Peecheruvu and Palutla) the contribution of the numerically dominant *kulam* to the respective total village size is less than 27 per cent. In other villages this percentage is as follow, Chinnamanthanala (36%); Nagaluti (32%); Chinthala (48%); Farabbad (53%); and Nakkanti (63%). Except the last three villages, the contribution of the numerically dominant *kulam* to the total population size of the respective villages is below 48 per cent.

Chenchu population is at constant state of flux. People move out and move in not only due to ecological and demographic reasons (sometimes people have to move out if the carrying capacity of the area diminished) but also due to social and cultural reasons (marriage, migrations due to social reasons, economic reasons, to sort out inherent familial problems, deaths, quarrels etc.). It is important to show whether the *kulam* wise population compositions described above is a general feature under normal circumstances, or not. Variation in population structure of the village community definitely occur due to reasons mentioned above. Village communities shrink and swell over time. This might also cause variation in the population composition of various *kulams* in the village community. In the absence of time series data it is difficult to assess the vulnerability and resilence of village communities or *kulams* when they are subjected to the normal demographic and ecological influences.

Table 2 presents sex ratios for 17 *kulams* out of 25 *kulams* recorded in the sampled villages. For all the 25 *kulams* that is for the total population of 2,004 people in all the sampled villages, the sex ratio is 96 females for 100 males. Sex ratio for different *kulams* show a great variation. It is possible that the fertility and mortality patterns of these *kulams* might differ significantly. Fertility and mortality data for *kulams* are presented elsewhere in this paper. It is also important to note that migration would lead to differential picture.

Clan Exogamy and Marriage Regulations

Haimendorf writes that "there are few occasions when clan *(kulam)* membership determines his behaviour, except in his relation with persons of the opposite sex who are either potential mates or beyond the pale of sexual associations" (194:87-88). *Kulam* exogamy is strictly observed. Haimendorf writes that "the clans are exogamous, but they do not all intermarry, for some are considered related and are grouped together in larger exogamous units" (194:88). He also reports that the Chenchu fail to define the exact composition of these larger units. It is basically due to the fact that it is the lineage that divides various *kulams* into marriageable and prohibited categories. Such marriageable set of *kulams* are also divided into sub-sets of related and unrelated *kulams*. The related *kulams* are again divided into closely related (the *kulams* belonging to mother's brother and father's sister and sister's husband etc.) and distantly related (where exact relationship is not traceable).

Within the lineage of a particular *kulam*, individuals might have contracted marriages with more than one *kulam* or more specifically, with different lineages of different *kulams*. And thus, these latter lineages representing the individual *kulams* enter into a brotherly relationship with each other and they do not intermarry. Superficially it appears as if there exist a group of brotherly related *kulams* and affinal *kulams*. That is why a Chenchu individual would be in a position to categorize *kulams* into consanguineal and affinal groups in relation to his own lineage, but generally becomes vague while establishing such a categorization with reference to other individuals belonging to different lineages of either his own *kulam* or other *kulams*.

An individual cognatically conceives four categories of *kulams* in relation to his own lineage based on the criterion of generation and relationship. Thus, there are *kulams* belonging to the rank of grand father generation, brotherly *kulams*, son-in-law *kulam* and brother-in--law *kulam*. This categorization suggests that the ego takes mates from brother-in-law *kulam*, and gives mates to son-in-law *kulam* and also to the individuals of other *kulams* who have access.

An individual affinal *kulams* are predetermined basing on marriages which took place earlier in his lineage. However, direct exchange of mates between two *kulams* is limited. Women are circulated in an asymmetrical fashion. This kind of system results in mate giving *kulams* and mate taking *kulams*. The overall picture is not simple because it is the lineage of the *kulam* that receives or gives away women in marriage. Thus, practically there are exchanges of mates between two *kulams* but usually between different lineages.[3] It is illustrated in the following figure (However this type of alliance pattern is not uniformly found in all the areas under the study).

A1 and A2 are lineages of *Arthi kulam* and B1 and B2 are lineages of *Bhumani kulam*. A1 gives mates to B1 and receives mates from B2. In the same fashion B1 gives mates to A2 and receives mates from A1. So is the case with A2 and B2. In the second generation all the women from mate giving *kulams* are mother's brother's daughters to their husbands of respective mate taking *kulams*. High level inbreeding would result if this trend is continued. However, such a perpetuation may not occur due to ecological and demographic factors.

As far as ecological factors are concerned an indirect influence operates allowing people to establish relationship through marriage with different *kulams* of different villages. This adaptive strategy is required for ecological exigencies which drive people to move into distant places. Unless one establishes realtionship with people of other areas, accessibility and opportunity to enter into the catchment territories becomes difficult. Because of such ecological operations we see high level village exogamy (55% of 437 marriages).

Mean marital distance for various *kulams* is shown in Table 3. Mean distance, though small, fluctuates considerably across various *kulams*. Small distance shows that marriages are contracted with the immediate neighbouring villages. Table 4 presents *kulam* wise marriage types.

Fertility and Mortality

Table 5 presents *kulam*-wise mean number of pregnancies, live births, living children and dead children (below 0-14) per woman. Differential performance is observed between the *kulam* groups, though variation is considerably low. Variation in mean number of pregnancies seems to be conspicuous (the range being 2.91 to 4.62) and it is less in case of live births and living children. The range for live births is 2.62 to 4.40 and for living children 2.10 to 3.39. This means that mortality levels across the *kulams* do not fluctuate rapidly. There is every reason to believe that mortality levels do not differ significantly because of the same ecological and social forces that influence the Chenchu population. An attempt is also made here to find the influence of village endogamy and exogamy of consanguineal and affinal unions on fertility and mortality in various *kulams* (Table 6 & 7).

Average number of pregnancies for village exogamous unions seems to be higher than those in case of village endogamous unions. Average number of children dead for village endogamous unions are higher than those of village exogamous unions. Reasons behind this variation are not quite clear.

Average number of pregnancies in case of consanguineal couples are higher than those affinal unions. Mortality is lower in case of affinal unions than in consanguineal union.

Summary and Conclusion

The Chenchu are divided into number of exogamous groups locally known as *kulams* and each *kulam* compraises of several lineages. Since exogamous descent groups of the Chenchu tribe are widely distributed throughout the Chenchu territory, population movements over the geographical area and exchange of women between related, distantly related and unrelated groups occur with varying frequencies in close relation to environmental conditions, population structure of the *kulams* and cultural factors.

The *kulams* continuously adjust and readjust to environmental pressures which alters variance in the composition of *kulams* in the village as individuals realign themselves with adjacent groups through extension or revival of kinship relations or establishing new relationships. The demographic and ecological factors set-in dysfunction among the previously functionally related *kulams* and cause dispersion of individuals who in turn seek to establish new relationships with the *kulams* of distant places.

Cultural factors, on the contrary, reinforce solidarity among the families of closely related groups by retaining them together and also bringing dispersed related people together.

Thus among the Chenchu, centripetal (cultural) and centrifugal (demographic and ecological) forces are operating which negate extreme configuration of certain exogamous groups and also wide dispersion of exogamous groups to the extent of occurring fragmentation. As a result, this leads the tribe losing its basic character as genetic and demographic unit.

FOOT NOTES

1. These villages are palem Cheruvu, Abbarajukunta, Byrluti, Nagaluti, Peccheruvu (located in Kurnool district), Peddamantanala, Chinnamanthanala, Chinthala, Marripalem, Nakkanti and Palutla in Prakacam district and Farahbad in Mahabubnagar district.

2. The exogamous descent groups are: Bhumani; Mandla; Uttaluri; Topi; Dasari; Chigurla; Gulla; Nimmala; Arthi; Jelli; Nagula; Garaboyina; Indla; Puli; Baramala; Kudumula; Chevula; Ileni; Seelam; Mekala; Thota; Raya; Avula; Paramasi; Pitta; Eravala; Kanemoni; Thokala; Nirupula; Bandrasi; Katraju; Elugodu; Vatterla; Pulicherla; Uduthala; Gurram; Pelam; Savaram; Damsam; Bachhala; Nallapothula; Manubothula; Parvatham; Bangi.

3. Genealogical analysis shows the practice of asymmetrical as well as direct exchange of women in marriage. Further studies are needed in this area.

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TABLE - 1

Sex-wise population figures for Kulams in the sample villages

Villages/ Kulam	Abbaraju-kunta M	Abbaraju-kunta F	Chinna-mantha-nala M	Chinna-mantha-nala F	Farah-bad M	Farah-bad F	Nekkanti M	Nekkanti F	Byruluti M	Byruluti F	Naga-luti M	Naga-luti F	Pechhe-ruvu M	Pechhe-ruvu F	Pedda-mantha-nala M	Pedda-mantha-nala F	Chin-thala M	Chin-thala F	Marri-palem M	Marri-palem F	Palem-cheruvu M	Palem-cheruvu F	Palutla M	Palutla F	Total male	Total Female	Total population
Arthi									8	8	1	3	32	33 (23%)	28	18	4	4			1	1			74	67	141
Avula											1	2													1	2	3
Bangi											6	4													6	4	10
Baramala									2	3															2	3	5
Bhumani	7	4	7	3			3	3					12	12	51	49 (42%)	39	34	55	55					174	160	334
Chevula							20	20 (63%)															19	19	39	39	78
Chigurla	1	1			5	6			8	7			3	1					4	6			6	8	27	29	56
Damsam	4	3							3	4					2	2			9	7			25	21 (27%)	43	37	80
Dasari	3	3	9	14 (36%)					13	13	2	2	28	33			9	8	23	18					87	91	178
Gulla	5	8							14	19 (20%)	27	19 (32%)	8	12											54	58	112
Gurram											2	1													2	1	3
Jelli											2	5					3	4	14	8	2	1	3	4	24	22	46
Kudumula			8	8	3	4	11	7			1	2	1	1	34	21	54	56 (48%)	84	85 (46%)			20	18	216	202	418
Mandla									9	7	3	5											4	3	16	15	31
Nallapothula													4	7											4	7	11
Nimmala	6	9	6	6							8	6	4	6							6	8	5	6	35	41	76
Paramasi																					1	2			1	2	3
Pulicherla	9	6							3	1	10	13	27	25	3	3	6	9	2	1	4	2			64	60	124
Raya																					10	7			10	7	17
Seelam																					2	3			2	3	5
Thokala					13	12 (63%)																			13	12	25
Thota	15	12 (26%)							2	3															17	15	32
Thopi									5	6															5	6	11
Uttaluri	1	2	2	1					10	10	10	8	20	18	16	14					35	36	5	4	99	93	192
Vatterla	2	2							3	4											1	1			6	7	13
Total	53	50	32	32	21	22	34	30	80	85	73	70	139	148	134	107	115	115	191	180	62	61	87	83	1021	983	2004
Grand Total	103		64		43		64		165		143		287		241		230		371		123		170				

Figures in brackets are percentages of the largest kulam members to the total population size of the respective villages.

TABLE- 2

Sex ratio (females per 100 males)

Kulam	0-4	5-9	10-14	0-14
Arthi	117	44	71	77
Bhumani	77	84	108	90
Chevula	67	89	75	77
Chigurla	200	100	40	113
Damsam	100	40	80	73
Dasari	100	77	40	72
Gulla	114	100	67	94
Jelli	83	20	75	69
Kudumula	97	80	50	76
Mandla	200	200	--	133
Nallapothula	100	50	100	83
Nimmala	100	83	117	100
Pulicherla	42	92	100	78
Raya	100	200	25	108
Thokala	100	150	300	183
Thota	200	50	100	117
Uttaluri	127	70	54	84
Aggregate	96	79	67	81

TABLE - 3

Mean marital distance (in miles) for Kulams

Kulam Groups	N	Mean Distances	S.D.
Arthi	36	3.89	6.24
Bhumani	79	6.22	7.55
Chevula	21	5.33	6.81
Damsam	21	8.90	10.00
Dasari	51	4.33	5.59
Gulla	34	5.74	7.92
Kudumula	91	5.06	6.52
Nimmala	21	5.24	6.83
Pulicherla	32	6.25	8.34
Uttaluri	51	3.31	4.76

Of 437, 55% are village exogamous unions.

TABLE - 4

Kulam wise Marriage types

Kulam	Not Related	MBD	ZD	FZD	More Distant	Total
Arthi	14	6	3	1	12	36
Bhumani	28	11	6	11	23	79
Chevula	9	5	--	7	--	21
Damsam	6	2	2	6	5	21
Dasari	13	14	2	4	18	51
Gulla	10	10	2	2	10	34
Kudumula	27	21	4	15	24	91
Nimmala	11	4	--	3	3	21
Pulicherla	16	3	3	4	6	32
Uttaluri	20	13	3	9	6	51
Total	154	89	25	62	107	437
	(35%)	(20%)	(6%)	(14%)	(25%)	(100%)

TABLE - 5

Mean No. of Pregnancies, Live Births, Living Children and Dead Children per Woman according to Kulam Group

Exogamous Groups	N*	Pregnancies		Live Births		Living Children		Dead Children (0-14)	
		Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.
Arthi	36	3.47	2.35	3.33	2.29	2.90	1.87	0.97	1.17
Bhumani	79	3.70	2.59	3.49	2.26	3.04	1.81	0.90	1.07
Chevula	21	3.67	1.65	3.38	1.75	2.24	1.51	1.14	1.11
Damsam	21	4.00	2.45	3.76	2.47	2.20	2.26	1.85	1.46
Dasari	51	4.00	2.95	3.86	2.98	3.02	1.95	1.56	1.58
Gulla	34	3.79	2.09	3.50	2.06	2.09	1.59	1.52	1.77
Kudumula	91	4.62	2.93	4.40	2.74	3.39	2.31	1.38	1.38
Nimmala	21	2.91	1.34	2.62	1.32	2.10	1.29	0.65	0.88
Pulicherla	32	4.22	2.92	3.88	2.57	2.76	1.81	1.52	1.50
Uttaluri	51	4.28	2.93	4.08	2.90	2.25	2.03	2.08	2.02

*N includes persons who have not yet conceived.

TABLE - 6

Kulamwise fertility, mortality differentials for village endogamous and exogamous unions

Exogamous Groups	Village Endogamy					Village Exogamy				
	N	Preg-nancies	Live Births	Children		N	Preg-nancies	Live Births	Children	
				Living	Dead				Living	Dead
Arthi	20	4.20	4.05	3.05	1.00	11	4.56	4.38	3.22	1.11
Bhumani	33	4.12	3.79	2.69	1.10	37	4.22	4.08	3.38	0.70
Chevula	5	3.20	2.80	1.60	1.20	16	3.81	3.56	2.43	1.13
Damsam	6	4.50	4.33	2.00	2.33	14	4.21	3.78	2.34	1.64
Dasari	19	3.83	3.78	2.61	1.17	24	5.46	5.21	3.38	1.83
Gulla	14	4.36	4.00	1.64	2.36	19	3.58	3.32	2.43	0.89
Kudumula	37	4.56	4.49	3.14	1.35	49	5.06	4.78	3.58	1.20
Nimmala	7	3.14	2.43	1.86	0.57	13	3.00	2.92	2.23	0.69
Pulicherla	13	5.23	4.31	2.39	1.92	16	4.19	4.25	3.06	1.19
Uttaluri	25	2.25	2.52	0.97	1.23	23	4.61	4.22	2.22	2.00
	179					222				

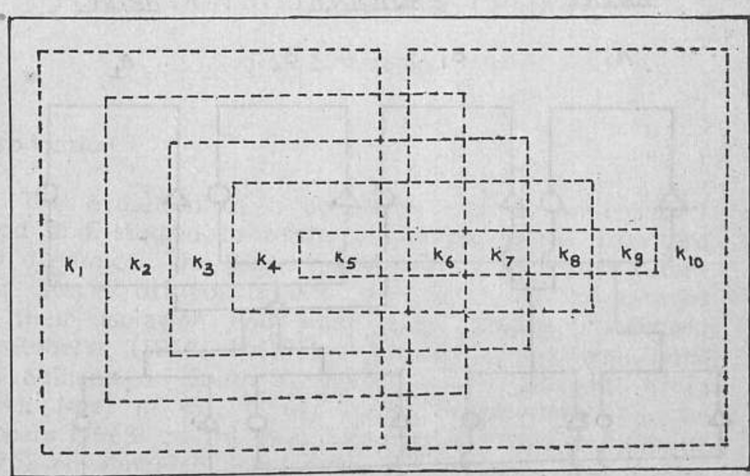
TABLE - 7

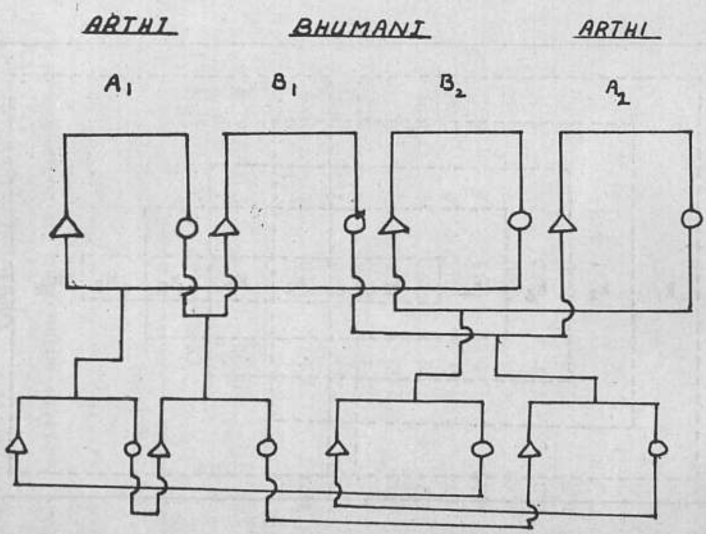
Kulamwise fertility, mortality differentials for consanguineal and affinal unions

Exogamous Groups	N	Consanguineal				N	Affinal			
		Preg-nancies	Live Births	Children Living	Children Dead		Preg-nancies	Live Births	Children Living	Children Dead
Arthi	17	4.53	4.29	3.11	1.18	14	3.43	3.36	2.65	0.71
Bhumani	42	4.43	4.10	3.00	1.10	28	3.80	3.70	3.09	0.61
Chevula	12	3.42	3.17	1.59	1.58	9	4.00	3.67	3.11	0.56
Damsam	14	4.50	4.14	2.00	2.14	6	3.83	3.50	2.33	1.17
Dasari	29	4.86	4.72	2.79	1.93	14	4.50	4.29	3.50	0.79
Gulla	23	3.96	3.74	1.91	1.83	10	3.80	3.30	2.50	0.80
Kudumula	60	5.03	4.83	3.48	1.35	26	4.23	4.12	3.12	1.00
Nimmala	10	3.20	2.60	1.70	0.90	10	2.90	2.90	2.50	0.40
Pulicherla	15	4.60	4.07	2.40	1.67	14	4.71	4.50	3.14	1.36
Uttaluri	29	4.28	4.21	1.83	2.38	19	5.79	4.53	2.90	1.63
	251					150				

Persons not yet conceived are excluded

Fig: 1. SCHEMATIC REPRESENTATION OF KULAM DISTRIBUTION




ARTHI
BHUMANI
ARTHI
A1
B1
B2
A2

POPULATION STRUCTURE OF CHENCHUS

S.M. Sirajuddin

Introduction

The evolution of a population can be well understood and studied in terms of its population structure and dynamics. The present day hunting and food gathering stage of populations provide many advantages by their isolation and small size. Studies conducted by Roberts (1956, 1968) on African populations, Neel and Salzano on South American tribes (Salzano, 1961, 1964), Neel *et al.*, (1964, 1968), Friere-Maia and coworkers (1963) on the Brazilian populations, Friedlaendar (1975) on Pingelap populations are some of the studies on these lines which have utilised Demography, Genetic variants, mating patterns, history and sophisticated statistical analysis to understand their population structure, genetic composition and dynamics of evolutionary processes. In India a few studies on Pahira (Basu, 1969), Kota (Basu, 1972; Ghosh, 1976), Dorla and Dhurwa (Rakshit, 1972), Chowrites and Terresens (Sen and Anadipal, 1976), Car-N Nicobarese (Gopala Krishnan *et al.*, 1977), Kolams (Ramesh, 1980) have been conducted, but still a large number of populations are yet to be studied. The recent reviews by Bajama (1967), Rakshit (1976), Malhotra (1977), and Mukherjee (1984) brought out the dearth of such studies in world populations, gaps in particular areas and stressed the importance of the inter-relationship of breeding structure and other variables. It is with this purpose that the present work has been attempted to study the population structure, mating patterns and its effects on fertility and mortality among the Chenchus of Andhra Pradesh (identified for its urgent study by WHO Committee, 1964).

Chenchus are one of the 33 tribes of Andhra Pradesh inhabiting predominantly the Nallamalai forest hills. They are still in food gathering and hunting stage economy with incipient agriculture. The total population of Chenchus is 24,178 (1971) out of which Mahaboobnagar, Kurnool and Guntur districts accounts for 3/4 of the population. Mahaboobnagar district accounts for 5,353 Chenchus, the highest concentration (22%) and Achmpet taluk of this district has 3,439 number. Kurnool district accounts for 2,832 Chenchus and the Atmakur and Nandyal taluks have 2,037 number. The Chenchu population residing in these two districts are isolated from each other and also from neighbouring districts with rivers and a vast forest land (Fig. 1) and behave as two separate endogamous groups (Table 1).

Material and Method

The paper is based on the material collected from the Achampet taluk of Mahaboobnagar, and Atmakur and Nandyal taluks of Kurnool district during March to July, 1981. Data has been collected from 18 settlements of Achampet taluk comprising 504 families and 9 settlements from Atmakur and Nandyal taluks (Fig. 1) comprising 215 families in the form of detailed bilateral three generation pedigrees from each couple. The demographic information was on their age, sex, marital status, who married whom, relation with the head of the family. The information from married woman was on her menarcheal age, age at first motherhood, outcome of each pregnancy, number of children, their age, sex and marital status. Age information has been corroborated with pedigrees and also with many check points.

The calculation of various attributes like child: woman ratio, net reproductive index are according to standard formulas and methods. The index of opportunity for selection (I) has been calculated following Crow (1958). Breeding size (N), effective population size (Ne) and variance due to genetic drift are calculated according to Lasker (1952) and Li (1963). Inbreeding coefficient has been calculated following Wright's path coefficient method and inbreeding effects on fertility and mortality were analysed through an exponential model Pi = 1-exp [-h+pFi]. The estimated values A and B were obtained through weighted least square technique (Smith, 1967) and the genetic load was calculated as per Morton, Crow and Muller (1956).

The data is utilised; 1. to characterise the Chenchu population by various demographic attributes and to assess the relative roles of fertility and mortality differentials in the two sub-populations in the operation of selection force, 2. to find out the part played by genetic drift and admixture rates, 3. to elucidate the information on breeding structure of the population and examination of spatial and temporal variation in the breeding rates, and 4. to assess the effects of consanguinity on fertility and mortality rate among the inbred offspring.

Results and Discussion

The average household size in Mahaboobnagar sample is 4.5 which is slightly higher in Kurnool district (4.24), but comparatively lower to the values of Andhra Pradesh state (4.8) and All India (5.1) as per the 1971 census. Selection of mate and endogamous nature of the Chenchus indicate that, village endogamy is 50% in Kurnool district as against 31% in Mahaboobnagar district. Outside the district only about 2% of the marriages were observed in both the district taluks (Table 1), thus indicating the strong endogamous nature of each district population.

The age and sex composition of the two districts sample (Table 2 and 3) show that, about 44% of the population is in below reproductive age group (below 15 years) for the combined population, and it is 41% in Kurnool district and 46% in Mahaboobnagar district. Above 50 years persons in Mahaboobnagar district are 8.7%, and in Kurnool district they are 7.4%. About 80% of the married women are in the key child bearing age group of 15-44 years. The incidence of divorced, widowed or separated persons are very few in C-K (2.6%) and they are about 10.1% in C-M. The overall sex-ratio (males per 100 females) for Mahaboobnagar Chenchus is equal (99.2%) whereas, it is high in Chenchus of Kurnool (124.5%).

Out of 504 married women, 46 women in Mahaboobnagar and cut of 215 married women, 32 women in Kurnool did not conceive at all giving a percentage of 9.1 in Mahaboobnagar and 14.9 in Kurnool sample. In Mahaboobnagar district, 458 married women who had been married atleast once reported 1,922 pregnancies including still births, abortions and twin births. The respective figures of surviving children, dead children and still births/abortions per 100 pregnancies are 69.82, 26.53 and 4.73 respectively. In Kurnool district, 183 women who had 777 pregnancies showed the percentage of 61.21 dead children and 3.35 still births and abortions (Table 5).

In Mahaboobnagar district 504 ever married women returned with 1,852 live births yielding an average of 3.67 children, whereas, in Kurnool district 215 ever married women showed a little lower average (3.51).

These fertility rates are moderate compared to most other Indian samples. Fertility completed mothers have been defined as those women who reported their age as 40 years or above. This criterion has been preferred in the present study especially in view of their earlier menopausal age and relatively very few conceptions at later ages. The mean number of live born and surviving children in fertility completed mothers show a moderate value for Mahaboobnagar Chenchus (5.70 and 3.81 respectively). Chenchus of Kurnool shows a high mean live births (6.17) but a lower mean surviving children (3.49). The mean number of live born offspring in completed families of Chenchus are higher to other tribal populations of India, with the exceptions of three Pahira sub-samples, Mallia, Irula and Hajong. The mean number of surviving offspring is a little less compared to caste populations but in consonant with most of the tribal populations. The mean number of children in fertility completed mothers indicate a moderate rate of population expansion (Tables 6 and 7).

Child:woman ratio, which represents the reproductive potential of the population is extremely high in Kurnool district (137.43), whereas, it is nearly half in Mahaboobnagar district (78.73). The fertility ratio, when partitioned shows that, female child:woman ratio is more than male child:woman ratio. Fertility ratio is high compared to other tribal populations of India. The net reproductive index, which is based on the number of surviving daughters and the number of mothers, indicates a value of 1.76 in the Chenchus of Kurnool, whereas, among Mahaboobnagar Chenchus, it is 1.93, which is higher than most of the tribal populations except the Pahiras (Table 8).

Most of the mortality observed is below 5 years and mostly infant deaths. Out of the 1,852 live births in Mahaboobnagar district, 17% of the deaths occurred below one year and 31% deaths before 15 years. Compared to this, Kurnool district Chenchus show a still higher mortality trend (about 36% of Juvenile mortality). About 9 cases of multiple births in Mahaboobnagar district and 2 cases in Kurnool district were observed.

The intensity of selection is the function of environment which has a direct relationship with the reproductive performance. Based on fertility and mortality measures following Crow (1958) index of opportunity for selection was calculated to see selection potential and the contribution of fertility and mortality components. The index is comparatively more in Kurnool district (1.0029) than in Mahaboobnagar district (0.8076). In both the cases, mortality component is twice to fertility component and the variance of the fertility is more than the mean fertility (Table 9). The index values are moderately high compared to the caste populations, but, at par with the tribal populations of Andhra Pradesh. The reviews of the existing data shows that most of the Indian tribes show more mortality component than fertility and in some tribes the contribution of Im and If are equal (Chengal Reddy and Lakshmanudu, 1979).

In order to identify the gene pool of the population and to evaluate the evolutionary factors operating on it, an attempt is made on the biological population of Chenchus. As direct analysis of the composition of gene pool is impossible, an inferential analysis on the basis of phenotypes of the reproducing individuals at a single point of time can be done. This was done by enumerating the actual progenetors that is the parents in a population responsible for the genetic constitution after deducting the sterile/infertile parents and multiple marriages. These progenitors constitute the breeding population (N) which is 45% for Mahaboobnagar district (826) and when extrapolated it is 1,551 for the Achmpet taluk and 2,414 for Mahaboobnagar district. Breeding size for Kurnool sample is 343 which is about 41% and when extrapolated it is

838 for the Atmakur and Nandyal taluks (Table 10).

Breeding size is refined to identify the effective breeding population (Ne) which is a hypothetical population in order to assess the potential effects of the various forces of evolution on the gene pool especially the genetic drift. Effective population size in Mahaboobnagar Chenchus is 569 which is about 31% for the sample, when extrapolated it is 1,068 for the Achampet taluk and 1,663 for the Mahaboobnagar district. For the Kurnool sample the effective breeding size is 228 which is 27% of the total population sample, when extrapolated it is 774 for the Kurnool district.

The operation of genetic drift in these two populations was evaluated after the deduction of effective breeding size. This evolutionary force is operative in small populations where the breeding size is in hundreds. Wright (1943) showed that the gene differentiation due to drift depends on the product of the effective population size and the migration rate (m), where 'm' is the proportion of a population replaced in each generation by migrants. This measure referred as the 'index of reproductive isolation' indirectly indicates the opportunity provided by the drift. If the product is below 5 units the expected changes in gene frequency due to genetic drift are likely to be very marked. If it is between 5 to 50 still the effect will be pronounced and if it is 50 and above there will be a negligible effect (Lasker, 1960). In the present two samples, it is worked out to be 0.54 in Kurnool district and 1.76 in Mahaboobnagar district indicating genetic drift as an important evolutionary force operating in this two sub-populations, the effect of which is greater in Kurnool district (Table 10). Admixture rate from outside the group is 0.2369 for Kurnool district sample and 0.3099 for Mahaboobnagar district sample, a very low values.

There is a general decline of inbreeding rates in most of the populations of the world as revealed by the recent reviews. But, South Indian populations exhibit still consanguinity in a high proportion. As the present Chenchu population also exhibits a high degree of consanguinity an attempt is made to find out the nature and degree of consanguineous marriages; to study the temporal and spatial variation; and to evaluate the risks involved in fertility and mortality rates in consanguineous and non-consanguineous couples.

504 marriages in Mahaboobnagar district, 215 marriages in Kurnool district were analysed to see the varying degrees of consanguinity and its effects on reproduction. Consanguinity rate is very high among Kurnool district Chenchus (49%), whereas, it is about 29% in Mahaboobnagar district Chenchus. A similar type of mating behaviour was observed by Sanghvi (1966) in the general populations of the two districts, and he also observed that, Telangana districts show comparatively low consanguinity rates compared to the coastal and Rayalaseema districts. Besides the small size of the population and nearness of the settlements, the impact of the marital behaviour of the general population may be the reason for the high degree of the consanguinity in Kurnool district which falls in Rayalaseema region. In both the districts, Uncle-Niece marriages were observed but they are in higher proportion in Kurnool district (5.11%) than in Mahaboobnagar sample (2.18%). First cousin marriages constitute more than 50% of the observed consanguinity in which MBD type being more prevalent than FSD type in Mahaboobnagar district, whereas, Kurnool sample shows predominantly FSD marriages. The coefficient of autosomal inbreeding calculated upto second cousins is 0.0282 ± 0.0024 in Kurnool district and 0.01507 ± 0.0012 in Mahaboobnagar district (Table 11). A glance over the comparative picture of the prevalence of consanguinity in the tribes like Rajgonds, Konda Reddies and Koyas show still higher values. When the population is divided into 4 generations to see the temporal trends,

a lower consangunity rates, though not significant, are observed in the recent generations.

The mean number of live births are consistently higher in different consanguineous classes compared to the non-consanguineous and in most of the classes the unit of difference is more than one and in some cases about two. In Mahaboobnagar district sample though the difference in mean values are not very large, they are comparatively higher values to non-consanguineous (Table 12). In the case of mean number of surviving children, the different classes in consanguinity show little higher values in Kurnool district Chenchus though the margin of difference is not large like in the live births. A similar trend is observed in Mahaboobnagar district sample. In both the district samples average number of pregnancies, average number of live births, surviving offspring, are little higher compared to the non-consanguineous class although the statistical tests do not show significance (Table 13). When the number of mothers are divided into below 40 and above 40 years the same trend is discernable. To find out the effects of inbreeding on mortality, mortality has been divided into foetal loss, abortions, still births, miscarriages, infant deaths and juvenile deaths and it is observed that most of the mortality attributes are little higher in consanguineous couples than in non-consanguineous particularly so in the Mahaboobnagar sample though statistically there is no significant difference. Kurnool sample does not show marked difference between the two classes of couples.

Besides the empirical comparisons the inbreeding effects were further analysed through a regression analysis by fitting an exponential model Pi = exp [-L + BFi]. The estimated values A and B and the Chi-square values for Mahaboobnagar, Kurnool and combined sample is shown in Table 14. The B/A values for foetal loss, juvenile deaths and for total mortality are low. None of the regressions attained significance except

TABLE - 2

Age-sex structure and marital status of Chenchu population in Mahaboobnagar district

Age group	Males				Females				Males + Females	
	Unmarried	Married	Widower/ divorcee	Total	Unmarried	Married	Widow/ divorcee	Total	Total	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	
0-4	154	--	--	154	168	--	--	168	322	
5-9	151	--	--	151	162	--	--	162	313	
10-14	121	--	--	121	74	16	--	90	211	
0-14	426	--	--	426	404	16	--	420	846	(46.2%)
Sex-Ratio : 101.43										
15-19	49	37	2	88	11	94	1	106	194	
20-24	5	81	2	88	--	91	3	94	182	
25-29	1	77	1	79	1	61	2	64	143	
30-34	--	66	1	67	--	49	1	50	117	
35-39	--	36	2	38	--	41	1	42	80	
40-44	--	33	--	33	--	26	4	30	63	
45-49	--	23	1	24	--	15	8	23	47	
15-49	55	353	9	417	12	377	20	409	826	(45.1%)
Sex-Ratio : 101.96										

Contd.....

mortality of the children below 15 years in Mahaboobnagar sample. In the Mahaboobnagar sample 0.5 lethal equivalents for foetal loss and 3.0 lethals for mortality below 15 years and 2.0 lethal equivalent for total mortality was obtained. The inbreeding effect is less pronounced in Kurnool district sample where high degree of consanguinity was observed. In fact the two values of 'B' are negative indicating negligible effect. In general, the regression values of 'B' (inbreeding load) are small and insignificant and the values of intercept 'A' (random load) are high than what could be found in the offspring of outbred samples. These low values can be accounted for the high consanguinity rate prevalent in the group and high mortality rate due to low socio-economic conditions which will result in spurious results indicating that the non-consanguineous group is not a strict control group as some amount of inbreeding is accumulated in them through generations.

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TABLE - 1

Frequency of marriages between Chenchu settlements

		Frequency	Percentage
Mahaboobnagar district			
1.	Both partners from same village and same group	151	31.20
2.	One partner from another village but same group	320	66.11
3.	One partner from same group but outside the taluq	10	2.07
4.	One partner from outside group	3	0.62
5.	Total marriages	484	100.00
Kurnool district			
1.	Both partners from same village and same group	107	50.71
2.	One partner from another village but same group	98	46.45
3.	One partner from same group but outside the taluq	5	2.37
4.	One partner from outside group	1	0.47
5.	Total marriages	211	100.00

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	
50-54	--	19	--	19	--	19	6	25	44	
55-59	--	14	1	15	--	10	13	23	38	
60-64	--	10	1	11	--	8	12	20	31	
65-69	--	13	--	13	--	2	7	9	22	
70 +	--	7	4	11	--	--	13	13	24	
50 +	--	63	6	69	--	39	51	90	159	(8.7%)

Sex-Ratio : 76.67

Total	481	416	15	912	416	432	71	919	1831

Sex-Ratio : 99.24

TABLE - 3

Age-sex structure and marital status of Chenchu population in Kurnool district

Age group	Males				Females				Males + Females Total	
	Unmarried	Married	Widower/ divorcee	Total	Unmarried	Married	Widow/ divorcee	Total		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	
0-4	67	--	--	67	79	--	--	79	146	
5-9	67	--	--	67	48	--	--	48	115	
10-14	38	--	--	38	43	--	--	43	81	
0-14	172	--	--	172	170	--	--	170	342	(41.00%)
Sex-Ratio : 101.18										
20-24	1	48	--	49	--	60	--	60	109	
25-29	--	31	--	31	--	30	1	31	62	
30-34	--	23	1	24	--	28	--	28	52	
35-39	--	29	1	30	--	11	--	11	41	
40-44	--	11	--	11	--	17	2	19	30	
45-49	--	8	--	8	--	15	3	18	26	
15-49	23	169	2	194	4	226	6	236	430	(51.56%)
Sex-Ratio : 82.20										

Contd.......

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	
50-54	--	18	--	18	--	10	1	11	29	
55-59	--	12	--	12	--	4	--	4	16	
60-64	--	6	--	6	--	2	3	5	11	
65-69	--	3	--	3	--	--	--	--	3	
70 +	--	2	--	2	--	1	--	1	3	
50 +	--	41	--	41	--	17	4	21	62	(7.44%)
				Sex-Ratio : 195.24						
Total	195	210	2	407	174	243	10	327	834	
				Sex-Ratio : 124.46						

TABLE - 4

Mean number of live births per married woman by age groups

	Age Groups							
	<20 Yrs.	20-24	25-29	30-34	35-39	40-44	45 +	All ages (TFR)
Mahaboobnagar district								
Number of Women	73	90	80	57	58	32	114	504
Number of live births	61	184	256	240	268	209	624	1852
Mean number of live births	0.84	2.04	3.33	4.21	4.62	6.53	5.47	3.67
Kurnool district								
Number of women	40	47	26	32	11	21	38	215
Number of live births	22	94	91	132	52	107	257	755
Mean number of live births	0.55	2.00	3.50	4.13	4.72	5.09	6.76	3.51

Fertility record of Chenchu women

Number of women who conceived	Live births	Surviving children	Dead children	Still born/ abortion
		Mahaboobnagar Chenchus		
458	1,852	1,342	510	91
		Kurnool Chenchus		
183	755	474	281	26

TABLE - 6

Distribution of live born and surviving offspring by sib-ship size in fertility completed mothers

Sib-ship size	Live-born children in mothers		Surviving children in mothers	
	Mahaboobnagar group	Kurnool group	Mahaboobnagar group	Kurnool group
(1)	(2)	(3)	(4)	(5)
0	5 (3.42)	1 (1.69)	7 (4.79)	6 (10.17)
1	2 (1.36)	3 (5.08)	13 (8.90)	8 (13.56)
2	16 (10.95)	4 (6.78)	18 (12.32)	3 (5.08)

Contd.....

the South to the Vindhyan mountains in the north. The number of phratries vary from place to place (Buradkar '40). Naik Gonds are an endogamous population group of the Gond ethnicity chiefly found in Chandrapur district of Maharashtra (Rao, V.R. '83). An individual among Naik Gonds identifies himself first with his name, in the middle his father's name and in the last his surname. On further enquiry he ascertains by saying that he belongs to such and such number of *'deve'* (exogamous group equal to Gotra among caste Hindus). They may be 7 *deve*, 6 *deve*, 5 *deve*, 4 *deve*, 3 *deve* and 1 *deve*. The surname and 'deve' affiliations are both exogamous, patrilineal and patrilocal. Haimendorf (1979) equates surnames as clan and the 'deve' affiliations as phratry. Altogether 6 phratries and 25 clans are identified among Naik Gonds (Table 1). The 6 *deve* phratry harbours the largest number of clans followed by 4 *deve* phratry. Numerically also 6 *deve* phratry is the largest, next inorder comes 4 *deve* phratry 7 *deve* phratry, 5 *deve* phratry, 3 *deve* phratry and 1 *deve* phratry. The 1 *deve* phratry is the most negligible one with only 7 male individuals. There are sufficient number of females for males only in 5 *deve* and 4 *deve* phratry whereas in all other phratries the females are lesser than males. The largest phratry (6 *deve)* and smallest phratry (3 *deve)* both have more number of females. Being patrilineal the perpetuation of a phratry depends more on differential sex ratio at birth and marital migrations.

The stochastic probabilities of females getting married into different phratries truncated for exogamy reveal that there is a preference for females from other phratries getting married into 6 *deve* phratry (Rao V.R. '83). A strong rank correlation of the order 0.94 ± 0.04 is obtained between the probabilities of females getting married into different phratries and inbreeding coefficient values (Table 2). Consanguineous marriages are more in 6 *deve* phratry, though it has got the largest number of clans. In the case of recur-

(1)	(2)	(3)	(4)	(5)
3	5 (3.42)	3 (5.08)	25 (17.12)	17 (28.81)
4	22 (15.06)	4 (6.78)	35 (23.97)	7 (11.86)
5	22 (15.06)	7 (11.86)	15 (10.27)	7 (11.86)
6	18 (12.32)	11 (18.64)	19 (13.01)	3 (5.08)
7	24 (16.43)	9 (15.25)	10 (6.84)	5 (8.47)
8	13 (8.90)	4 (6.78)	3 (2.05)	2 (3.39)
9	9 (6.16)	8 (13.56)	1 (0.68)	1 (0.69)
10	8 (5.48)	--	--	--
11	3 (2.05)	--	--	--
12	1 (0.68)	--	--	--
Total	146 (100.00)	59 (100.00)	146 (100.00)	59 (100.00)
Mean ± S.E.	5.70 ± 0.23	6.17 ± 0.38	3.81 ± 0.16	3.49 ± 0.29

TABLE - 7

Distribution of live born and surviving children by sib-ship size in ever married women

Sib-ship size	Live born Children in mothers		Surviving children in mothers	
	Mahaboobnagar group	Kurnool group	Mahaboobnagar group	Kurnool group
(1)	(2)	(3)	(4)	(5)
0	50 (9.92)	32 (14.88)	67 (13.29)	46 (21.39)
1	74 (14.68)	38 (17.67)	104 (20.63)	60 (27.91)
2	70 (13.89)	32 (14.88)	81 (16.07)	26 (12.09)
3	66 (13.09)	20 (9.30)	92 (18.25)	29 (13.49)
4	68 (13.49)	15 (6.98)	79 (15.68)	22 (10.23)
5	58 (11.51)	21 (9.76)	32 (6.35)	17 (7.91)
6	37 (7.34)	22 (10.23)	29 (5.76)	7 (3.25)
7	33 (6.55)	13 (6.04)	12 (2.38)	5 (2.32)
8	24 (4.76)	8 (3.72)	6 (1.19)	2 (0.93)

Contd...

(1)	(2)	(3)	(4)	(5)
9	12 (2.38)	9 (4.18)	2 (0.40)	1 (0.46)
10	8 (1.59)	--	--	--
11	3 (0.59)	--	--	--
12	1 (0.20)	5 (2.32)	--	--
Total	504 (100.00)	215 (100.00)	504 (100.00)	215 (100.00)
Mean ± S.E.	3.67 ± 0.12	3.51 ± 0.20	2.66 ± 0.09	2.20 ± 0.14

TABLE - 8

Child: Woman ratio and net reproductive index

Attribute	Mahaboobnagar district	Kurnool district
Child : Woman Ratio		
Number of women in 15-49 years	409	179
Number of male children below 5 years	154	124
Number of female children below 5 years	168	122
Total number of children below 5 years	322	246
Male child : woman ratio	37.65	69.27
Female child:woman ratio	41.08	68.16
Child : woman ratio	78.65	137.43
Net Reproductive Index		
Number of women 40 + years	146	59
Number of surviving daughters	286	104
Net reproductive index	1.93	1.76

TABLE - 9

Indices of selection potential in Chenchu population

Mothers aged 40 years and above	Live Births			Premature deaths (Pd)	IM	IF	IF/PS	I
	Number	$\bar{X}$	Variance					
Mahaboobnagar Chenchus								
146	833	5.70	6.65	278	0.50	0.20	0.31	0.808
Kurnool Chenchus								
59	364	6.17	8.64	141	0.63	0.23	0.37	1.00

TABLE - 10

Breeding size and effective population size among Chenchus

Breeding Size			Mean fertility ($\bar{X}$)	Variance of fertility	Effective Population size (Ne)	Variance due to drift
Nm	Nf	Total				
Mahaboobnagar Chenchus						
382	444	826	2.66	3.80	569	0.0002197
Kurnool Chenchus						
161	182	343	2.20	4.00	228	0.0005482

TABLE - 11

Frequency of consanguineous marriages and inbreeding coefficient in Chenchus

Types of marriages	Mahaboobnagar Chenchus		Kurnool Chenchus	
	Frequency	Percentage	Frequency	Percentage
Uncle-Niece	11	2.18	11	5.11
First Cousins	89	17.66	66	30.70
MBD (IC_M)	58	9.92	31	14.42
FSD (IC_P)	39	7.74	35	16.28
First Cousins once removed	9	1.79	9	4.19
Second Cousins	24	4.76	20	9.30
Beyond Second Cousins	15	2.98	--	--
Total Consanguineous	148	29.37	106	49.30
Non-Consanguineous	356	70.63	109	50.70
Total marriages	504	100.00	215	100.00
Inbreeding coefficient	0.01507 ± 0.0012		0.0282 ± 0.0024	

X^2 Value for different degrees of consanguinity in two districts 0.5814 d.f. = 3

TABLE - 12

Mean number of live born and surviving children per woman by type of consanguineous marriages among Chenchus

Marriage type	Coefficient of inbreeding (F_A)	Number studied (N)	Number of Live births		Number of surviving children	
			Mean	S.D.	Mean	S.D.
Mahaboobnagar sample						
Non-consanguineous	0	356	3.55	2.56	2.63	1.96
Beyond second cousins	>1/64	15	3.73	2.79	2.53	2.03
Second cousins	1/64	24	3.33	2.79	2.63	2.45
First cousins once removed	1/32	9	3.66	2.45	2.56	1.33
First cousins	1/16	89	4.30	2.82	2.89	1.66
Uncle-Niece	1/8	11	3.73	2.45	2.90	2.12
Kurnool sample						
Non-consanguineous	0	109	3.29	3.05	2.01	1.99
Second cousins	1/64	20	4.7	2.87	3.1	2.34
First cousins once removed	1/32	9	5.3	2.29	3.44	2.18
First cousins	1/16	66	3.07	2.67	2.07	1.88
Uncle-Niece	1/8	11	4.64	2.90	2.27	1.68

TABLE - 13

Mean and 't' values of fertility and mortality in consanguineous and non-consanguineous marriages

Attribute	Consanguineous Mean ± S.E.	Non-consanguineous Mean ± S.E.	't' values	
Mahaboobnagar Chenchus				(d.f. = 503)
1 Conceptions	3.93 ± 0.24	3.75 ± 0.14	0.64	
2 Live births	3.97 ± 0.33	3.55 ± 0.19	1.10	
3 Surviving children	2.72 ± 0.22	2.62 ± 0.14	0.38	
4 Foetal loss	0.22 ± 0.06	0.19 ± 0.03	0.45	
5 Mortality below 15 years	1.35 ± 0.15	1.06 ± 0.08	1.88	
Kurnool Chenchus				(d.f. = 214)
1 Conceptions	3.83 ± 0.27	3.40 ± 0.30	1.47	
2 Live births	3.72 ± 0.36	3.29 ± 0.29	0.93	
3 Surviving children	2.40 ± 0.20	2.01 ± 0.19	1.41	
4 Foetal loss	0.09 ± 0.04	0.15 ± 0.06	-0.83	
5 Mortality below 15 years	1.28 ± 0.91	1.23 ± 0.61	0.04	

TABLE - 14

Regression analysis of inbreeding effects

Attribute	Estimated values			X^2 values		
	A	B	B/A	Regression (d.f. = 1)	Residual (d.f. = 2)	Total (d.f. = 3)
(1)	(2)	(3)	(4)	(5)	(6)	(7)
Mahaboobnagar Sample						
1 Foetal loss (abortions still births and miscarriages)	0.0428	0.2076	4.85	1.4250	0.0019	1.4269
2 Mortality below 15 years	0.3434	1.2002	3.50	4.8571*	0.0081	4.8652
3 Total mortality (children of all ages excluding foetal loss)	0.3027	0.6912	2.28	1.9629	0.0000	1.9629
Kurnool Sample						
1 Foetal loss (abortions still births and miscarriages)	0.0254	- 0.1073	- 4.2244	0.1323	0.0118	0.1441

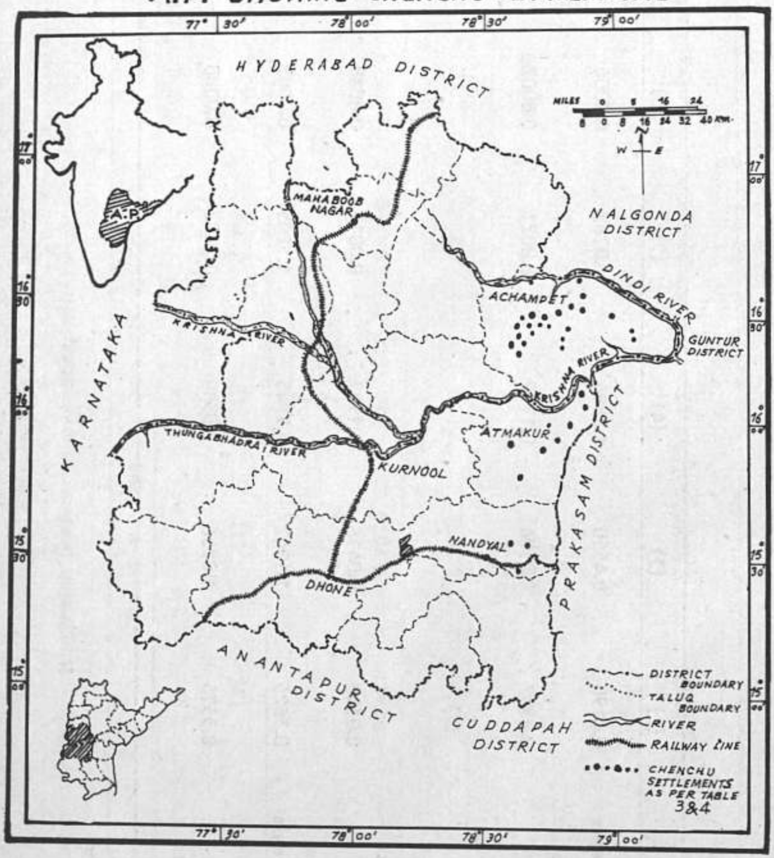
Contd.......

(1)	(2)	(3)	(4)	(5)	(6)	(7)
2 Mortality below 15 years	0.4190	0.4550	1.0884	0.0762	0.0004	0.0766
3 Total mortality (children of all ages excluding foetal loss)	0.4552	- 0.0796	- 0.1749	0.0021	0.0002	0.0023
Kurnool + Mahaboobnagar Sample						
1 Foetal loss (abortions, still birts and miscarriages)	0.0348	0.0416	1.1957	0.0017	0.0048	0.0265
2 Mortality below 15 years	0.3625	1.1942	3.2945	1.5205	0.0009	1.5214
3 Total mortality (children of all ages excluding foetal loss)	0.3375	1.0256	3.0388	1.2402	0.0000	1.2402

* Significant at 5% level

FIG: 1

KURNOOL AND MAHABOOBNAGAR DISTRICTS OF A.P. SHOWING CHENCHU SETTLEMENTS



DEMOGRAPHY AND SOCIAL ORGANISATION AMONG THE NAIK GONDS

V. Raghavendra Rao

Introduction

Populations as demographic units of observation have long been identified. Distribution of age, sex, birth, death and migrations are the usual components of the demographic analysis of a population. The census operations are based on national and regional populations at macro level, whereas microlevel studies are based on endogamous population groups like caste, sub caste, tribe and sub tribe. All these studies are focused on the growth of population and its concordant correlates either biological or social. Some of the microlevel studies on individual population groups sought genetic explanations for demographic features. In fact the genetic fitness or the intrinsic rate of natural increase is nothing but the genetic variance in fitness of a population at a particular point of time (Fisher '30).

Further, populations in many instances are divided into exogamous divisions as mioeties, phratries, clans, lineages etc. Such divisions are moderators of a pattern in marital migrations. The number of exogamous divisions are directly related to the size of a population.

Even the level of identifiable units a population presents at a particular time such as phratry, clan, lineage also indicates, the approximate size of the population. In general the tribes with fewer number of broader exogamous divisions have small to moderate population sizes. Whereas castes with large number of smaller divisions are larger in size. Nevertheless comparative empirical data is needed to look into these propositions.

Similarities in the pattern and distribution of exogamous divisions within populations may indicate the close relatedness between the populations (Lasker '77) Consistency observed in intermarrying patterns between exogamous divisions through generations lead to genetic differentiation (Malcolm '71). The importance of clans and circulating connubia as genetic barriers of recent theoretical considerations (Morton '71).

The present study aims at depicting empirical data on the age, sex distributions, places of origin and frequency distribution of the exogamous divisions within an endogamous tribal population group i.e. Naik Gonds of Chandrapur District.

Material & Methods

The demographic information comprises extended genealogical data from 60 village settlements of Naik Gonds in Chandrapur District. Field work has been conducted during May-August 1978 and March-July 1979. The data for the present study include 3651 individuals with their phratry affiliations and 3479 individuals known for their origin of clan.

Results and Discussions

Phratry organization is one of the characteristic features of the Gond Social Organization (Haimendorf '79). Gonds comprise a large number of related endogamous groups spread from the Godawari gorges in rence of phratries at various degrees of affinal relatives also the phratries having larger number of clans i.e. 4 deve phratry and 6 *deve* phratry show higher percentages of Isonymous matings (Table 3). This may indicate that most of the clans are monophyletic.

The population pyramids drawn for different phratries along with the total Naik Gond population is depicted in Fig. 1. They reveal the age, sex distributions at the particular point of time as a result of previous experiences of fertility, mortality and migration. The married females are included in the maiden phratry affiliation. The pyramid for Naik Gonds in total looks like growing population with a broad base and tapering ends. In the age group 0-9 there are more males than females. The marriageable age groups 15-24 also show more males than females. Females survive in later age groups than males. The pyramid for 7 *deve*, 6 *deve* and 4 *deve* phratries broadly resemble the Naik Gonds in general. But the 5 *deve* and 3 *deve* pyramids reveal a case of distortions. The interesting feature of 3 *deve* phratry is its very broad base compared to all other phratries, with male births predominating the females. This indicates that though 3 *deve* phratry is the smallest, it is in transition to regain its numerical strength.

Fig. 2 shows the frequency distribution of different clans among males and females for the Naik Gonds. Tekan clan of the 4 *deve* phratry is the largest both among males and females followed by *kodape* and *Atram* of the 6 *deve* phratry and *Madavi* of the 7 *deve* phratry. The interesting feature of the frequency distribution of different clans among phratry is that among the two largest phratries, the 4 *deve* phratry is predominate by only one single clan, whereas in 6 *deve* phratry there are more than one clan with appreciable frequencies. Table 4 shows the names of old and new clans in different phratries based on genealogical histories. The clans that can be traced to 3 to 4 generations in the genealogies are taken as older ones than the others. A comparison of the table and frequency distribution of clans in figure 2 reveals the fact that the old settled clans are much more in frequency than the other newer clans. The newer ones may be taken as latest migrants. All these demographic indications favour the hypothesis that most of the clans among the Naik Gonds may be monophyletic.

Finally different clans are plotted on the map of Chandrapur district (Fig. 3). It is interesting to see that a few clans such as *sayam* of 7 *deve* phratry and *kandore* of 1 *deve* phratry in the north eastern border of the district and the *Yette* of the 6 *deve* phratry in north western region are localized. In general the Central and towards the south west of the district more number of old clans are found. This is another indication to our already established hypothesis that the Naik Gonds are a fissioned group from the major tribal population 'Kolams' inhabiting the south-western region of the district.

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TABLE - 1

Population size of individual phratries and number of clans

Phratry	Population			No.of Clans	Sex Ratio (No.of females to 1000 males)
	Male	Female	Total		
7 deve	295	260	555	2	881
6 deve	815	735	1550	11	902
5 deve	105	126	231	3	1200
4 deve	608	610	1218	6	1003
3 deve	52	45	97	2	865
1 deve*	7	0	7	1	--
Total	1882	1776	3658	25	947

Total estimated population size = 15000

P.C. of the population sampled = 3658/15,000 = 24.38

* Not included in the total Naik Gond Population Pyramid.

TABLE - 2

Phratry matings and consanguinity

Male	x	Female	Observed	Consanguineous	Non-Consanguineous
1 deve	x	Rest	7	0	7
3 deve	x	Rest	65	2	63
4 deve	x	Rest	805	76	729
5 deve	x	Rest	206	15	191
6 deve	x	Rest	1044	105	939
7 deve	x	Rest	384	40	344

Coefficient of Inbreeding F = 0.0063

Rank Correlation between probabilities of females getting married into different phratries and F values = 0.94 ± 0.04.

TABLE – 3

Recurrence of phratries at various degrees of affinal relatives

	3	deve	4	deve	5	deve	6	deve	7	deve
	N	PC	N	PC	N	PC	N	PC	N	PC
Hu = WiMo	2	3.12	32	4.23	5	2.72	101	10.82	24	6.74
Hu = WiFaMo	11	1.56	22	2.91	1	0.54	26	2.78	7	1.97
Hu = WiMoMo	0	0	3	0.39	0	0	1	0.10	2	0.56
HuMo = WiFa	6	9.37	178	23.54	7	3.80	133	14.25	54	15.17
HuFaMo = WiFa	0	0	21	2.78	1	0.54	19	2.03	6	1.68
HuMoMo = WiFa	0	0	1	0.13	0	0	0	0	0	0
Isonymous	9	14.05	257	34.0	14	7.61	280	30.01	93	26.12
Non-Isonymous	55	85.94	499	66.0	170	92.39	653	69.99	263	73.88

TABLE - 4

Old and new settled clans of Chandrapur district in different Phratries

Phratry	Old Clans	New Clans
7 deve	Madavi, Sayam	--
6 deve	Kodape, Atram, Gedam, Vike	Thumram, Yettem, Kothade, Kudmethe, Pendor, Chandekar, Thura.
5 deve	Soyam	Ghodam, Alam.
4 deve	Tekam	Shedam, Netham, Madchape, Madkham, Parchaki.
3 deve	Matte	Thalandi
1 deve	Kandore	--

Fig. I (a)

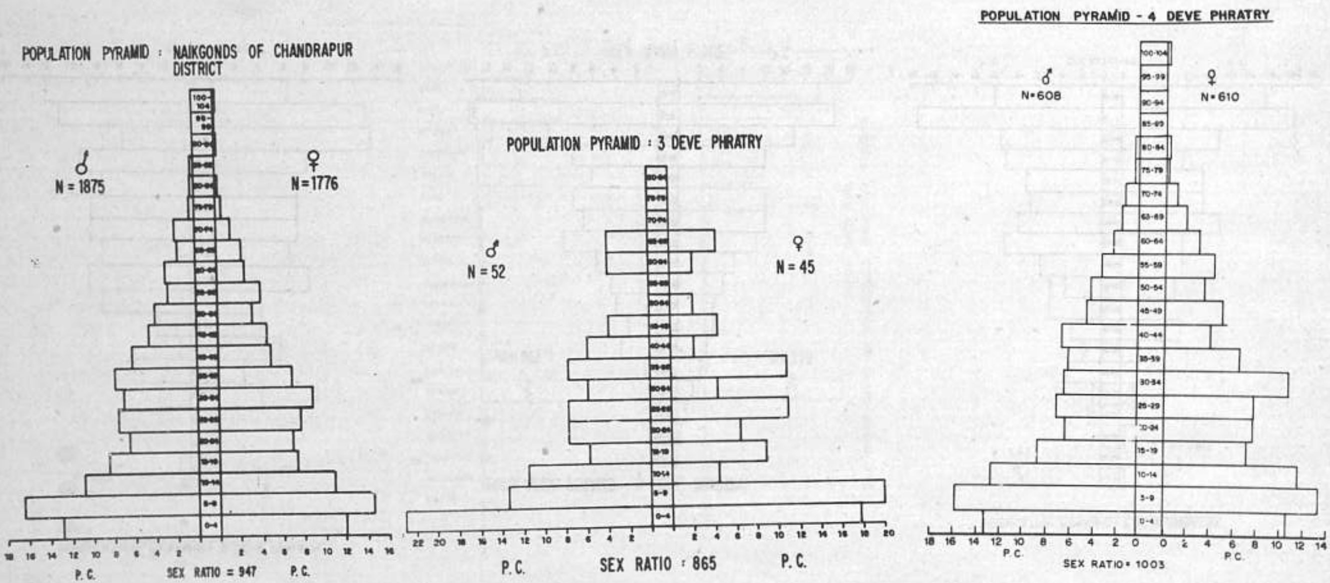

POPULATION PYRAMID : NAIKGONDS OF CHANDRAPUR DISTRICT
♂ N = 1875
♀ N = 1776
P. C.
SEX RATIO = 947
P. C.
POPULATION PYRAMID : 3 DEVE PHRATRY
♂ N = 52
♀ N = 45
P. C.
SEX RATIO : 865
P. C.
POPULATION PYRAMID - 4 DEVE PHRATRY
♂ N=608
♀ N=610
P.C.
SEX RATIO = 1003
P.C.

Fig. 1 (b)

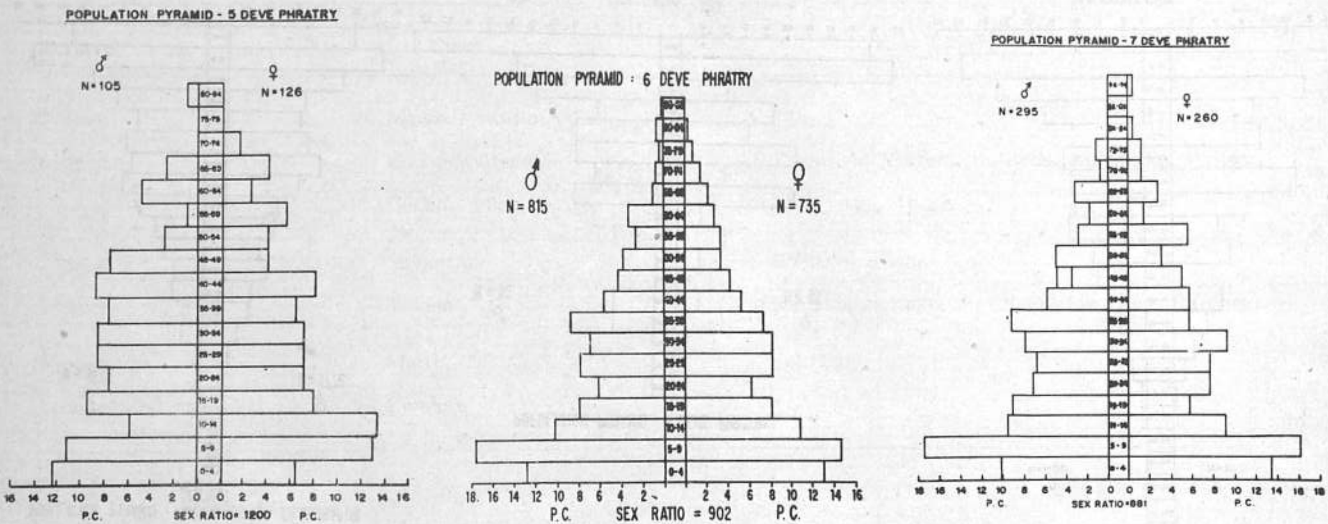

POPULATION PYRAMID - 5 DEVE PHRATRY
♂ N=105
♀ N=126
P.C.
SEX RATIO= 1200
P.C.
POPULATION PYRAMID : 6 DEVE PHRATRY
♂ N = 815
♀ N = 735
P.C.
SEX RATIO = 902
P.C.
POPULATION PYRAMID - 7 DEVE PHRATRY
♂ N=295
♀ N=260
P.C.
SEX RATIO=881
P.C.

Fig. II

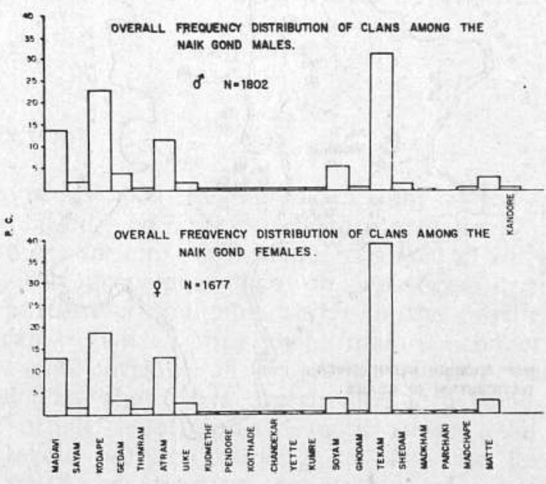
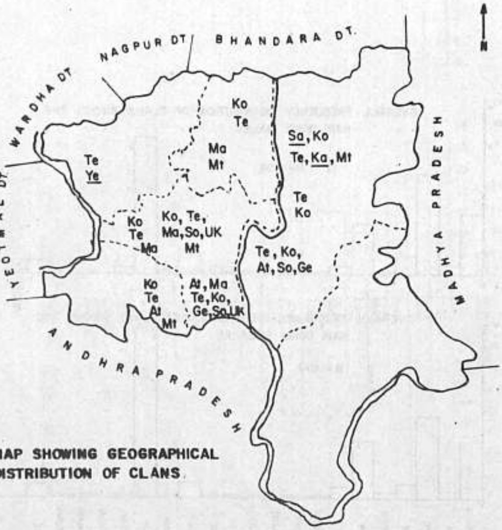

OVERALL FREQUENCY DISTRIBUTION OF CLANS AMONG THE NAIK GOND MALES.
♂ N=1802
OVERALL FREQVENCY DISTRIBUTION OF CLANS AMONG THE NAIK GOND FEMALES.
♀ N=1677
P. C.
KANDORE
MADAVI
SAYAM
KODAPE
SEDAM
THUMRAM
ATRAM
UIKE
KUDMETHE
PENDORE
KOITHADE
CHANDEKAR
YETTE
KUMRE
SOYAM
GHODAM
TEKAM
SHEDAM
MADKHAM
PARCHAKI
MADCHAPE
MATTE

Fig. III



MAP SHOWING GEOGRAPHICAL
DISTRIBUTION OF CLANS.

ETHNIC GROUPS AND LINEAGES AS STRUCTURAL UNITS AMONG THE KINNERS OF HIMALAYAS

Ramesh Chandra

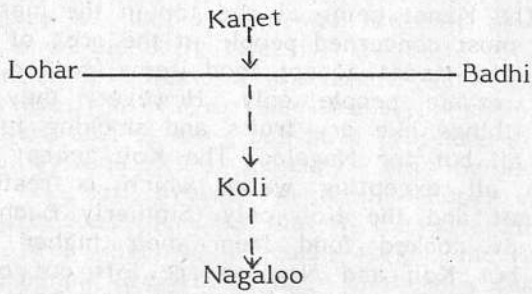
Introduction

Divisions and segments of any tribe or social group based on socio-cultural, religious, economic and other factors are important units of population study. The groupings done on whatever criteria, give a set pattern or indicate trends in the profile of social demography since they are mainly concerned with inflow and outflow of brides or mating partners. It is usual that the tribes are divided into some subgroups at the ethnic level, lineage or *Khandan* level and such other levels -- each working as, at some level, structural units constituting population structure of the group. Here in this paper I am concerned with the population structural units of the Kinners -- a tribe living in the north-western Himalayas in the district Kinnaur, Himachal Pradesh (Table 1). I would try to demonstrate as how this vast group of tribe called Kinners is divided and segmented into various categories working as definite independent structural units controlling the social demographic aspect of the tribe, specially the inflow and outflow of the brides and thus regulate the marriage system.

The kinners are a tribe in general; but within this tribe which is endogamous in nature, there are different sub-groups (all exogamous) at the level of ethnic group, lineage/Khandan and other socio-religious groups (Table 2). The Kinners are fraternal polyandrous people basing much on their religion. Their population structure has also bearing on religion as some of the Kanet's lineages, as it will appear later, are derived after religion. Mating pattern (Biological sense) and/or the marriage system (socio-cultural sense) of these people is governed after considering the various structural units that are in existence in the Kinners.

Structure of the Population

The general appellation Kinner includes five ethnic groups within its fold. These are the Kanet, Koli, Badhi, Lohar and the Nagaloo. Each of these groups is an independent ethnic group strictly endogamous in nature. Flow of brides is within the respective ethnic group only, though all of them behave homogeneously so far the socio-cultural life or ethos of the tribe is concerned. The Kanet is dominant ethnic group to which all other four groups look upon and depend heavily to derive the social code and 'living in order' of the tribe in general. The Kanet are in a way 'trend setter' for all socio-cultural life style to other groups. However, they do not have any occupational base as the case is with other ethnic groups. The Koli are the weavers, tailors and also engaged in leather works; the Badhi are the carpenters, Lohar are the smiths and the Nagaloo are the basket makers. All these five ethnic groups of the tribe Kinners work as structural units regulating population structure and checking or permitting flow of brides and other aspects of social demography. A sense of hierarchy is present among the ethnic groups and the model followed is that the Kanet occupy the highest position in the order followed by the Badhi and Lohar who have some dispute among themselves regarding the superiority of the each over the other; then come the Koli and in the last the Nagaloo who are placed at the bottom of the hierarchical order. The model is somewhat as given below:



The structural unit at the ethnic group level restricts the movement of the girls in that group only that is to say a Kanet bride would move within the Kanet group and the Koli in the Koli group respectively and the like wise. However, there is some flexibility in case of Badhi and Lohar who among themselves can, if situation so demands, exchange brides of flow of brides could be on either direction. This is mainly due to the fact that these two ethnic groups are numerically very weak. In case of Koli and the Kanet regulation and prescription regarding population structure is very strong and as such flow of brides is restricted within the respective group only. Excommunication and inclusion in the lower ethnic fold is the fate of any interethnic marriage. I could record two such cases where this had happened. In one case a Kanet Man had married a Koli woman and in the other the case was just reverse. In both the cases excommunication was the result and both the Kanet persons were degraded into the Koli fold.

Rules of commensuality are very much in vogue and the ethnic groups are governed by those rules to the extent that the identity of the Ethnic groups becomes obvious in day to day life which in other words maintains the population structural units quite distinct and apart. In case of excommunication rules of commensuality are also imposed on the concerned members. The Kanet being at the top in the hierarchy remain the most concerned people in the area of commensuality. The Kanet accept food items (cooked ones) from their ethnic people only. However, they may accept dry things like dry fruits and smoking tobacco etc., from all but the Nagaloo. The Koli accept every thing from all excepting water which is restricted to the Kanet and the Koli only. Similarly Badhi and Lohar accept cooked food from their higher group the Kanet but Koli and Nagaloo are left out of the interacting fold. The rigid commensuality norms are so much pervasive in the minds of the Kinner people that the population gets segregated into ethnic groups on its own and it perpetuates in the form of restricting marriages within the group which gives it a concrete shape of a structural unit, not only in sphere of marriages but other areas as well.

The Kanet ethnic group is quite a dominant structural unit for population structure of the Kinners. As a matter of fact, the Kinner tribe is represented by the Kanet group mainly. This group is further divided into three social sub-groups called as:

1. Orang Kanet - Treated as superior Kanets.
2. Orang Mechh or Maorang Kanet - Inferior Kanet
3. Waza or Ghara Kanet - Kanet having occupational base.

The Orang Kanet are the superior Kanets having been associated with the religious deities and their functions, forming integral parts of the temple working teams with various functions to perform like that of priest, *Groksha*, *Mathas* and other *Kardars* (temple functionaries). The Orang group is further divided into many segments referred the unit of Lineage/Khan-*dans*. The Maorang group of Kanet includes general category of the people who are not associated with temple or the deity directly. The third social sub-group called as the Waza or the Ghara Kanet is constituted by those who have some basis in their occupation. Members of this sub-group have professions like pottery, carpentry and often masonry. May be that presently they are not involved in such occupations but their heritage does speak so that in the past their ancestors have been involved in such works; and some of the Waza people are still engaged in these works. Regulation of marriage in terms of restriction of out flow of the brides outside the sub-group starts working right from the social sub-group itself. This indicates that the mates are to be chosen from and within one's own social sub-group only. This remains the 'thought of order' of the tribe. The closeness to the deity and its temple forms a kind of hierarchy among the Kanets themselves. And this creates some stratified order in the social structure of the tribe in general and the Kanet in particular.

The Kanets besides being divided into three social sub-groups, are further segmented into a number of lineages within each sub-group that are mainly to work as regulating system for marriage and thus the flow of brides. Some lineages collected from the field during the phase of investigation are shown below under the respective sub-group of the Kanets (Table 3). It is to be noted that the lineages have some territorial dimension with them as all names are not universally found in the area, rather it is with some local touch in the naming pattern of the lineages that becomes evident when we peruse them according to the area of study villages. It is seen that the population strength of these lineages is not very strong as in a villages only a few households belong to a particular lineage.

In a village Chandika of central Kinnaur, where live 53 households of the Kanet having 375 persons only 12 lineages are found to exist. Each lineage/Khandan has its own traceable ancestry usually upto two or three generations. There is no set pattern about their settlement in the village as the households of any particular lineage are scattered in the whole of the village. Although the lineages mentioned in the above chart are as many as 34 in number but of these only 12 namely Khashto, Kushan, Rekpang, Ranseru, Mutan, Nektu, Shuran, Charas, Kochapang, Thakutas, Ganki and Rekpang are said to belong to the village. Of these Rekang is the largest lineage group having some 14 housholds followed by Ranseru 6, Mutan 5 and Khashto and many others with 4 households respectively. Each lineage is exogamous though village exogamy is not the rule. Each of the lineage is free and independent structural unit and is not oblige to observe any death pollution rites for other lineage people.

A little different picture is emerging from the study of a western Kinnaur village, Maheshwar (Table 4). In this village having Kanet population of 284 persons distributed in some 49 households there exists some 13 lineages. Here in Maheshwar village though the function of lineage remains the same, i.e., to regulate the flow of brides according to the rules prescribed by the community, check the inflow and outflow of the mates and bind its members as one structural unit from the view point of population structure, yet some territorial dimension is added to it along with the idea of observance of death pollution with some of the lineage groups and sharing the cremation ground with closely associated lineages. A sort of clubbing of some lineages is seen in Maheshwar village on the grounds just discussed here. The lineages which are listed here, are divided into eight wider groups governed by the norm of exogamy, death pollution and cremation ground sharing persons living in one hamlet derive the notion of Kodorang (people related by blood and lineage ancestry at some level).

The lineages living in hamlet Mazzlling have a common cremation and observe death pollution and other rituals together with all the members of the hamlet. They observe exogamy not only within the lineage but at the hamlet level as well since the idea of *Kodorang* operates among them. Of the 13 lineages of the village 4 having 16 households are thus grouped together to form a wider structural unit giving a new dimension to the population structure of the tribe. This appeared to be the case of fission of the lineage groups at some point of time since in no other hamlet similar situation is found. The Zitpalling hamlet has three lineages of which Kotal is independent one and the other two, i.e., Topuch and Turus are sharing one common cremation ground and hence behave as *Kodorang*. Other hamlets are devoid of any such consideration and behave as independent structural units adding much to the population structure of the tribe in general.

The various segments as discussed here are working in the light of controlling mating behaviour of the tribe and provide an intent check on any disorder in the system. Deviations are severely met with and consequences are grave as mentioned earlier. This helps in the smooth perpetuation of the Kinners. Following Kanet model of segmentation other ethnic groups, specially the Koli have also derived some mechanism to regulate their marriage ties within the fold of structural units and to avoid incest and inbreeding among closer order of people of the same ethnicity.

The ethnic group Koli is well distributed throughout the district Kinnaur, in all the cultural zones, valleys and villages. They do not have any further segmentation in terms of lineages or *Khandans*. In order to follow the ideational model provided by the Kanets -- the trend setter in the tribe -- the Koli have evolved a mechanism to divide its sizable population into some further groups based on occupational specialisation. They have occupations like weaving, tailoring and leatherworks -- making shoes and leather sacs etc. The Koli population structural units have bearing on these occupations. Each occupational group works as an independent unit for the sake of regulation of marriage ties and mating behaviour of the Koli. This is also to help avoiding the incest and inbreeding since Kolis having one occupation do not indulge in other occupations and thus maintain their own identity; and is observed at the occupational group level. To illustrate this, a Koli boy having tailoring occupation cannot marry a girl whose patri people have tailoring as occupation.

For other ethnic groups like Badhi and Lohar and Nagaloo, it is observed that being in thin population size these groups go for village exogamy to avoid disorderly marriage ties as all those living in a village belong to same ancestory. Thus in these cases ethnicity is the only criteria to establish their population structural units.

The Kinners having different levels of structural units in their society, at the ethnic group level and further at the social sub-division and lineage/Khandan levels, and interestingly enough at the occupational specialisation level, reveal that the various structural units work cogently to help regulate mating behaviour of the tribe; and maintain population structural identity as well within the larger framework of a homogeneous tribe without loosing their intrinsic values.

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TABLE - 1

Ethnic group population in Kinnaur

Total Population	Kanet	Other ethnic groups	Others
49,835	34,090	9,669	6,076
	68.41%	19.40%	12.79%

Source: Census of India, 1971.

TABLE - 2

Ethnic group distribution in villages of study

Name of Villages	Kanet	Koli	Lohar	Badhi	Nagaloo
Dabla	170	78	6	--	--
	(31)	(14)	(2)	--	--
Chandika	375	264	--	--	--
	(53)	(49)	--	--	--
Maheshwar	284	189	23	40	16
	(49)	(30)	(3)	(7)	(3)

Figures in parenthesis indicate number of household of each Ethnic group in the villages of study.

TABLE - 3

Various structural units of Kanets in the population structure of the Kinners (Central Kinnaur).

Kanet

Orang Kanet	**Maorang Kanet**	**Waza Kanet**
Groksha, Ranseru, Rekpang, Khashto, Kushan, Charas, Surag, Sangchain, Kharian, Turkian, Rangmien, Patiyan, Pangtu, Porpang, Kochapang, Rekpang, Thakutas, Ganki.	Arais, Erais, Surian, Krungalgo, Tholpa, Aswan, Yuthung, Sokhan, Dancas.	Nektu, Garh, Mutan, Pranas, Pisipan, Jangpan, Jegta.

TABLE - 4

Distribution pattern of lineages as structural units in the population structure of the Kinners (Western Kinnaur)

Hamlet	**Lineage/Khandan dwelling**			
Mazzaling	Kotch (8)	Borantu (2)	Chankum (3)	Sumtian (3)
Zitpalling	Kotal (4)	Topuch (5)	Turus (7)	
Dunpalling	Jangian (4)	Puchan (2)	Charas (1)	
Baucha	Shukliya (1)	Shomyan (3)	Chatkiya (3)	

Figures in parenthesis indicate number of households of each lineage.

POPULATION STRUCTURE OF THE BHOTIA TRIBE IN KUMAON HIMALAYAS

Lalit Kumar Kashyap

Introduction

Bhotias or Bhotiyas or Bhutiyas and Bhotos or Bodhs or Bottos, are labels given to a number of tribes living on the Indo Tibetan border. Etymology of the label Bhotia, from the authoritative accounts of Atkinson on Himalayan Tribes, is as follows: "Bod, the native name for Tibet, corrupted by people of India into Bhot, has given rise to the name Bhotiya for the border tribes between the two countries" (Atkinson, 1884). Bhotias of Uttar Pradesh residing in Kumaon and Garhwal Himalayas were declared Scheduled Tribes (STs) in 1967 whereas Bhutias in West Bengal and Tripura and Bhots/Bodhs in Himachal Pradesh were STs right from 1950. Bhutias in Sikkim have been declared STs in 1978 and recently Bhots/Bodhs of Ladakh have also started striving for the status of ST. The term ST generally denotes to an administratively convenient category having invariably a number of sub-groups within it. Bhotia of Uttar Pradesh have following major sub-groups: Jads, Tolchhas, Marchhas, Joharis, Byansis, Chaudansis and Darmias. Johari Bhotias like to be labelled as Shokas whereas Byansi, Chaudansi and Darmias like to be collectively called as Rang. The present paper is confined to reporting of certain aspects of the population structure of a little known small inbred sub-group of Johari Bhotias/Shokas named Harkotias.

The term population structure has been taken in its broadest sense as developed in the following edited volumes: *The Structure of Human Populations* (Harrison & Boyce, 1972), *Methods and Theories of Anthropological Genetics* (Crawford & Workman, 1973), *Demogrpahic Genetics* (Weiss & Ballonoff, 1975), *Demographic Evolution of Human Population* (Ward and Weiss, 1976) and *Population Structure and Human Variation* (Harrison, 1977). The concept of population structure has been reviewed by Yasuda and Morton (1967), Schull and Maccluer (1968) and Cannings & Cavalli-Sforza (1973). Population structure as a concept has evolved to encompass the "ensemble of factors that limit the validity of theories using random mating and infinite populations. Thus, finite population size and deviation from randomness due to geographic, demographic, ethnic, social, psychological and other factors all come into picture" (Cannings & Cavalli-Sforza, 1973). Besides these factors importance of historical delving has also been recognised in recent anthropological studies, as the population structure of a human population observed at any particular point of time is contingent upon preceding historical activities having both cultural and biological attributes. With this perspective in mind the population structure of Harkotias has been analysed in this paper. Few suggestions for bridging the gap between population structure studies and planning for tribal development have been proposed at the end of this communication.

Material and Methods

The Harkotias inhabit only five villages. Out of these, two villages have a common name, i.e. Harkot, One village Harkot, where field work was conducted during December, 1975, is about five kilometers from the Munsiary Tehsil headquarters in Pithoragarh district and is a part of Johar Valley. Other four Harkotia villages named Chaura, Harkot, Khaljuni and Mikila are in Danpur Pargana of Almora District en route Pindari glacier. Cluster of these four harkotia villages is about 100 kms from the village Harkot of Johar valley. To cover this distance Harkotias have to travel on foot for three days. There were 20 Harkotia, 22 SC and 4 Johari Bhotia households in the Harkot village of Johar. All the 20 Harkotia households in village Harkot of Johar were covered by canvassing schedules (to collect socio-economic data) and drawing genealogies-pedigrees in consultation with village elders (to collect bio-demographic data). Representatives of SCs and Johari Bhotias living in Harkot were also interviewed at random. All the four Bhotia families in Harkot were found to be of Kunkiya type. Kunkiyas used to work like serfs with the Johari Bhotias. Upper strata of Johari Bhotias is known as Bharet and the lower one as Kunkiya.

During the field work, two Harkotias from the villages of Almora side were also available in the Harkot of Johar. Their genealogies were drawn besides ascertaining other general information about their four villages in Almora district. Further details about the four Harkotias villages of Almora were drawn from a doctoral thesis submitted to the University of Delhi in 1959. In that thesis entitled "Ethnological study of the Shokas with special emphasis on social structure and Culture Change" by J.D.Mehra, the tribe was labelled as Shokas. However, it was admitted in the thesis (page 116) that "The word Shoka is also used to designate the entire Bhotiya group but in this study, it is meant to define a small group who live in the four villages of Chaura, Harkot, Khaljuni and Mikila". On the other hand, in Johar valley this tribe is known as Harkotias. Because, name of the two villages out of only five villages of this tribe is Harkot, I have preferred to designate Harkotia as the name of the tribe under study.

Labelling Harkotia is further justified if one goes through the Gazetteers of Almora. According to Walton (1911), the chief sub-division of Bhotias classified according to their language, are the (1) *Jethoras* (who speak Rankas or Shankiya Khun -- a Tibetan branch of Tibeto -- Burman family and live in Goripat, Malla Danpur and Johar), (2) *Tolchhas* and (3) *Marchhas* (who have forgotten their old language and employ the ordinary hill language of their southern neighbourers), (4) *Rawats* or *Sankitali Shankas* or *Shokas* -- a corruption of Shokpa (who live in Johar and no longer use their original language), (5) *Byansis*, (6) *Chaudansis* and (7) *Darmias* (who speak their own language). From this classification it seems that the Harkotias belong to the first group of Jethoras -- who derive their name from the world 'Jeth' (which means elder) and claim to be the descendants of the first Bhotia settlers. Sub-divisions of Jethoras, again according to Walton, are named after the villages in which they live. The Jethoras are, unlike all other Bhotias, not traders but cultivators, not migrant but stationary.

During the field work in Johar valley, it was learnt that Jethoras were the original land owners of the area and other trading Bhotia groups arrived at a later stage on the scene. Some of the Jethor Sub-groups like Golphals, Bonyals, Chethhals and Namiquals were reported to have become extinct over time and now no descendant of them can be seen in Johar. At present, there are only 12 villages left of Jethoras which are locally known as Barpatiyas. Name of these 12 villages and sub-tribes known after the name of each village are as follows: Bothi (Bothiyal), Barniagaon (Barnia), Chilkot (Chilkotia), Chona (Bokatyal), Imla (Imlal), Josha (Joshal), Kotalgaon (Kotyal), Namiq (Namiqual now only Jamiyal), Quiri-Jimia (Pachhain), Papera (Papera), Ringu (Ringwal) and Tomiq (Tomiqual). In addition to these sedentary Barpatiyas is the unique 13th group of Harkotias. Uniqueness of Harkotias is in their practice of consanguinity which is not prevalent in any other sub-group of Bhotias.

The Consanguinity Rate and Inbreeding Coefficient (F) were calculated by the pedigree method. Marriages upto three generations only were considered for the calculation of F, so as to avoid the effects of truncation of pedigrees (Kashyap, 1980).

Population figures for all the five Harkotia villages have been gleaned through the Census Reports of 1951, 1961 and 1971. Village wise population figures for Harkotias from the Census 1981 were not available at the time of writing of this paper.

In Harkot of Johar valley, only three clans were encountered: *Harkotia*, *Semia* and *Khaljuni*. In the four villages of Harkotias of Almora district, clan-wise picture was as follows: Chaura (Choria, Bishia, Gondhari, Bhima, Khenchal and Harkotias), Harkot (Harkotia), Mikila (Khaljuni and Byoria) and Khaljuni (Khaljuni, Choria and Harkotia). As all the Harkotia clans are exogamous and their number is small, isonymic method for calculation of F was not employed in this paper.

Results and Discussion

To check the apprehensions of Harkotias about their declining population, an attempt was made to reconstruct the growth trend of all the five Harkotia villages from the available secondary sources and the empirical data collected during the field work. Main secondary sources utilized were the District Census Handbooks (DCHs) for Almora and Pithoragarh Districts of the 1951, 1961 and 1971 Census. The picture of the population figures of all the Harkotia villages emerging from this exercise may be seen in the tables 1, 2 and 3.

Only total figures of Harkotia village may be seen from table 1, as there was no break-up available for Scheduled Castes and Scheduled Tribes at that time. A column for Scheduled Castes was there but without any entry under it in the DCHs of 1951.

Details of population break-up for Scheduled Castes was available in the DCHs of 1961 (Table 2). As Pithoragarh district was created in 1960 after being carved out from Almora District, DCHs for both the districts had to be consulted to re-construct the population figures of five Harkotia villages.

The ST wise population break-up became available from the DCHs of 1971 as the Bhotia tribe got the ST status only in 1967. From the 1971 census figures (Table 3), total ST population in five Harkotia villages may be deduced as 433 (presuming that except 201 SCs in village Mikila rest all 42 were STs). If we subtract few Bhotia residents (say 33) from the total ST population of Harkotia villages, the number of Harkotia population can safely be taken as around 400 at the time of 1971 Census. It is interesting to observe that at the end of 1975 (during my field work) the population of Harkotias was also reported to be about 400 only, with the following village-wise break-up: harkot of Johar (95), Chaura (160), Harkot (45), Khaljuni (50) and Mikila (50).

From the three-decadal Census figures for Harkotia villages, it is clear that the total population of these villages have increased from 675 (1951) to 1037 (1961) and then to 1172 (1971). Total figure for 1951 may be taken as 825 (instead of 675), if we add 150 as the population figure for village Mikila, taking clues from village census reported by Mehra (1959), who conducted field work in the early fifties. According to Mehra the Village-wise population position was as follows: 311 for Chaura (with 200 Shokas/Harkotias), 168 for Mikila, 121 for Khaljuni and only 84 for Harkot.

To see the growth of Harkotia population, we have got the population figures for Harkotias of Chaura for three different points of time but from three different sources. In early fifties, Harkotias were reported to be 200 in Chaura (Mehra, 1959) and according to 1971 Census they were 171 (Table 3). Population of Harkotias in village Chaura further declined to 160 in 1975 (present study). If population of the Harkotias in their largest village (Chaura) is declining, it may be surmised that this would be the probable trend in rest of the four Harkotia villages.

A comparison of growth rate of the SC population with the total population from 1961 to 1971 (Table 2 & 3) provides a clearer evidence of the decline of the Harkotia population. Number of SCs increased from 449 to 659 from 1961 to 1971 showing a growth rate of 46.77. In the same period the total population of the five Harkotia villages increased from 1037 to 1172 showing a growth rate of only 13.02. If we subtract SC population from the total population, rest of the population comes to be 588 in 1961 and 513 in 1971 with a negative growth rate of 12.76. This decline in rest of the population of Harkotia villages, which is constituted mainly by Harkotia tribe, clearly demonstrates that the study population has declined from 1961 to 1971.

Another significant observation from Table 3 is the skewed sex-ratio of the Harkotias. It is interesting to observe that in all the five Harkotia villages, under the ST column, females outnumber the males. Although the number of females is higher, there were cases reported from Harkot village where males remained unmarried throughout their life. Limited spouse pool and large geographic distance among the Harkotia settlements may be the reasons for such cases. Instances of married women coming back and staying with their parents instead with their husbands were reported to be quite common in Harkotia villages. Getting children through illegitimate unions by such women was also reported not to be uncommon. In the matter of sex, the Harkotia society may be having comparatively liberal regulations, as Mehra (1959) also reported "....... lax morals and there are numerous illicit sexual liaisons of both unmarried and married males and females."

It is not known when exactly this demographically distrubed tribal population started the practice of consanguinity but their kinship terminology suggests that the practice is not of reasonably recent origin.

The consanguinity rate and inbreeding coefficient (autosomal) calculated for Harkotias were 16.24% and 0.0064 respectively. Details of the degree of consanguinity is set in the table 4. Only cross-cousin marriages, that too with higher incidence of matrilateral cross-cousin marriages, were noticed among the Harkotias.

From North India, mainly Muslim population have been reported to practice the consanguineous marriages whereas from South India, Hindus, Muslims and some Tribes have been reported to be inbred. Some of the reported inbred populations from North India and the comparative position of Harkotias amongst them may be seen in table 5.

The inbreeding coefficient for Harkotias is higher than that for Jats of Jammu and lower than that of all other reported communities from North India (Table 5). It is expected that the random component of inbreeding, consequently the actual F-values, must be very high amongst the Harkotias having a small number of clans and a finite population size. Demo-geographic compulsions seem to be responsible for inducing inbreeding in the small tribe of Harkotias, living amidst non-inbred communities.

Effects of consanguinity on fertility, mortality and morbidity have been documented in several studies.

Verma (1985) noticed an increase of 1 1/2 times in the rate of malformations among the offsprings of consanguineous marriages from a large series of hospital data. Among the Harkotias also comparatively a large number of abortions and still-births were reported. In Harkot, common malformations noticed were eye and ear deformities, swellings of legs and feet, deaf and dumb children and cases of mental retardation.

Population structure of Harkotias seems to be in disarray resulting in its decline. Besides the biological (inbreeding depression) and demographic (disturbed age and sex structure) reasons, there were certain social factors reported to be responsible for dampening the dynamism of Harkotia population.

In social hierarchy Harkotias are placed between Bhotias and SCs. Culturally they are caught between the dominant groups of Bhotias and Kumaonis. Having no strong enough cultural base or focus (Mehra, 1959), Harkotias were wide open to all manners of disintegrating influences irradiating from the two dominant cultures. In their anxiety to be this and that culturally in a confused and directionless manner Harkotias run the risk of becoming fairly normless themselves and are in real danger of being lost on the high seas of cultural flux. Professor Mehra highlighted the hapless state of Harkotia society in the following words: "They seem to have been dehydrated of much of their verve and dynamism and to be sunk in melancolic langour of abject surrender to their fate or destiny, which to them comes in the guise of an unequal combat with forces of a superior culture, against which they seem to have little effective defence. It appears that they suffer from an 'anomy' which paralyees their inner walls of surging dynamism and relaxes all springs of action."

Speaking theoretically, at present, it may be said that to come out of the confusion on cultural front, Harkotias have to identify their exact position amongst the Jethoras, Johari Bhotias, Kumaoni Rajputs and SCs by the retracing their ethnohistory and to start feeling proud of their heritage. On biological front, Harkotias have to increase their genetic heterozygosity to reduce the genetic load by establishing matrimonial alliances with some neighbouring communities who are nearer to them in social hierarchy. Only future studies would tell, how Harkotias -- a biologically and socially strained society -- (i) found a way out from the stiffling situation created by circumstances, or (ii) lost their cultural and biological identity.

At the end of this paper, I am tempted to touch briefly on the tribal population structure studies that need to be conducted in future. For only those who want to do applied research, population structure studies should not stop at the simple description of the demographic profile, mating pattern and genetic structure of a tribe but their data should be oriented towards the planning for tribal development. Tribal health and family welfare are the areas where such studies can contribute significantly. A look at the list of studies on health related problems of tribes conducted by the TRIs and the ICMR during the Sixth Plan Period (Annexure I & II) reveals that a lot more such studies and, in such studies, can be done. Few suggestions are proposed below with the hope to bridge some gap between the population structure studies and programmes for tribal development.

1. Research workers going to conduct population structure studies should be aware of the major national programmes for the development of weaker sections, like the Tribal Sub Plan (TSP), Special Component Plan (SCP) and Integrated Rural Development Programme (IRDP), and about the thrust areas in the current plans of both the Central and State Government. This knowledge may be helpful to orient the findings of a study towards the success of some

of the on-going development schemes in the study area. Linking up the study findings to development needs of the tribe may not always be possible but knowledge of development programmes would definitely facilitate rapport establishment with the study population, necessary for any successful fieldwork in the prevailing conditions in most of the rural areas of the country. A researcher knowing that declining or stagnant tribes get centpercent Special Central Assistance for their development as 'primitive tribes' under the TSP, may not stop at simply describing fertility/mortality and growth rate but would go ahead recommending the special status for the tribe studied for its rapid all round devleopment.

2. The 'Hit and, Run' technique employed by many researchers may not yield the desired results. Duration of field work has to be sufficiently large for population structure studies so that some significant findings or tangible results may emerge. Dr. Gajducek who reported the unique tribal disease 'Kuru' among the 'Fore', had to visit a tribe of Papua New Guinea in four successive years to report yet another unqiue disease -- 'Male Pseudo-hermophroditism of Simbari-Anga'. He undertook another five annual visits in that tribal area before realizing the importance of thorough genealogical survey for explaining the peculiar trait (Gajducek, 1977). The finer details about the sub-divisions of Bhotias of Kumaon (which have been discussed earlier in this paper) were unmasked only after staying continuously for five months in the study area.

3. Small tribal populations have the potential of providing useful information on unusual diseases and unique genetic variants. Urgent attention needs to be paid to study the structure of such small tribal populations. Higher frequency of traits like Sickle Cell,

Thalassemia and G-6 PD deficiency reported from various tribes can only be detected by the analysis of blood samples in the laboratories. Lack of good laboratories for biochemical analysis, perhaps, has resulted in considerable tribal blood-drain from India. In a large number of cases, blood samples of Indian tribes have been sent to the laboratories of Kirk (Australia), Papiha (England) and Walters (West Germany). It would be appropriate if we analyse such samples in India alone in collaboration with Indian scientists until it is unavoidable to send tribal blood samples abroad. It is high time that a National Institute for Tribal Health is established, equipped with good laboratories for biochemical and cytogenetical analysis and manned by an inter-disciplinary team of scientists. Some regional centres set up by the ICMR to conduct tribal health studies should also form part of the proposed National Institute. A documentation centre in the Institute, for maintaining a data bank and providing a Review/Abstracting Service on tribal studies is also needed to disseminate the flow of information coming from different sources to the concerned quarters. Till such an institute is established, we must continue our population structure studies managing with the available funds and facilities.

4. For a good population structure study knowledge of a number of sub-disciplines is imperative. Besides having a sound foundation in anthropology, knowledge of demography, nutrition and ecology and exposure to the literature of related fields like epidemiology, social and preventive medicine, community and public health is also desirable. Laying hands on proceedings of seminars/symposia (like on Health & Disease in tribal Society/Societies by the Ciba Foundation, 1977) and review articles (like on Health of Traditional Societies by Wirsing, 1985) on the subject can help in this matter.

5. Interested workers in the field, need to attend training programmes/workshops on methodologies/techniques of social surveys, demographic analysis, nutritional assessment, statistical treatment, biochemical assaying and cytogenetic mapping among others to sharpen their skills. Tribal Research Institutes, sparsed in about 12 different states, must take a lead in organising such training programmes for developing the human resources by collaborating with other willing organizations/universities.

Picking up some lines of action for future study, emanating from the above outlined suggestions, I would be revisiting the Harkotias at the earliest available opportunity.

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Annexure - I

Studies on Topics Relating to Population Structure/ Health and Family Welfare of Tribes Undertaken by

the Tribal Research Institutes (TRIs) During the Sixth Plan

Andhra Pradesh

1. Venereal Diseases Among Tribals.
2. Health Status on Boarders of Ashram School in Visakhapatnam District.
3. Fertility and Family Planning among Kolams of Adilabad District.

Assam - Nil -

Bihar

1. Study of Main Causes of Malnutrition Including Consumption of Khesari Dal.
2. Health Survey of Pahariyas
3. Health Coverage in Tribal Areas

Gujarat

1. Survey of Health and Sanitation Conditions in Tribal Gujarat.
2. A study of Food and Nutrition among Tribals of Gujarat.

Kerala - Nil -

Madhya Pradesh - Nil -

Maharashtra - Nil -

Orissa

1. Study of Health and Nutritional Problems of Pauri Bhuiyans of Jaldih Board Area in Sundergarh District.

2. Study of Health and Genetic Problems of Kutia-Kondh of Belghar Area.

3. Survey of Health and Nutritional Status among the Juangs of Keonjhar and Gadabas of Koraput District.

4. Study of Health and Nutritional Status of Tribals of Orissa.

Rajasthan

1. Health coverage of panchayat samiti, Jhadol.

2. Impact of Special Nutrition Programme.

3. Guinea-worm Incidence vis-a-vis Hand Pump Programme.

West Bengal

1. Study on Prevalence of Diseases among the Tribals of 'Tribal Contracted Areas' and their Acceptance of Modern Medicine.

(Source: "Tribal Research Institutes An Appraisal", Background Paper on Tribal Development No. 10, Ministry of Home Affairs, Government of India, 1984).

Annexure - II

Studies on Topics Relating to Population Structure/ Health and Family Welfare of Tribes Undertaken by the Indian Council of Medical Research (ICMR) During the Sixth Plan

1. Multi-centric study on breast feeding practices in the tribal population in Andhra Pradesh, Madhya Pradesh, Manipur, Meghalaya, Orissa and Rajasthan.

2. Study of Nutritional and Health Status of Tribal Population at Regional Medical Research Centres at Port Blair (A & N Islands and Jabalpur (MP).

3. Study of Sickle Cell Anaemia in tribal/SC population of Ranchi (Bihar) and Rajpur (MP).

4. Study of MCH contraceptive practices in tribal population in Cuttack, Imphal, Raipur, Shillong, Udaipur and Warrangal.

5. Study on cancer in tribal and backward areas.

6. Study on Psycho-social aspects of Bihar population.

(Source: Annual Report of the Ministry of Health & Family Welfare, Government of India, 1984-85).

TABLE - 1

Population size of Harkotia villages as per the census of 1951

Villages	Population (Total)			SCs
	P	M	F	
1	2	3	4	5
Chaura	285	128	157	--
Harkot	86	47	39	--
Khaljuni	127	75	52	--
Mikila*	--	--	--	--
Harkot (of Johar)	177	91	86	--
Total	675	341	334	--

* No mention of this village was found in the Village Directory of the DCH Almora (1951).

TABLE - 2

Population size of Harkotia Villages as per the census of 1961

Villages	Population (Total)			SCs		STs
	P	M	F	M	F	
Chaura	367	197	170	52	82	--
Harkot	93	48	45	21	22	--
Khaljuni	161	81	80	37	41	--
Mikila	199	102	97	54	48	--
Harkot (of Johar)	217	107	110	48	44	--
Total	1037	535	502	212	237	--

TABLE - 3

Population size of Harkotia villages as per the census of 1971

Villages	Population (Total)			SCs		STs	
	P	M	F	M	F	M	F
1	2	3	4	5	6	7	8
Chaura	442	223	219	129	127	85	86
Harkot	87	42	45	20	22	20	22
Khaljuni	154	75	79	26	34	34	35
Mikila*	243	133	110	111	90	--	--
Harkot (of Johar)	246	116	130	45	55	48	61
Total	1172	589	583	331	328	187	204

* Break-up of ST Population for this village was not available in the DCH, Almora (1971).

TABLE - 4

Consanguinity rate and inbreeding coefficient amongst the Harkotias

Degree of Consanguinity						Consanguinity Rate	N.C. marriages	Total marriages	F
I	I 1/2	II	II 1/2	III	Others				
1	2	3	4	5	6	7	8	9	10
9 (7.69)	4 (3.42)	3 (2.56)	1 (0.85)	2 (1.71)	0 (0.00)	19 (16.24)	98 (83.76)	117	0.0064

TABLE - 5

Inbreeding levels in some North Indian population groups

Group	State/ U.T.	Total Marriages	Consanguinity Rate	Inbreeding coefficient	Reference
(1)	(2)	(3)	(4)	(5)	(6)
Muslim					
Ahmadiyyas	J & K	863	30.59	0.0146	Kashyap, 1978
Sunnis	J & K	316	16.46	0.0085	Kashyap, 1978
Shias	J & K	114	57.89	0.0185	Kashyap, 1978
Gujiars	J & K	282	30.85	0.0122	Kashyap, 1978
Dawoodi Bohras	Rajasthan	957	41.80	0.0219	Basu, 1978
Sayyad Shias	U.P.	1000	49.40	0.0199	Basu, 1978
Sunni Sheikhs	Delhi	1158	29.10	0.0124	Basu, 1978
Sunni Moghals	Delhi	253	22.13	0.0112	Basu, 1978
Sunni Pathans	Delhi	72	23.61	0.0134	Basu, 1978
Hindu					
Bhatias	Rajasthan	100	57.00	0.0248	Bhalla and Bhatia, 1974
Jats	J & K	229	11.35	0.0048	Kashyap, 1978
Tribal					
Harkotias	U.P.	117	16.24	0.0064	Present Study

CULTURE AND DEMOGRAPHY AMONG THE HIGH ALTITUDE SHERPAS

Ranjan Gupta

Introduction

Since long man has been cognizant that condition of life is usually harder and breathing is difficult in high than in low altitude areas and that striking functional and morphological differences exist between high and low altitude populations.

The effects of environmental traits of human biological parameters have been recognised by the ancient thinkers of pre-Christian era, for example, Herodotus, Hippocrates and others. Despite a deluge of works in recent times, however, our knowledge concerning the biology of man at high altitude is still fragmentary.

In view of this, a comprehensive bio-anthropological study of the Sherpas of Upper Khumbu (3,500-4,500 m), northeastern Nepal, and Darjeeling district (1,000-1,500 m), West Bengal, India was undertaken to evaluate the effects of altitude on demographic, anthropometric (both adults and children), dietary, clinical-haematological, etc., traits. Part of the demographic data reported earlier (Gupta, 1980) shows that whilst a consistent relationship exists between altitude and fertility -- the latter being reduced in the high altitude Sherpas -- no relationship is detectable between altitude and mortality.

Subsequently, Sherpa villages/hamlets at the low altitude Kalimpong area were classified into three occupational categories on the basis of the following primary occupations: (1) predominantly cultivation/agriculture labour, (2) plantation labour, and (3) forestry (including forest labour and wood cutting-cum-selling) to detect the effects of cultural factors on biological traits holding altitude invariant. Our findings showed no significant difference in mortality, but a consistent and generally significant pattern of fertility reduction in the agriculture practising group (Gupta, 1979; Gupta, 1981). These findings suggest that cultural factors associated with occupation, spatial distance and the degree of urban contact may have greater effects on fertility than altitude hypoxia, even if the possibility of hypoxic effect cannot be entirely ruled out.

In high altitude areas in general and the Upper Khumbu region in particular where the hypoxic stress acts as a major environmental constraint, cultural factors associated with the degree of urbanization also have been found to have important effects in determining demographic structures (Hoff and Abelson, 1976; Weitz *et. al.*, 1978; Goldstain, *et. al.*, 1983; Basu, *et. al.*, 1984; Basu and Gupta, 1984; Ross, 1984).

The above findings prompted us to reexamine our high altitude demographic data. Accordingly, we reanalysed our Upper Khumbu data by classifying the villages as 'Urbanized' and 'Unurbanized'. This classification was intended to be analogous to Weitz *et. al.'s* (1978) classification of 'Acculturated' and 'Unacculturated' villages.

The purpose of this report is to compare the demographic characteristics of the Urbanized and Unurbanized clusters of the Upper Khumbu Sherpas to detect the effects of cultural factors on the demographic characteristics.

Materials and Methods

The Upper Khumbu villages/hamlets under study were grouped into the following two clusters: (1) 'Urbanized' i.e., villages clustered around the major trekking route to Mt. Everest whose economy was mainly based on mountaineering and cash based tourism, and unurbanized', i.e., villages relatively more isolated and located further away from the trekking routes and having their economy mainly revolving around agro-pastoralism.

The demographic information were collected using household and fertility questionnaries/schedules. The first was completed using information on age, sex, marital status, place of birth, occupation, expenditure, etc.; from the head of each household or from some elderly members of the household. The fertility schedule was completed using information from married females on their reproductive performance. Difficulties were encountered in the assessment of age. The data on reproductive wastages have not been utilized for this study because of the possibility of under-reporting and recall lapse.

Results and Discussion

Figure 1 shows that about 40, 48 and 10% of the population in the Urbanized cluster and 47, 41 and 11% in the Unurbanised cluster are in the 0-14, 15-49 and 50+ years age groups respectively, suggesting a potentially growing population trend. The overall sex ratios are 52.51% and 47% and the sex ratios at birth 50.68% and 47.32% in the Urbanised and Unurbanised clusters, respectively. Figure 1 also shows a constriction at the base of the population pyramid of the Urbanised cluster, suggesting a recent decline in fertility and /or high infant mortality, of which latter possibility, however, there is no record. Monogamy is the main form of marriage in both the clusters; about 93% of marriages are monogamous in Urbanised and 98% in Unurbanised clusters, with only rare instances of polygynous and polyandrous marriages in both.

The child:woman ratio is 50.67 in the Urbanised, 78.05 in Unurbanised clusters indicating high fertility in the latter by comparison with the ratio in a number of high fertility populations, e.g., Hutterites, Dinka and the Alaskan Eskimos (Eaton and Mayer, 1953; Roberts, 1956, Milan, 1970).

The net reproductive index is 1.64 and 3.00 in Urbanised and Unurbanised clusters, respectively, which again corroborates high fertility in the latter.

In all the fertility measures employed (for example, completed family size, total fertility rate, mean number of live birth per fertile woman, mean number of surviving children per fertile woman) (Table 1) women of the Urbanised cluster show a consistently lower fertility than in the Unurbanised cluster considering both 'all women' and 'per fertile woman'.

Table 2 shows that both infant and adolescent mortality rates are lower in Urbanised than in the Unurbanised cluster.

To sum up the findings, it appears that both fertility and mortality levels are consistently lower in the Urbanised cluster compared to the Unurbanised cluster. Although the physical environmental factors (e.g., hypoxia, cold, terrain, etc.) are known to affect both fertility and mortality levels (hypoxia is known to affect fecundity and reproductive physiology as well as infant mortality due to low birth weight --

for review see Clegg, 1978), cultural factors associated with the degree of urbanization appear to be more important even in the stressful environment of a high altitude region. For instance, Heer (1964) suggested that fertility differentials were functional effects of socioeconomic structure in Andean countries and demonstrated a negative relationship of the fertility of women with their proportion in the labour force. Goldstein *et al.* (1983) ruled out hypoxia as a causative factor completely and attributed the low fertility of high altitude Himalayan populations, where it occurred to cultural factors alone. Basu and Gupta (1984) contested this view and suggested that hypoxia and other altitude-related physical environmental factors could not be ruled out but recognized the possibility that concomitant sociocultural factors may have precipitating effects.

The present finding is in conformity with Weitz *et al.'s* (1978) study of the effect of urbanization on the demographic structure of the same region as well as population and therefore confirm their observation although it does not by implication rule out the possibility of hypoxic effect.

ACKNOWLEDGEMENTS

We are indebted to the Sherpas of Upper Khumbu, Nepal for their help and cooperation; to His Majesty's Government of Nepal for allowing us to undertake this research in Upper Khumbu to Shri P.C. Kumar for preparing the diagram, to Shri K.K. Halder for secretarial assistance; and to Professor A. Basu for guiding this work.

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TABLE - 1

Fertility measures among the Sherpas

Population	Completed Family size	Total Fertility Rate	Mean No. of live births per fertile woman	Mean no. of surviving children per fertile woman	Child: Woman Ratio	Net Reproductive Index
Urbanised	4.36	4.81	3.85	3.35	50.67	1.64
Unurbanised	5.00	5.75	4.62	3.87	78.05	3.00

TABLE - 2

Mortality measures among the Sherpas

Population	Total no. of live births	Infant Mortality Pate (%)	Adolescent Mortality Rate (%)
Urbanised	221	4.98	12.22
Unurbanised	112	11.61	15.18

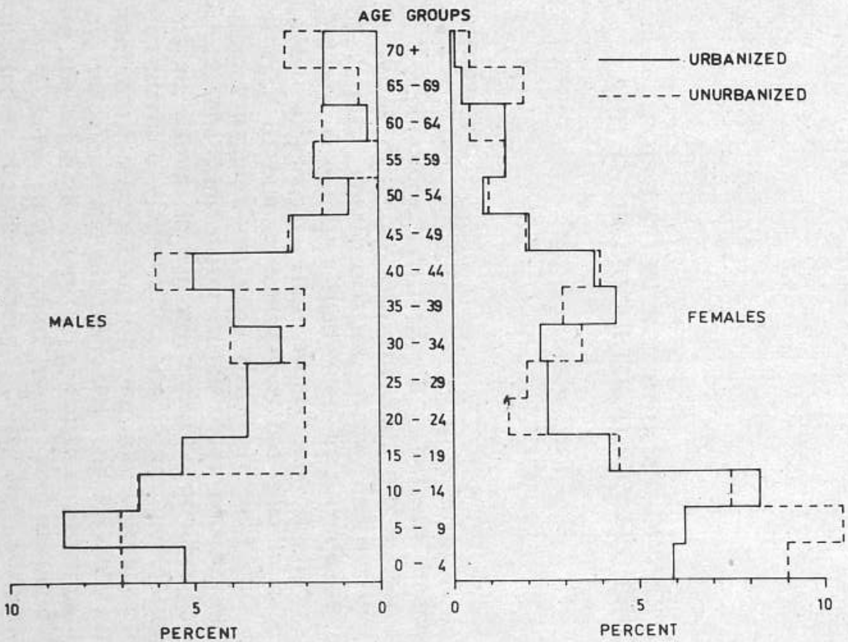

Fig. I

POPULATION PYRAMIDS

POPULATION SIZE AND SUB-DIVISION, AND THEIR BIOCULTURAL CONSEQUENCES

Amitabha Basu

Introduction

Populations, defined in whatever manner, e.g., in terms of ecological, regional, ethnic, social, economic, etc. characteristics, vary enormously in size, and are very often subdivided into complete or incomplete subgroups. This phenomenon is true not only in case of human populations but also in case of many animal populations: e.g., there are subgroups of Drosophila inhabiting different altitudes and having different mating habits. In humans, these phenomena have reached considerbale elaboration, and in the population of India they have reached an extreme stage, perhaps aggravated by its unique and all pervasive caste system, in addition to the wide diversity of physical environmental factors. On a very rough count there are about 3000 castes in India. Besides these, there are several religious groups. The Scheduled Tribes, who constitute the bulk of the tribal populations, are more easily enumerable and number 250 by 1981 Census (Singh, 1985). Some of these tribes, or tribal agglomerates, are known to be divided into subgroups, e.g., the Nāgas, many tribes in the eastern and northeastern India have large converted Christian subgroups, while many others are also divided in some way but the divisions are not so clear.

Given that population size variations over a wide range and population subdivisions of various kinds are common phenomena among Indian tribes, the obvious question is what aspects of these phenomena should be studied? The question has two major components: (a) What aspects *can be* studied (in the sense that are amenable to scientific investigations)? This component can possibly be somewhat objectively answered for it encompasses the whole range of possibilities. (b) What aspects *should be* studied (in the sense that in preference to others)? This component has admittedly a substantial element of subjectivity, for obviously it involves choice of some of the possibilities in preference to others which in its turn involves a value judgement -- and value judgement is in the last analysis subjective. I shall attempt to deal with both the components in this presentation; for, I have no inhibition to using my value judgement, even if subjectively, in my professions field which is part of my total way of life, and laying it bare for public scrutiny.

The purpose of this presentation is therefore twofold:

(a) To study the genetic consequences of population size, especially size reduction, and subdivision. This objective is mostly but not exclusively academic.

(b) To study the non-genetic consequences of size and subdivision, e.g., consequences relating to health, nutrition, economic/political power, etc. This objective is more of practical significance than merely academic.

The two objectives are not obviously mutually exclusive. Also the biological and cultural consequences are often interrelated. I shall concentrate mainly on the biological consequences, and refer to the cultural consequences briefly.

I shall also cite examples from our own studies to the extent possible, not because other relevant ones do not exist but merely because I know of ours best.

Genetic consequences of Population Size and Subdivision: The Pahira Example

The theoretical aspects of population size (reduction) and subdivision have been mathematically worked out by Wright (1949), and others; I shall not go into them here. I shall cite an emprical example of a small population undergoing subdivision into smaller groups and the major genetic consequences of this phenomenon, i.e., genetic drift. I shall also note at this point that 'size' does not only imply reduction but may also imply growth, and 'subdivision' may be followed by 'amalgamation'; the consequences of some of these reverse processes should also be considered. Much of the following discussion is based on materials presented earlier by Basu (1969, 1971, 1974).

The Paharia, or Pahira, meaning 'people of the hills', is a small population of 1353 individuals, as of my 1963-64 census. They inhabit the foothills and the slopes of the Ajodhya hills in Purulia district, West Bengal and the Dalma hills and the ranges further west across the river Subarnarekha in the Singhbhum and Ranchi districts, Bihar (Figure 1).

This small population of 1353 individuals is further subdivided into one almost completely isolated group which I have designated as Northern Pahira (NP) because of their relative spatial location and two partially isolated ones, the Southern Pahira I (SPI) and Southern Pahira II (SPII), which still intermarry to a certain extent but seem to be in the process of becoming more and more isolated in course of time (Table 1). They were treated as two separate groups because of the fact that intermarriage between SPI and SPII were less frequent and intra-marriage within each more frequent than expected on the basis of chance alone, and the difference was significant:

	SPI x SPI	SPI x SPII	SPII x SPII
Exp. no	68.4	171.0	102.6
Obs. no.	126.0	85.0	131.0

X^2, 99.62; $p < 0.001$

The Pahiras are a very backward, food gathering population collecting roots and tubers in the neighbouring forests, cutting and selling timbers and making brooms from bamboo strips.

The main problem of academic interest involving the Pahiras was the chances of genetic drift in the small subgroups of the following sizes: NP, 301; SPI, 475; and SPII, 577. The size of the breeding population, effective population size and variance of allele proportions due to drift were estimated according to the methods described by Lasker (1952), following Wright's (1949) formulations as follows:

Breeding size, N = no. of *parents* in the group;

σ_k^2 = variance in the number of offspring of the female parents;

Effective population size, $N_e = (4N - 2)/(\sigma_k^2 + 2)$; and

Variance due to drift, $\sigma_{\delta q}^2 = [q(1-q)/2N_e$.

The value of the allele Proportion, q, has been taken to 0.5 in this analysis, because for this value of q the variance due to drift is maximal. Since none of the groups were completely isolated, some adjustment had to be done using the admixture rate. To do this the coefficient of breeding isolation, $N_e m$, was computed by multiplying N_e by the admixture rate, m.

The admixture rate was computed in the following manner: Among the 301 individuals belonging to the NP there are 16 cases of one parent and 11 cases of both parents having been born outside the NP. Thus, the parental element was contributed from outside the group in 16/2 + 11 of the 301 individuals, resulting into an admixture rate of 6.31%. The following classification of $N_e m$ was used: when $N_e m < 5$, changes, in allele proportion due to drift is likely to be marked; when $N_e m$ is between 5 and 50 the changes are still appreciable; but when $N_e m > 50$ the changes are slight (Roberts, 1956; Lasker, 1960). Based on this classification, and considering Table 2, changes due to drift is likely to be reasonaly marked in the NP but not SPI or SPII.

Thus, the data show that changes in allele proportions due to random genetic drift is likely to occur only in the smallest group of this small population.

However, is this the whole story? Subsequent analyses of the Pahira demographic data showed that, under the simplifying assumption of 'stable population', i.e., unchanging age structure, fertility and mortality, and absence of in- or out-migration, the intrinsic rate of natural increase, r, of all three Pahira groups were low compared to that of the total Indian population, and r has a negative value in NP: $r_{NP} = 0.0028$, $r_{SPI} = 0.0119$, $r_{SPII} = 0.0131$, $r_{India\ (1951-61)} = 0.0190$.) Obviously, in a group of the total size of 301 declining by 0.2% per year N_e will decline correspondingly, and even with unchanging fertility, mortality and admixture rates the changes due to drift will gradually increase. It is not important to estimate $\sigma^2_{\delta q}$ or $N_e m$ in relation to a systematic population size decline by - 0.2% per year, although it is quite possible to do so, for the fertility, mortality and admixture rates will most probably not remain unchanged in such a small group, but it is important to indicate that the changes due to drift will gradually increase. The possibilities of the population going through an epidemic, drought or famine, none of which can be ruled out, will further accentuate the possibility of allele proportion fluctuation due to chance.

Two questions may be asked regarding the future of this subdivided population: (a) What happens to the allele proportions if the three groups continue to admix at the present rates and when do they reach homogeneity? (b) What happens to the allele proportions of the Pahira population *as a whole* if the three groups continue to grow/decline at the present rates and the allele proportions of each subgroup remains unchanged?

The first question was approached in the following manner. Consider a population divided into three groups having allele proportions for a certain allele q1, q2 and q3 and unchanging admixture rates as given in Table 3. Assume that the allele proportions do not change except through admixture. Then the allele proportion of the group at the t-th generation will be as follows (Roberts and Hiorns, 1962):

$$\underset{\sim}{q_t} = \underset{\sim}{M}^t \underset{\sim}{Q_o}$$

where $\underset{\sim}{q_t}$ is the vector of allele proportions at the t-th generation, $\underset{\sim}{q_o}$ the initial allele proportions and $\underset{\sim}{M}$ the admixture matrix. Using the allele proportions for the I^B allele of the blood group system we have:

$$\begin{bmatrix} q_1 \\ q_2 \\ q_3 \end{bmatrix}_t = \begin{bmatrix} 0.9688 & 0.0260 & 0.0052 \\ 0.0227 & 0.7750 & 0.2023 \\ 0.0079 & 0.1614 & 0.8307 \end{bmatrix}^t \times \begin{bmatrix} 0.2309 \\ 0.2044 \\ 0.3299 \end{bmatrix}$$

The analysis shows that the allele proportions converged in course of time and were likely to become homogeneous in 88 generations (Figure 2). As a word of caution, these results should not be taken too seriously, for the simplifying assumption of unchanging admixture rate over 88 generations may not be realistic; they are presented merely to indicate that even with such low or medium admixture rates the groups do approach homogeneity, initially quite quickly, and eventually achieve it.

The second question was approached in the following manner. Consider a population of size N divided into three groups of size n1, n2 and n3 growing at rates r1, r2 and r3, respectively per year and having allele proportions q1, q2 and q3, respectively. Assume the r_i's and q_i's do not change over time and mutation, selection, admixture and drift do not operate. Then the allele proportion, Q_t, of the total population N at time point will be as follows:

$$Q_t = \left(\sum_{i=1}^{3} n_{it} q_i \right) / N,$$

where

$$n_{it} = n_{io} e^{r_i t}$$

The values of Q_t at different time points are plotted in Figure 3. It appears that the allele proportions change in the direction of the most highly growing group, as expected, with the rate of change slowing down as the value of q approaches the upper limit. Again, these results should be taken with caution, for the simplifying assumptions are not very realistic; but they nevertheless indicate that the allele proportions of a subdivided population may change, even if the population genetical mechanisms do not operate, merely as a function of the differential growth/decline rates of its constituent groups.

The analyses shown above were done essentially for their academic interest. However these analyses may also have been of practical significance if we deal with genetically determined disease traits. The change of allele proportions of diseases due to drift, i.e., diseases having post-reproductive age of onset (to avoid effect of selection), can be estimated by the simple formula (Mettler and Gregg, 1969):

$$\sigma_q^2 = p_o q_o \, [1-(1-1/2N)^t],$$

where σ_q^2 is the variance of allele proportion q, p_o and q_o are initial allele proportions, N is the population size and t is the time in years.

The high prevalence of retenis pigmentosa in the Tristan population may be a striking example of drastic increase of even a deleterious allele due to drift, notwithstanding perhaps a certain amount of selection operating against the trait.

Non-Genetic Consequences of Population Size and Subdivision: Examples From our Recent Studies

I shall now consider some consequences of small population size and population subdivision which are more directly related to health, nutrition, survival -- demographic and/or sociocultural -- and well-being but not genetic in nature. The examples will be cited mainly from our ongoing projects presently being run under the broad heading of 'Human Adaptability Programme'. The short-term objective of this programme is to detect and measure the effects of physical environmental, sociocultural and ethnic factors on population health, as well as the effects of health and activity pattern on the environment (Weiner, 1969; UNESCO, 1973); the long-term objective was to determine 'the limits to human adaptation, the limits defined in terms of 'a population's health, ability to feed itself adequately, functional capability in its physical environment and reproductive performance' (Baker, 1984).

My first example is from the population of Mirpur village in southern Midnapore district, West Bengal. The population claims descent from 12 Portuguese gunmen who came to this area about 200 years ago, married local women and settled down. Subsequently, marriages occurred with local populations, some with other Christian populations across the Ganges but mostly within the population. As per our 1976 census the population totals 320 individuals, with a completed family size of 7.31 and infant mortality rate of 6.15. These fertility and mortality rates do not apparently imply any immediate threat to the population's demograhic survival. However, despite this apparent security two problems exist: one, with increasing transport and communication facilities and declining orthodoxy, increasing amounts of intermarriage between this population and other Christian -- and eventually non-Christian -- populations far and near will most probably occur so that the population will lose its ethnic identity and get absorbed into wider social groups; and two, given the existing state of malnutrition of the Mirpur population (Table 4) and the high intestinal parasitic infestation (about 90% of the population suffer from one or more infestations), the mortality may rise to such a level as to cause the population to decline despite the high fertility, in the near future (Basu, *et al.*, 1980). In addition to these, a large area including Mirpur village and the agricultural fields of its inhabitants has already been acquired by the government for expansion of the port town of Haldia, which may cause uprooting and dispersal of this small, a typical population, and its sociocultural extinction.

The extinction of some Andaman tribes due to intrusion of diseases to which these small populations had no prior exposure and resistance (Figure 4) is too well known to be discussed. The negative growth rate of one of the Pahira groups has already been mentioned. These are relatively straightforward cases of demographic extinction. The Mirpur case, in addition to showing the chances of demographic extinction due to the 'malnutrition-infection-mortality' vicious circle in a small population, additionally indicates the possibility of socio-cultural extinction due to absorbtion into a broader population or uprooting and dispersal by expanding urban centres.

My second example is from the Sherpas of Kalimpong subdivision, Darjeeling district, West Bengal. The population is divided into three occupational groups, agricultural, plantation labourer and forest labour. The three groups are also characterised by their relative distance from Kalimpong town, the agricultural group being the nearest, the forest labour are furthest and the plantation labour are in between. Completed fertility rate, total fertility rate, mean number of live births per woman and mean number of surviving children per woman increase consistently from the agricultural through plantation labour to forest labour group, indicating differential chances of survival and expansion of the three subdivision (Gupta, 1980). If we compare the pooled Kalimpong Sherpas with the more remote Sherpa settlement in the Medicinal Plantation at Rango located in the fringe of Kalimpong subdivision and Alipurduar subdivision of Jalpaiguri district, we find considerably higher fertility as well as mortality in Rango; we also find higher fertility, mortality in the Buddhist than in the Christian Lepchas around Kalimpong town and in the Bhutia group in northern Sikkim which periodically migrates upwards to about 14000 ft. for potato cultivation than in the one which migrates downwards to about 3000 ft. for maize cultivation (Basu et al., 1984). All these examples further illustrate the differential survival possibilities of subdivisions, often neighbouring, of a population.

I shall now pass over to differential dietary status of subdivisions of single populations.

One-day semi-quantitative dietary surveys were done on the Sherpas and Lepchas inhabiting the Kalimpong subdivision, Darjeeling district, and the Oraons of Alipurduar subdivision, Jalpaiguri district. The detailed results and methodology are reported by Basu *et al.*, (1985) recently and are not repeated here. Briefly, however, the data show (Table 5) significant differences among the three Lepcha groups, i.e., 'Rural less-developed', 'Rural developed' and 'Urban', as well as between the two Oraon groups, i.e., labourers of the adjacent Birpara and Dalgaon Tea Gardens, using four major nutrients, calorie, animal protein, vegetable protein and fat and applying a multivariate analysis of variance technique. Analyses of consumption 'per capita' and 'per consumption unit' show similar results. Differences in intakes between subdivisions are so marked that if one takes up a household randomly from the total sample of households studied without knowing its subdivision affiliation, one can correctly classify it into the subdivision it actually belongs who often a high degree of probability, e.g., about 60% probability in case of the Oraons (Table 6). These results suggest that subdivision of populations in terms of degree of urbanisation as in the case of Lepchas, or the small differences, if any, in income, living conditions and such other facilities as may occur between the two Oraon groups, may lead to considerable differences in intakes of major nutrients, with all the consequences of such difference on adult body size, child growth, haematological status, vulnerability to infections, etc.

Examples can be cited from intestinal parasitic infestations. Table 7 show the significant differences occur between two Sherpa subdivisions, villages, Echhay and Dhapgaon.

I shall not go into details of differences between high and low altitude Sherpa subdivisions in respect of fertility (Table 8), adult body size (Table 9), haematology (Table 10) and blood pressure (Figure 5), for these are discussed in details elsewhere. It is only to be expected of course that differences will occur between such environmentally drastically different subdivisions since they occur between more contiguous, and at least physical environmentally similar, subgroups.

Biocultural Problems Involving Population Size (Reduction) and Subdivision

So far have dealt with the biological effects of population size reduction and subdivision. I shall now go very briefly into the cultural problems associated with these phenomena, as well as those associated with the overlapping area or area of interaction between biological and cultural factors.

A small population size does not only lead to predictable risks of extinction and/or increase of a deleterious allele proportion, which may also eventually reduce the populations chances of survival. It may also lead to a persistent fear of extinction or loss of sociocultural identity and absorbtion into bigger, dominant groups which surround it, or intrude into its boundaries. This fear of extinction or absorbtion into wider populations may not be objectively assessable, but the psychological stress that it generates may indeed affect the population's physical as well as mental and social well-being; the effects of psychological stress on physical well-being is now generally known and that on mental and social well-being by disturbing its relationships with neighbouring populations, by creating a self-imposed isolation, etc. can be visualised. This lack of *perceived state of well-being*, even though subjective, may indeed be a sociocultural problem of great import, generating from the biological/demographic phenomenon of small population size.

The effect of population subdivision on mental and social well-being may not be as detrimental as that of population size reduction if the subdivisions are not as small in size as, for instance, the smallest Pahira group, the Mirpurians or some of the Andaman tribes. Nevertheless, other problems may be involved, equally affecting the *perceived state of wellbeing.* For instance, to cite the Pahira example again, the NP considers itself superior to the SPI and SPII in the sense of being more 'pure', closer to the socially and economically dominant Bhumij group, etc.; and between the SPI and SPII, the latter consider itself more 'pure' than the SPI which is alleged to be 'contaminated' by its nearness to and influence of Jamshedpur town; and so on, thereby leading to schism, intergroup apathy, etc. aggrevating the already evident sense of insecurity and lack of social well-being of a small population of 1353 individuals. A persistent sense of insecurity may not only hamper social well-being, but also cause psychological stress with all its consequent effects on physical well-being, e.g., high pulse rate and blood pressure, insomnia, loss of appetite, gastritis, cardio-vascular problems, etc.

The problem of schism, inter-group apathy can occur in numerically larger groups as well. For instance, the Lepchas of the Kalimpong area are now divided into two religious subgroups, the Buddhists and Christians. The Buddhist Lepchas feel deserted by those who got converted to Christianity for some material benefits associated with missionary contacts. While superficially good neighbourly relations are maintained between the two religious groups of the Lepchas, one can detect an undercurrent of tension, mutual distrust and apathy between them on close observation. Such schism has not created any major social conflicts between the two Lepchs religious subgroups to my knowledge, but the possibility cannot be ruled out in a changing social situation characterised by rising aspirations, on the one hand, and increasing demands on the limited resources, on the other, and the resultant dissatisfaction, psychological stress and inter-group conflict.

In a wider context, one can consider the 'hill-people versus plains-people' problem. At one level all hill people, at least in the Darjeeling-Kalimpong area, feel a sense of identity, and feel dominated upon by the plains-people. However, at a lower level, the Sherpas, Bhutias and Lepchas, the tribals, feel dominated upon by the Nepalis, who were brought into this area by the British Raj a couple hundred years ago, at a still lower level the Lepchas feel dominated by the Sherpas and Bhutias who are also migrants from Tibet via Nepal or Sikkim; at the even lower, intra-tribal level occurs this feeling of inequality between the more privileged Christian and less-privileged Buddhist Lepcha. There is thus a hierarchical system of segmentation of the population of the Darjeeling-Kalimpong area -- and this must be true for most other regions -- with all the consequent, intricate hierarchical order of distrust, conflict and lack of social well-being. The implications of this lack of well-being on mental and physical well-beings cannot be readily conjectured. However, much of the conflicts at micro-, macro- and mega-levels in India today, i.e., among ethnic, regional, rural/urban, social, political, etc. sub-groups and groups, may plausibly be traced back to differences/-disparities among them with respect to economic and other conditions. This is of course stating the obvious, that social conflicts generate from disparities in socio-economic conditions. But, the point that I want to emphasise here is that some of the mega- or macro-level social conflicts may be traced back to those at the micro-level, or in other words, socio-economic disparities and the consequent social conflicts at the micro-level may, if unchecked, magnify into macro- or mega-level conflicts. Thus, the anthropological approach of micro-level study may provide important clues to the genesis, i.e., provide extrapolationable explanation of the causations, of social conflicts at the macro-or mega-levels, and even suggest possible solutions.

If in presenting my thoughts here I have drifted too much from the narrow precincts of anthropological genetics, biological anthropology, or even anthropology, defined exclusively in the traditional sense of study of rural, remote populations and have tried to explore the much broader, even if delicate, canvass of social conflicts, their genesis and resolution through the use of anthropological methodology, I have no regrets. For, in my opinion, (a) 'anthropology' should remain a holistic discipline without the schism of physical/biological and social/cultural anthropologies, and (b) this holistic discipline should address itself to the real problems facing the Indian people today, of which the stress and conflict generating from population size (reduction) and subdivision is a major one, rather than indulge into socially meaningless, even its academically entertaining, exercises.

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TABLE - 1

Admixture rate by age groups (generations)

Age group (generation)	Both parents from same sub-population	One parent from another sub-population or another population	Both parents from another sub-population or another population	Total no. of individuals	Admixture rate
		N.P.			%
0-23	143	5	1	149	2.35
24-47	90	11	5	106	9.91
48+	41	--	5	46	10.87
Total	274	16	11	301	6.31
		S.P.I.			
0-23	184	69	17	270	19.07
24-47	64	51	22	137	34.67
48+	33	21	14	68	36.03
Total	281	141	53	475	26.00
		S.P.II			
0-23	202	132	9	343	21.87
24-47	86	70	21	177	31.64
48+	23	18	16	57	43.86
Total	311	220	46	577	27.04

TABLE - 2

Breeding size, effective population size, coefficient of breeding isolation, and variance due to drift

Sub-population	Breeding size (N)	Effective population size (N_e)	Sub-Coefficient of breeding isolation ($N_e m$)	Variance due to drift $0^2 oq$ (where q = 0.5)
N.P.	122	121	7.64	0.001033
S.P.I.	204	192	49.92	0.000651
S.P.II	222	170	45.97	0.000735

TABLE - 3

Gene exchange rates

Recipient Population	Donating Population		
	NP	SP I	SP II
NP	0.9688	0.0260	0.0052
SP I	0.0227	0.7750	0.2023
SP II	0.0079	0.1614	0.8307

TABLE - 4

Average daily consumption of various nutrients (±SD) in Mirpur

	Intake	SD	Recommended allowances +
Calories	2,106	±562	2,800
Protein (g)			
Animal	5.2	±5.9	55
Vegetable	46.1	±14.8	
Fat (g)	15.6	±11.4	
Calcium (mg)	336	±156	400-500
Iron (mg)	34.6	±12.6	20
Vitamins			
A (iu)	1,957	±2,052	3,000
B_1 (mg)	1.5	±0.5	1.4
B_2 (mg)	0.6	±0.3	1.5
Nicotinic acid (mg)	21.2	±5.6	19
C (mg)	70	±54	50

+ Indian Council of Medical Research, 1968.

TABLE - 5

Results of Manova for comparing sub-groups of each population group

Population group	Sub-groups compared	Per capita			Per Consumption Unit		
		Wilks' Λ	F-statistic Value	F-statistic d.f.	Wilks' Λ	F-statistic Value	F-statistic d.f.
Sherpa		0.830	2.255	4,44	0.832	2.224	4,44
	Agricultural workers						
	Plantation workers						
Lepcha-Buddhist		0.766^{+}	2.208	8,124	0.754^{+}	2,352	8,124
	Rural: Less Developed						
	Rural: Developed						
	Urban						
Oraon		0.945^{+}	6.102	4,419	0.947^{+}	5.811	4,419
	Birpara						
	Dalgaon						

+ Wilks' Λ significant at the 5% level.

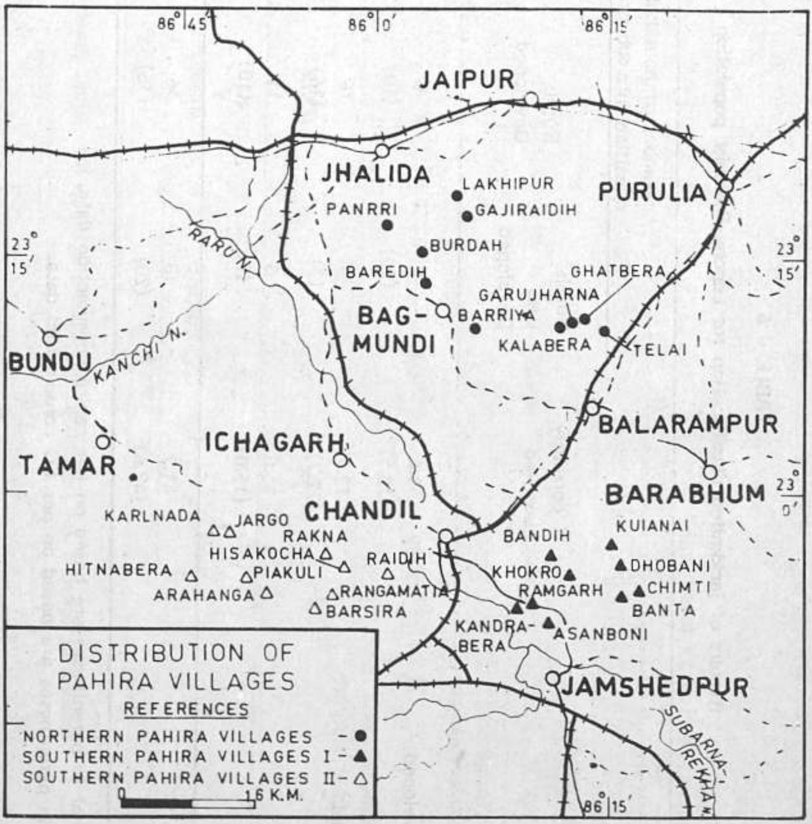
TABLE - 6

Results of jackknifed classification for Lepcha-Buddhist population

Actual/ sub-group	% correctly classified	Number of households classified into sub-group: Rural: Less Developed	Rural: Developed	Urban
Rural: Less Developed	34.6 (38.5)	9 (10)	9 (10)	8 (6)
Rural: Developed	72.7 (72.7)	3 (3)	16 (16)	3 (3)
Urban	15.0 (15.0)	6 (7)	11 (10)	3 (3)
Total	41.2 (42.6)	18 (20)	36 (36)	14 (12)

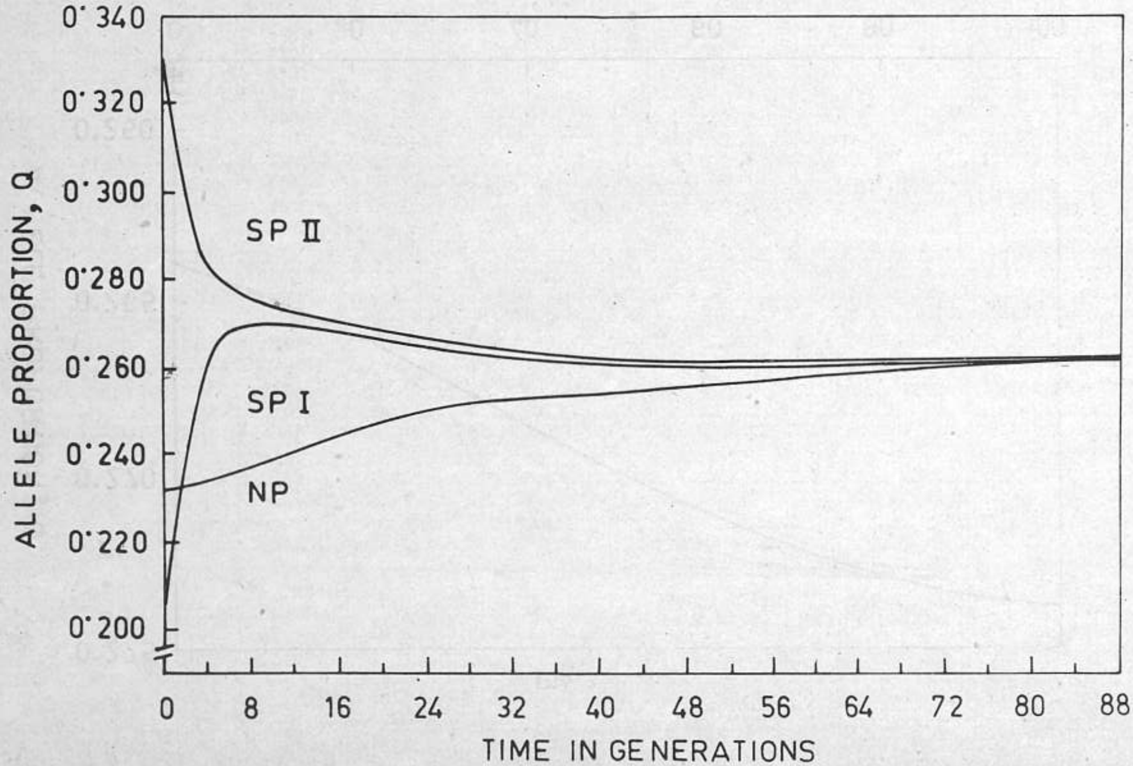
Note: Figures not in parentheses are based on per capita consumption data.
Figures in parentheses are based on per CU consumption data.

Fig.1



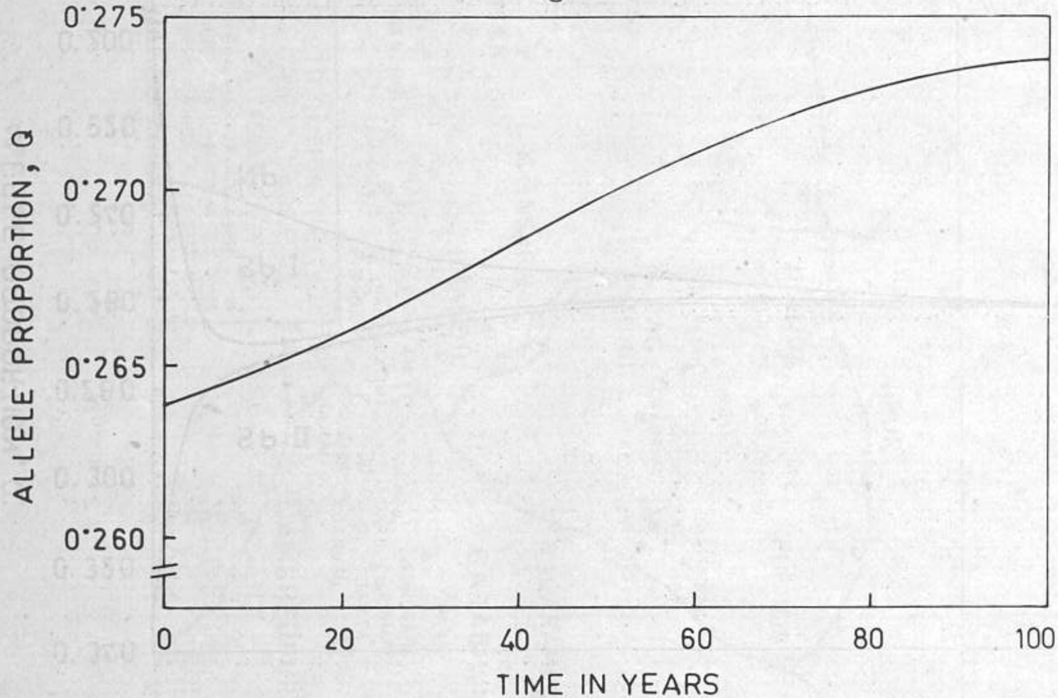
86° 45'
86° 0'
86° 15'
JAIPUR
JHALIDA
PURULIA
LAKHIPUR
GAJIRAIDIH
PANRRI
BURDAH
RARU N.
23° 15'
BAREDIH
GHATBERA
GARUJHARNA
BAG-MUNDI
BARRIYA
KALABERA
TELAI
BUNDU
KANCHI N.
BALARAMPUR
ICHAGARH
TAMAR
BARABHUM
23° 0'
CHANDIL
KARLNADA
JARGO
RAKNA
KUIANAI
BANDIH
HISAKOCHA
HITNABERA
PIAKULI
RAIDIH
KHOKRO
DHOBANI
ARAHANGA
RANGAMATIA
RAMGARH
CHIMTI
BARSIRA
BANTA
KANDRA-BERA
ASANBONI
JAMSHEDPUR
SUBARNA-REKHA N.
DISTRIBUTION OF PAHIRA VILLAGES
REFERENCES
NORTHERN PAHIRA VILLAGES
SOUTHERN PAHIRA VILLAGES I
SOUTHERN PAHIRA VILLAGES II
0
16 K.M.

Fig.2



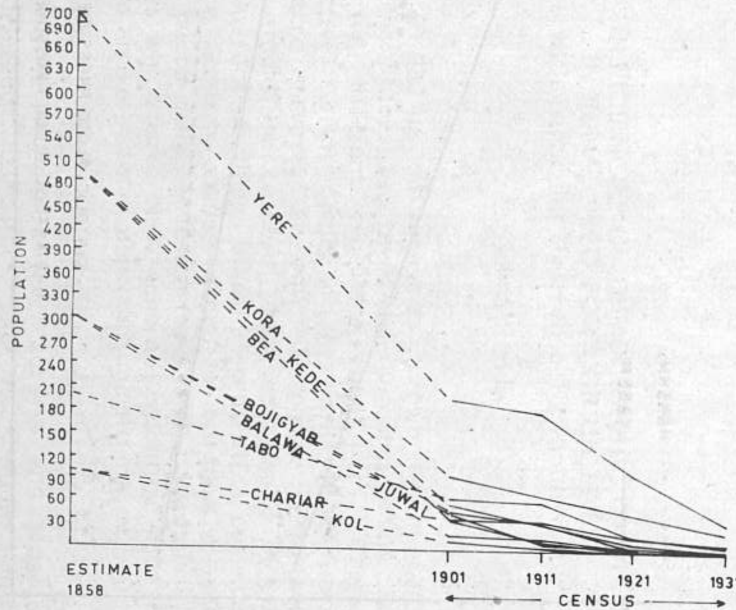
0'340
0'320
0'300
0'280
0'260
0'240
0'220
0'200
ALLELE PROPORTION, Q
SP II
SP I
NP
0
8
16
24
32
40
48
56
64
72
80
88
TIME IN GENERATIONS

Fig.3



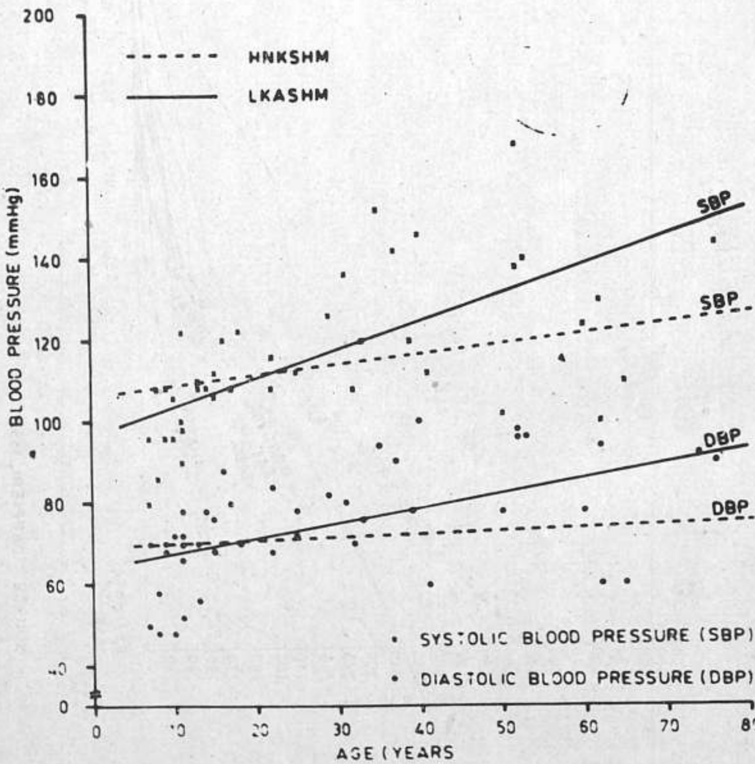
0·275
0·270
0·265
0·260
ALLELE PROPORTION, Q
0
20
40
60
80
100
TIME IN YEARS

Fig.4



SOURCE : CAPPIERI, 1954

Fig.5



HNKSHM
LKASHM
SBP
SBP
DBP
DBP
BLOOD PRESSURE (mmHg)
200
180
160
140
120
100
80
60
0
0
10
20
30
40
50
60
70
80
AGE (YEARS
SYSTOLIC BLOOD PRESSURE (SBP)
DIASTOLIC BLOOD PRESSURE (DBP)

DEFICIENCIES OF DEMOGRAPHIC DATA IN INDIA: NEED FOR CORRECTIVES

(With Particular Reference To Tamil Nadu)

N. Subba Reddy

The glaring discrepancies thrown up by some of the macro level surveys and censuses point to the need for different types of correctives. Where the corrective cannot come in the form of a repetition of macro surveys, the only alternative is to conduct micro studies on carefully designed samples of population. In fact as things stand at present in our country, genuine fertility studies seem to be mostly available from micro level investigations and not macro level surveys which have been generally adopting some short-cuts to arrive at some important constructs.

When we look at some of the crucial data available in different macro level surveys and see through the divergent indicators and implications emerging from them, the need for better planned studies becomes obvious.

Some Crucial Facts of Indian Situation

The population according to the 1981 census stands at 685 million. Some people place the figure at 703 million after making the necessary adjustments and extrapolations (Sundaram, 1984). While the death rate declined by 21% from 15.9 to 12.9, the birth rate declined only by 9% from 36.3 to 33.2 during the Seventies. The projections of population growth for the future are indeed frightening. The Indian Registrar General's Office predicts that the population of India may go upto 991 million by the year 2001.

Sundaram (1984) in his article, on the Registrar General's projections, draws attention to certain aspects of the population momentum which are indeed material to the context. One crucial fact is that a large number of persons are now entering the child-bearing age because of the baby boom in the Sixties. The World Development Report (1984) estimates that the influx of large numbers into the child-bearing age should be normally expected to have the effect of raising the crude birth-rate by 1.1 points. Of course, the rise of marriage age recorded for many regions of India is supposed to offset the effect of this factor to some extent. But as Sundaram points out in the aforementioned article, even a moderate decline in the growth of population will reduce the share of 15-19 age-group and increase the share of 20-24 and 25-29 age-groups. While deferred marriages make a significant dent in the proportion of the married in the first category, they are not likely to affect very much the later age-groups. Failure to take note of this factor is likely to make projections err on the low side.

There is one more factor which might upset any demographic projections. Normally any rise of age at marriage is by itself expected to cause a decline in crude birth-rate and also in the total fertility rate. This is based on the assumption that the pattern of specific fertility for different age grades remains unaltered. But one should not lose sight of the possibility of compensatory upsurge of fertility at later ages in the case of deferred marriages. Even as the indices of age specific fertility in India, go 40% of the children are being born to women aged over 30 years while less than 10% are being born to women below 19 years. Hence the rise of average age of marriage for women by one year that has occurred the last decade (from about 17 years in 1971 to about 18 years in 1981) should not be counted to make any substantial change in population growth in the absence of contraceptive practice.

In fact the different pictures of age specific fertility in India at different periods is a little confusing and is also a little disturbing. The figures given by Padmanabha (1983) indicate that the fertility for the age-group 15-19 for 1000 rural women was 97.5 in 1972 and 73.2 in 1978. The census of 1981 also gives the age specific fertility indices based on 5% sample. There in one finds that the fertility for 1000 women of the age group of 15-19 years is 127. What do these figures indicate? Has the specific fertility for the 15-19 age-group been following such a zig-zag course? It is certainly ominous if inspite of all the rosy expectations about the effect of rise of marriage age for women, the fertility of women in the youngest age group is to rise again.

Fertility Indicators

If we take the figures presented by Padmanabha (Ibid) regarding the general marital fertility rate for 15-19 years it was 211.5 for 1000 rural women and 220.6 for 1000 urban women in 1972 while it was 175.2 for the rural women and 197.3 for the urban women in 1978. When we look at the 5% sample of the 1981 census we find the general marital fertility rate for the 15-19 years to be 127 (for the rural and urban combined). The difference is indeed considerable.

We face the same discrepancy of data when we come to consider the total fertility rate and the total marital fertility rate. Many reports mention 4.8 as the total fertility rate for India in 1981. According to the figures presented by Padmanabha (Ibid), the TFR for the rural area in 1978 works out to be 4.6 and for urban area 3.2. The TMFR in 1978 for the rural area is 5.4 and for urban area 4.6. According to the 5% sample of the 1981 census the TFR is 3.6 and the TMFR is 4.3. The targets for 1996 mention a figure of 3.5 for the TFR under a standard decline and a figure of 2.5 under rapid decline (World Development Report, 1984:159). If you take the target of 3.5, we seem to have already achieved it as per the 5% sample mentioned above. If you take the target as referring to TMFR, even then we seem to be only a little short of the target. A question which we have to ask ourselves is whether we are not lulling ourselves into false complacency. Carefully planned studies are called for on this vital aspect of demography.

The TFR or TMFR are based on age specific fertility rates. If these bases are not themselves accurate, the constructs based on them cannot be reliable. Not only the age specific fertility rates have to be carefully cross-checked but even the methodology underlying their computation should be closely scrutinized.

There are some frank comments by a few demographers about the absence of reliable vital statistics in India. Smith observes: "Owing to the absence of reliable Registration Statistics in India, Pakistan and other common-wealth countries of Continental Africa, estimates of crude birth-rate and of more sophisticated measures of fertility, such as the gross reproduction rate can only be made at intervals of a decade through the use of census data and periodically through the use of Sample Survey data, when available. In none of these countries are reliable estimates of the trend in crude birth-rate over the period 1960-70 available" (Smith, 1973:40).

Agarwala makes the following observation in one of his books: "Correct information on fertility on all India basis is not available. The fertility enquiries carried out by the Indian Censuses in 1911, 1921, 1931 were confined to small areas. At the time of 1951 census, fertility data were collected in Kerala, West Bengal and Madhya Pradesh, but only the data of Kerala are reasonably reliable. The Registrar General's office carried out a fertility study at the time of the 1961 census, but a complete report is not yet published. Information on fertility is available in a number of small area surveys, but they do not give an all India picture" (Agarwala, 1977:43).

Obviously what is implied is that in the census operations and other macro-level surveys, the complete fertility history of individual women is not investigated. Consequently the crucial concepts such as age-specific fertility and total fertility rate are being arrived at through some short-cuts. Hence the method of arriving at these crucial concepts needs to be carefully scrutinized. The macro level surveys seem to enquire whether a particular women has had a child during the one year preceding the date of enumeration. The women's age is noted and indicated by the pre-set quinquennial age grades of 15-19 years, 20-24 years, etc. So while we get the specific fertility for the age spans such as 15-19 years and 20-24 years, we do not know the specific fertility, say for women of 22 years or 19 years. Among the total births that occur in the time span of five years, a greater proportion may be occurring in one particular year or in two adjacent years within that age span. It is crucial to know that. But the available data are not helpful in this regard.

There is one more important gap in the present state of information made available by the macro-level surveys. We may know the cumulative fertility of women for different age spans. But we do not know the fertility output, say, in the 20-24 years age span for those women who are now 40-44 years of age. In other words, many of the available macro level surveys do not distinguish between the two sets of cohorts, the real and the synthetic, which is important in any full-fledged fertility study. The assumption underlying the present macro surveys is that the fertility patterns of women of two different birth cohorts will be the same. This is a patently wrong assumption. Studies which have followed this distinction have come out with results showing the differences in the age specific fertility patterns of women of different age cohorts. This is also going to be of crucial significance in following the fertility trends emerging from the rise of age of marriage and consequential, compensatory differences in the patterns of age specific fertility.

In his book, *A Demographic study of Six Urbanising Villages*, Agarwala (1970) carries out an analysis of both the cohorts and comes out with the following findings. If we take the fertility performance during the age span of 25-29 years for certain real cohorts, it is 1.94 for those who are between 30-34 years of age and 1.70 for those who are 45 years or above. The fertility for all years for the cohort of women born in 1915 or earlier is 7.8 while the same is 7.08 for the synthetic cohort (Agarwala, 1970:92).

The different patterns of fertility of two different cohorts of women, one married before 1930 and the other married after 1930 are presented by Agarwala in the following words: "It is interesting that the post-1930 married females who have an initial disadvantage because they married later, more than make it up in the very next stage" (1970: 96-97). The Cumulative fertility for the age span of below 15, 15-19 and 20-24 years is 0.07, 0.93 and 2.58 for the pre 1930 marriage cohorts while the corresponding figures are 0.04, 1.02 and 2.91 for the post 1930 marriage cohort" (Agarwala, 1970:97).

With the rise in the age of marriage already evident in different parts of India due to the spread of education and other modernising influences, the pattern of age specific fertility is bound to change in the future. It is only by intensive micro level studies of fertility in different parts of the country, that demographers can keep track of this important aspect of fertility behaviour. While the rise of marriage age that has already occurred in different parts of the country should arouse optimism about the future trends, one has also to be vary about the possible changes in the pattern of natality.

Age of Marriage-Cases of Kerala and Tamil Nadu

A rise in the marital age of women and female literacy are undoubtedly important factors in any fertility analysis. The cases of Kerala and Tamilnadu deserve special attention in this respect.

Of course, the figures for the marriage age of women differs slightly from report to report. A note prepared by the Family Planning Foundation in 1983 gives the marriage age of women for India as 18.7 years. But another report (Goel 1982) gives this figure as 17.9 (arrived at by the synthetic cohort method). The latter source gives the figures for Kerala and Tamilnadu as 21.28 years and 19.74 years respectively. Even in 1961 the mean marital age for females in Kerala and Tamilnadu were 20.36 years and 17.4 years respectively when it was 14.10 years for U.P. (Agarwala, 1977:31).

This difference of three years in the mean age of marriage between women of Kerala and Tamilnadu in 1961 should have reflected itself in the birth rates of the two States in the following decade. But it did not to any appreciable extent. The birth rates in Tamilnadu and Kerala have been almost the same in 1971 (i.e., 31.4 for Tamilnadu and 31.1 for Kerala). But when we look at the birth rates for 1981 there is a difference between Kerala and Tamilnadu, the figure for the former standing at 27 and that for the latter standing at 30. One obvious inference from this is that the continued difference in the age of marriage for women between Kerala and Tamil Nadu has made itself felt by 1981 and not by 1971. The T.F.R. is 2.9 for Kerala and 3.8 for Tamil Nadu (1981 Census). But the decadal growth rate for 1971-81 has been reported to be 19.2% for Kerala and 17.5% for Tamilnadu. Is this conundrum to be explained by the difference in death rates 6.7 for Kerala and 11.6 for Tamilnadu?

When we look at the average number of children of mothers of different age-groups in Kerala and Tamilnadu, we again find the data intriguing. While the average number of children born per women is less in Kerala than in Tamilnadu in the younger age groups upto 34 years it is more in Kerala than in Tamilnadu for the older age groups i.e., from 35 years onwards. For the age group 40-44 years the average number of children born per woman is 4.99 for Kerala compared to 4.18 for Tamilnadu (Census 1983 C).

One important question that needs to be investigated is whether the fertility behaviour is taking two different courses in Tamilnadu and Kerala, the fertility starting at a higher pace in the younger age group but tapering off comparatively early in Tamilnadu, and starting late and continuing until the end of child-bearing age in Kerala. It should be noted that 42% of total births are occurring to women past the age of 35 years in Kerala while the corresponding figures are 26% for Tamilnadu and 30% for India. It becomes necessary to investigate through intensive fertility surveys whether the cohorts of Kerala women who married after the sixties would be experiencing age specific fertilities which are significantly different from those women who are now past the age of 45 years or they would also be falling into the same pattern.

Discrepant Data

Some of the demographic indicators for Tamilnadu are intriguing. According to the sample Registration Scheme, the birth rate in Tamilnadu was 33.8 in 1969. It fell to 30 in 1970, but again rose to 31.4 in 1971, 32.4 in 1972 and came down to 30 in 1981. The decadal growth rates have wavered between 11.85% in 1951-61, 22.3% in 1961-71 and 17.5% in 1971-81.

When we consider the total fertility rates for Tamilnadu, the figures are 4.66 for 1961-71 and 3.82 for 1971-81 (Bhat, *et al.*, 1981). A question that comes to one's mind is that when the total fertility rate and the decadal growth rate declined markedly, why it is not reflected in the birth-rates to the same extent. Such a situation can come to obtain only if the proportion of adults in the population suddenly goes down in relation to the number of births. But the child-woman ratio has declined steadily from 547 in 1961 and 531 in 1971 to 435 in 1981. (The figure for child-woman ratio is 529 for Tamilnadu as per a document prepared by the Family Planning Foundation for the Planning Commission in 1983). All these discrepancies raise some legitimate doubts as to the veracity of the basic demographic data that are available.

Only some well-planned studies can help us to know where we stand. Particularly in deciphering the subtle influence of some cultural factors on fertility, micro studies will be most useful. The marriage system, the norms governing the pre-marital and extra-marital relations, periodical taboos on sex, family structure, patterns of breast feeding, work-participation and labour value of children and above all the motivation and adoption of family planning techniques by individual couples vis-a-vis the mode of operation of public agencies in this field are all matters for careful investigation at the micro level.

Problems in Tribal Demography

The greatest problem in the study of tribal demography is that of proper identification and designation of the communities. In the census enumeration or in the preparation of lists of scheduled tribes, necessary care has not been exercised. One error leads to another error and the cumulative distortion confuse and confound any student in this field. This is one area where careful micro studies can help in clearing the confusion.

Let us look at 1961 and 1971 census figures for tribal communities in Tamilnadu (1981 census figures for individual tribal communities are not yet available). There were only 3 konda Kapus in 1961 but they multiplied to 255 in 1971. There were 86 Konda Reddies in 1961, but their number rose to 855 in 1971. The number of Kuruman became 11269 in 1971 from a mere 112 in 1961. These cases point to the complex problem of non-tribal people stealthily but steadily registering themselves as tribal people, taking advantage of proximate nomenclatures. Only close scrutiny at micro-level can establish the extent to which figures became bloated through wrong enumeration.

When there are similar names for tribal and non-tribal communities, this problem is bound to be there. And if the same name is spelt in different ways criss-crossing the boundary between tribal and non-tribal communities, the problém becomes aggravated. An example is that of the tribal Kurumba and the non-tribal Kuruba (Shepherd caste). In all records such as census reports, or Thurston's reports or Aiyappan's reports, each of these groups have been referred to in alternate ways, sometimes as Kuruba, sometimes as Kurumba, sometimes as Kuruman, sometimes as Kurumban, and sometimes as Kurumbar. All these alternative names appear both in reference to the tribal group as well as the non-tribal group. Hence this has become an impelling lure for the non-tribal community to claim that they are the same as the tribal community and ask for inclusion in the scheduled list. Unless these trends are checked, psuedo scheduled tribal population will grow up in districts where there was none.

An imminent danger it spells for the genuine tribal communities is that the social benefits meant for them may be snatched away by relatively advanced caste groups by producing certificates that they are the same as the former. If census reports and scheduled lists are based on proper identification and on unambiguous form of designation, keeping a distinction between the tribal and non-tribal communities, this problem could have been avoided. Such steps should be taken even at this stage if this stupendous problem has to be tackled. But it is a matter of doubt whether there is a will or motivation to clear this confusion. Vested interests may be inclined the other way.

An unique problem in tribal demography is that of declining populations. The situation among the Andaman tribes has been frequently cited in this context. In Tamilnadu itself, the case of Kattunayakans needs to be mentioned. Their population, according to census figures declined from 6459 in 1961 to 5042 in 1971. It needs to be investigated whether it is a case of faulty enumeration or of emigration or of a real decline in fertility among them.

Also the Toda and the Kota offer good case material for intensive fertility analysis. Their populations have been more or less steady over the decades. Being distinct ethnic groups living in exclusive hamlets of their own, they offer a good opportunity for intensive studies in demography and population genetics.

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APPROACHES TO THE STUDY OF POPULATION STRUCTURES WITH REFERENCE TO THE INDIAN TRIBES

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Introduction

The scientific consideration of the biology of man as an animal is one thing which is different from the population biology of man, the study of which necessarily requires an integrative approach. Man, whose geographical distribution is wider than that of any other species on this planet, remained prehistoric for about three-fourths time of his career struggling more for the preservation of his kind rather than for its multiplication but by his technological advancement and cultural organisation combined with his biological fitness, he became the most successful and highly widespread species of the universe even in the extreme climatic situations. The four big problems that bother modern man currently are nuclear war, over population, pollution and resource depletion and ever widening gap between the economic wealth of the rich and poor countries. Of these the last three are the outcome of the population growth, the understanding and control of which would be possible when the studies of the human populations are conducted with a holistic approach. Experience has shown that the human species is remarkably characterised by a system of flexibility and social adaptation in its social structure which has been inherited from that of our primate ancestors within specific ecological situation making it possible for man to adapt to any complex situation (Rourke and Enciso, 1982). In the words of Frank Fenner (1972) ...."Man must .... make to cope with the demographic results of his scientific and technological progress, for unless he understands and adjusts his population structure and there by adjusts it to the world that is our only home. *Homo sapiens* will have no future, only a past." This statement clearly underlines why the study of population structure is necessary in the prevailing situation of the world.

Populations and Population Structure

The term 'population structure' may be defined as that which generates the full account of the structure of a population -- urban, rural, caste, tribal, or even religious -- based on the study of the total array of biological, social-cultural, demographic and ecological aspects acting on the gene pool of the populations. That the study of population structure can be carried out not only among human groups but also among non-human primates has been shown by a recent study (O' Rourke and Enciso, 1982). To have a complete story of the structure of any population is beyond the professional competence and comprehension of any of us involved in these types of research. However, let us, first peep into what these populations are, how and why they are structured, and above all, what the academic, research and applied importance that underlies the study of these populations is.

Populations are nothing but clusters of consistently and meaningfully linked Homo sapiens which are found in different areas at a given point of time all over the cosmos in a well-organized and defined form unlike the other members of the animal kingdom. This structured form of human populations, which is an acknowledged fact of the nature, during the course of time maintains continuity although it tends to undergo change. Such an ordered system of populations is not only a reality but a truism, and is quite distinct from a mere band of persons. The deeply ingrained biocultural history as also the large number of phenotypically demonstrable biocultural traits are graphically reflected in the complexity as well as uniqueness of the individuals that constitute the structure and its irreversibility. There is between-structure similarity of varying degrees of some populations, particularly of those which live in close proximity to one another consequent upon the extent of biological and cultural interactions between such populations. In addition to biological and cultural aspects which determine structure of populations, there is as yet another category of factors called the 'geographical and physical environmental conditions', which play as significant a role as the biological and cultural factors, when they influence the size, growth and distribution of human populations. The different cultural factors that manifest in the different degrees of social behaviour of man, although have apparently emanated from the biological nature of human species, may express as entities distinct from those of the biology. In a given geographical environment one can observe the existence of more than a single social structure each with several interrelated and interdependent cultural factors, which interact with one another giving rise to a particular form of social structure in tune with the existing phenomena. It is generally held that these historically developed cultural factors operate uninterruptedly from generation to generation and in this sense they do not necessarily require the role of the factors that contribute to the biological structure as can be seen in the independent inheritance of the biological and cultural factors. Inspite of the complex nature of a number of problems the fact of the interdependence and interaction between cultural and biological factors in producing population structure is hard to deny.

Populations are not only defined in terms of space but by structural heterogeneity as known by the vertical divisions of social hierarchies or strata within one and the same spatial population. People belonging to the same caste/sub-caste, tribe or religion, language etc may live in different places but they can constitute into different populations in terms of those characteristics into convenient units which form the core of most of the population concepts of the hierarchical divisions. The large number of factors of different kinds which represent the hierarchies of populations form a continum of overlapping series rather than grading into a series of clusters. But for convenience of study one may choose a particular set of characters characterising the populations which may be conceived under the demographic, genetic, social and ecological approaches.

APPROACHES

Demographic Approach

The word 'demography' derived from the Greek words 'demos' (meaning 'the people') and 'graphein' (meaning 'to write'), according to the Chamber's twentieth century dictionary, collectively means 'the study of population' and is thus self-explanatory. Broadly, this area of interest by tradition is vitally concerned with the projections of statistics of births or fertility, deaths or mortality, and diseases or morbidity, or in the words of Bogue (1969) it (demography) "is the empirical, statistical, and mathematical study of human populations." Both biological and social variables fall within the domain of demography and so the distribution between them is arbitrary. The concepts of time-depth, population types, sizes and nature of biological and social-cultural anthropology play a vital role in meaningful demographic projections. A demographic population like the genetic, social, or ecological populations, practically embraces the study of a group of human beings and it is mostly as good as the latter although it may not justify the connotation of an ideally-structured group of people. The tools and techniques of demographic research can be profitably utilised in the study of populations with respect to their behaviour and biology without being conscious of their literal meaning. The population structure as based on the study of demographic parameters is of signal importance in the evaluation of population dynamics such as growth and decline, composition and distribution in space (Bogue, 1969). The understanding of how populations interacted in the past in terms of fertility, moratlity, morbidity and population growth can be accomplished by palaeodemographic researches.

Genetic Approach

According to this approach, the genetic populations, also called Mendelian populations, are characterised by biologically related individuals with common gene pool and the sizes of such populations range from as small as a nuclear family of wife and husband and their offspring to as large as that which comprises all the members of the whole species of *Homo sapiens* as is known from the grand fact of the existence of different gene pools for different species or species-specific gene pools separated from one another by the barriers of reproductive isolation. Interspersed between these two extreme categories of Mendelian population are numerous intermediate populations, the identification of which, based on all the different biological factors, goes difficult and is beset with problems. The concepts of genetic structure as based on the organisation of genes into genotypes, and genetic composition as known from the factors determining the genes of the various hierarchical Mendelian populations are of great significance in understanding of the nature of human variety. Factors like natural selection, migration, inbreeding etc. affect the genetic structure of populations.

Social Approach

This approach involves the social populations as study groups, whcih are defined as arbitrarily as the demographic populations wholly in accordance with the purposes of the different research workers. These populations are recognisable, finite units, broadly similar to the genetic populations in terms of their nature being characterised by social hierarchies based on the commonly shared cultural traits such as customs, beliefs, technology etc. These may be defined by social status of the groups such as caste/sub-caste, and tribe, occupation and such other criteria. But these social hierarchical groups are remarkably different from the genetic populations when it comes to practical situations.

Ecological Approach

This approach considers the natural and artificial conditions of the physical environment natural and man-made - and the implications of their action on the variations of geographical distributions of human populations, their activities and socioeconomic factors. Ecological populations consist of groups of people living in a particular habitat and interacting with one another during the curse of sharing the environmental resources in different degrees. This definition is though somewhat similar to the concepts of genetic and social populations, we are not sure of the extent of similarity of the environmental resources nor the extent of their exploitation by different population groups. However, the approach of ecological population in the study of population structures of human populations has been recognised as important by one and all.

It is evident from the preceding approaches for fruitful investigation of 'structures' of human populations that there exists intimate relationships between social populations and genetic populations on the one hand and between each of these populations and ecological populations on the. other. As rightly averred by Harrison and Boyce (1972), mating patterns which primarily define genetic populations are influenced by both social factors when they affect mate selection as also define social population, and by environmental factors when they affect population distribution, density and mobility as also define ecological populations. The institution of social organisation, which is the main segment of a social population, is affected in different degrees by natural ecological conditions such as relief, climate, water, soils, vegetation, space etc. and by a number of artificial conditions as well. So also the nature of habitats and available resources, and between-people interaction levels are determined by social factors and similarly to some extent by genetic factors. Majority of the factors that determine either of the genetic, social or ecological populations interact with one another. The type of populations one wants to study is difined from the view point of the situation or the nature of the problem to be tackled. So a population defined in a particular context may include a number of populations defined for other purposes. This is particularly true as in the case of wide ranging genetic populations where the units governing the hierarchical groups are usually smaller than those of the social and ecological populations and as a result a number of heterogeneous populations may constitute into a single population for other purposes.

The analyses and interpretation of different demographic, genetic, social, and ecological characters for projecting the human population structures can be accomplished by the application of various mathematical models, a number of which have been sophisticated or even modified, and many new ones are under development. Suffice it to say that these models are applied depending upon the context and the nature of the data on hand. The enumeration of these models in a lecture of this kind is hardly justifiable except for accounting for the fact of their significance, when an actual population problem should be approached.

The Indian Scene

The above approaches have been more or less followed by emphasizing their importance in the exposition of the nature of genetic diversity in the light of demographic and economic factors among a large number of American Indian and Eskimo groups of hunter-gatherer stage with incipient agriculture, and agriculturists, fishers, and tribes somewhat accultured in the study of Salzano (1972) following the fission-fusion model, and Wright's island model, Kimura's stepping-stone model, or their modified forms respectively;· genetic heterogeneity as influenced by demographic and social history among the trophical forest slash-and-burn cultivator group of the Yanomamo Indians of Venezuela and Brazil by Chagnon (1972); demogrpahic structure considered in the ecological frame of reference among the Congo Pygmy hunters and gatherers by Turnbull (1972) and other populations investigated on these lines being the Eskimos and Aleuts in the arctic and a number of Amerindian groups. Crawford and Mielke's (1982) edited volume is solely devoted to the ecology and population structure as demonstrated by the works of Harpending and wandsnider among two groups of hunter-gatherer! Kung Bushmen of Botswana in South Africa, Crawford and Enciso among the Eskimos and other tribal groups from Siberia to Greenland, Lefevre-witier on the Central Saharan nomadic group, Smouse among the Yanomama Indians of Amazon rain forest, Fix among the Semai of Malay peninsula, Sokal and Friedlaender among the Bougainville Islanders, Kirk among the Swidden agriculturists of New Guinea and the Western Pacific, etc.

While this is the level of research on the population structure in other parts of the world, it is surprisingly scarce among the Indian tribes let alone the data on the historical time depth or the time-span involved on historic to prehistortic populations.

The Tribes

Six major racial groups have been discerned among the Indian people by Guha in his 1937 classification based on mainly anthropometric and somatoscopic criteria. Although, since then, a large number of population genetic investigations have been carried out among different Indian populations no systematic and detailed classification has yet emerged.

The aboriginal people of India or Adivasis (Original inhabitants) are known by the term 'tribes' for which there is no precise definition. They are also known by the terms Vanyajathi, Adimajati, Vanavasi etc. The tribal communities are those scheduled under the relevant constitutional notification of the Government of India mainly to protect them from exploitation by their relatively more advanced neighbours and are thus known as 'scheduled tribes'. The scheduled tribes together with the scheduled castes constitute about 21 percent of the 68.38 crores of the country's population according to 1981 census. Over 400 scheduled tribes have been recognised comprising a population of about four crores or 7.5 percent of the country's total population.

Excepting the Punjab, Haryana, Jammu and Kashmir, Chandigarh, Delhi and Pondicherry, in all the other states and Union Territories there are scheduled tribes with uneven distribution of their population. Over one-fourth of their population is found in Madhya Pradesh itself. Compared to the total population, their highest proportions are found in Lakshadweep (93%), Nagaland (89%), Dadra and Nagar Haveli (87%), Meghalaya (81%) and Arunchal Pradesh (79%). The major tribes in order of their numerical strength are Bhils (5.2 m), Gonds (4.8 m), Santhals (2.6 m), Oraons (1.7 m), Minas (1.5 m), Mundas (1.2 m), Khonds (0.9 m), Hos (0.5 m), and Nagas (0.5 m). The 2nd category of tribes consist of over 50 groups which present a wide range in terms of their population from as small a number as 25 individuals represented by the Great Andamanese to as large as 200 thousand. The remaining tribes constituting the 3rd category consist of a few thousand only, the total population of which is about one million. Based on the levels of social-cultural and economic development the Indian tribal communities can be broadly categorised into hunters and food gatherers, pastroalists and agriculturists as in other parts of the world. The first category of tribes is usually confined to hills and jungles without any contact with the main stream of life. Such tribes are found in Andaman Islands (Onge, Jarwa and Andamanese) and in pockets of south (Malapandaram and Arandan of Kerala) and central (Birhor of Bihar) India. The 2nd category is characterised by different levels of economy including pastoralism on a predominant scale and is found all over the country. The 3rd category of tribes is also found commonly with agriculture as the mainstay of the economy and occurs almost in every part of the country of their existence. The tribals of Northeast India have developed tremendous awareness of freedom and have come upto the level of other communities of the country.

The Indian tribes are divisible into three broad racial groups, namely the Negroids, the Mongoloids, and the Proto-Australoids. There are alsc admixtures of these in different degrees with other racial types. Of particular interest is the Mediterranean type, which is believed to be very common among some tribes like the Mina of Rajasthan.

The scheduled tribes of the country are placed under four zones based on the demographic traits and geographical proximity besides cultural, linguistic and racial affinities: North -- North-eastern Zone, Central Zone, Western Zone, and Southern Zone. The North-Northeastern Zone includes Arunachal Pradesh, Assam, Meghalaya,Mizoram, Manipur, Tripura, Sikkim, the Himalayan belt of Himachal Pradesh and Uttar Pradesh and Darjeeling district of West Bengal. Most of the tribes in this zone belong to the Mongoloid racial stock. The common languages spoken by them belong to the Tibeto-Burman family. Most of them are fairly developed. Their literacy rate ranges from 15.03% in Tripura to 53.49% in Mizoram the average being 29.45% which is closely comparable to the general literacy in India and much higher than the average literacy of 11.3% estimated for the tribes of the whole country. The traditional shifting cultivation is still practised by a number of tribes in this zone. Both matrilineal as well as partilineal societies prevail among them with the latter being more common than the former. Garos and Khasis characterise the materilineal type while the Nagas belong to the Patrilineal type. In Himachal Pradesh there is a tradition of fraternal polyandry prevailing in some tribes such as the Bhot of Lahaul.

The Central Zone covers the states of West Bengal with the exception of Darjeeling district, Bihar, Madhya Pradesh, Eastern Maharashtra, Orissa and some parts of Andhra Pradesh. This zone contains the largest proportion (58.33%) of the total scheduled tribe population of the country. The most important tribes inhabiting this zone are the Gond, the Santhal, the Munda, the Oraon, the Ho, the Khond, the Bhumij, the Birhor and the Korku. They belong to the Proto-Australoid racial stock with certain mixed types as a result of miscegenation with other communities. Most of them speak their own languages. Majority of them are agriculturists practising shifting to plough cultivation. A few tribes like Birhor and Korwa are still at the hunting and food gathering stage of economy. Their clans in a number of them are totemistic. Their social organisation is relatively well organised. They have undergone acculturation due to contact with the caste populations.

In the Western Zone covering Western Maharashtra, Rajasthan, Gujarat, Dadra and Nagar Haveli, and Goa and Daman and Diu, the tribes belong to different racial types rather of a mixed kind. The most important tribes are the Bhil, the Dubla, the Warli, the Dhodia, the Seharia, and the Mina. Most of them practise agriculture for their livelihood.

The Southern Zone is characterised by the most primitive tribes of the country belonging to the Proto-Australoid stock and distributed in the states of Kerala, Karnataka, Tamilnadu, Andhra Pradesh excluding Visakhapatnam and Srikakulam districts, and Lakshadweep Islands. They speak the language of the state where they live besides their own dialects while some of them have taken to agriculture. Majority of them still practise gathering and hunting techniques for their survival. In some areas particularly Kerala and Tamil nadu where rubber, coffee and tea plantations have come up a humber of tribal people have been employed as labourers resulting in socio-cultural and economic changes in their life. A number of Kerala tribes and those of Lakshadweep follow matrilineal traditions. Besides the above there are the most primitive tribes living in the Andaman and Nicobar Islands in the Bay of Bengal. They consist of the Onge of Little Andaman and Jarwa of the South Andaman and the Sentinelese of the North Sentinel Island. The latter two tribes have been found to be hostile and it became difficult to develop contacts with them.

The Prospective Strategies

As shown above the Indian tribal communities characterised by different population sizes, social-cultural and economic levels of development, languages, biogenetic factors and live in varied geographical and physical environmental settings. The natural and man-made factors governing the present distribution of the tribes; the demographic forces of fertility, mortality and morbidity determining the distribution and the implications of these for social and economic development as also for genetic composition of the groups, written records such as census statistics, vital statistics, and quantitative evidence on a number of factors ranging from occupation, income, to geographical and social mobility to give a historical time-depth to the structure of population as illustrated by Drake (1972) of a society with simple and subsistence economy where it was customary to restrict fertility; social and biological factors affecting fertility patterns, sex ratio and the factors associated with it (birth order, maternal age, paternal age, family size, etc) patterns of mating and their importance for genetic structure, ecological factors and their impact on demographic structure, infectious diseases, and agricultural practices; genetic data and genetic distance analysis to reflect ethnology, history or archaeology of the populations, knowledge of language families and cognates, etc are all the phenomena concerning the population structures of Indian tribes whose study calls for multidisciplinary approaches, which may be demographic, genetic, social, ecological, etc. In reality it is abhoring to note that not even the idea of these approaches has made realised the Indian anthropologists let alone their serious execution in the study of tribal populations of this great country.

The strategies of investigation to understand the population structures of the Indian tribes are multi-disciplinary in nature and collaborative in perspective as elsewhere in the world. Their study can be accomplished by a synthesis of social-cultural, economic, and ethnohistoric aspects, demographic structure and population growth, genetic structure including physique and growth, and general health status including dental conditions, and ecology and physical environment, etc.

The ethnohistory of the living tribes can be elicited from the folklore and folk traditions, languages, place names, surnames or family names, travellers' accounts apart from the material culture, and recorded accounts in the District Gazetteers, census hand books, etc. The tribal communities living invaried climatic conditions depend upon the indigenous resources exploited by the hunting and gathering techniques besides fishing and different primitive agricultural practices. These and a number of other aspects such as the low literacy rate, awareness of medical facilities, and attitudes, beliefs, response, religious and cultural taboos towards modern medical system, etc. have to be systematically investigated to evaluate their impact on fertility, mortality, and morbidity which not only reveal the population structure but also help in the assessment of the magnitude of the problem in order to enable the public health workers to take appropriate steps in the promotion of health and family welfare programmes.

Nutritional status and economic status which are intimately linked with one another are of cardinal importance in assessing the health status as well as the demographic structure of a population. The nutritional status of the indian tribal populations is unsatisfactory as revealed by the surveys conducted by the National Institute of Nutrition (1971), Gopalan (1971), and the Planning Commission of India during the Sixth Five year Plan besides those carried out by individual workers in different states (Chitre et al, 1976; Pingle, 1975). Their staple diet is rice besides fish and all types of meat. There is a high protein calorie malnutrition (PCM) in their diet resulting in a number of nutritional deficiency disorders such the goitre, angular stomatitis, etc, besides infectious and parasitic diseases. These form an important cause of morbidity. Systematic dietary surveys and the study of the associated social cultural and economic variables have to be conducted to evaluate the population structure besides planning for the health care.

The mating patterns are governed by socio-cultural and religious practices and beliefs besides geographical locations. Tribal populations are usually characterised by close breeding habits. The rule of endogamy with inbreeding and parental consanguinity in varying degrees is followed by majority of the tribes. Though some studies have been conducted on this aspect among certain tribes of Andhra Pradesh, Madhya Pradesh, and Maharashtra reporting high rates of consanguinity (over 50%), there are still a large number of unstudied tribes. Investigations on this aspect are essential and urgent to assess the effects in terms of reproductive wastage, pre-reproductive mortality, congenital malformations etc. Many tribes in the eastern and central parts of the country practise polygamous marriages which have been estimated to be more than 15%. Planned studies have to be undertaken on this type of marriage of socio-sexual selection with detailed genealogies in different tribes to know the incidence, reasons and implications for fertility differentials. The praternal polyandry prevailing among the Bhots of Lahaul in Himachal Pradesh also deserves careful investigation for our purposes.

There are numerous intra-uterine and extra-uterine factors associated with the pregnancy and child birth among tribal communities. Those that contribute to the foetal damage and need investigation are maternal age, maternal disabilities like diabetes, hypertension, previous child-bearing experience, maternal nutrition, antigenic sensitiveness, infection, etc. apart from a number of cultural factors (Jindal *et al*, 1985). The marriage consummation with the attainment of puberty is often believed to lead to abortions, stillbirths, and neonatal mortality, increasing birth orders and known antigenic sensitivities of Rh factor and ABO blood group incompatabilities. The Rh factor ranges from nil to 3% while the ABO blood group gene frequencies show wide variation according to the available data. The pregnant mothers are the target of attack by a number of infections caused by taxoplasmosis, rubella and other viral agents resulting in mental retardation and blindness. The intra-uterine growth, and physiological and mental well being of the child during pregnancy is affected by vitamin and nutritional deficiencies. These biological and direct and indirect social factors affecting fertility and population structure have to be studied in detail.

Data on tribal fertility and mortality trends are limited to a few groups only like Gonds, Zemi of Nagaland, Kotas of Nilgiri Hills, etc. which reveal a moderately high mortality including high reproductive wastage and neonatal and infant mortality necessitating the study of these aspects among different tribal communities which are distinct biological isolates with varying cultural activities. Data on marriage age are also available for only a few tribes which reveal early marriages according to 1971 census (Padmanabha, 1985).

The sex ratio of the tribal population of the country according to 1971 census is 982, which is although less than the figure in 1961 (987), is much more than that in the general population (930). In the tribes of certain States like Manipur (1009), and Union Territories like Lakshadweep (1021) and Mizoram (1021) the sex ratio is very high while it is lower in Andhra Pradesh, Kerala, Tamil Nadu and Andaman and Nicobar Islands, the lowest being found in U.P. (880). The different multiple factors associated with the differential sex ratio have to be carefully investigated to understand its importance in demographic and biogenetic population structure.

It is interesting to study the different disorders and their influence on the demographic structure of the Indian tribal populations with particular reference to foetal wastage and child mortality. Of vital importance are the various abnormal haemoglobins such as sickle cell trait, G-6-PD and Thalassaemia. The first of these disorders shows wide variation from less than 5% in southeastern tribes to over 20% in southwestern tribes. But its association with fertility and mortality trends as also its relation to the endemicity of malaria and the implications of the association for selection are yet to be unravelled. The red cell enzyme deficiency (G-6-PD) is absent in many tribal populations as shown by a number of studies while in some others it varies from 1-15%. Its relationship with malarial endemicity is not clear. These are a number of haemoglobin abnormalities (Hb, D, HbE, HbQ, HbJ Thalassaemia) which need to be carefully screened.

The fertility and mortality patterns which are influenced by a combination of various social and biological factors in turn influence the growth rate of a population. The overall growth rate of the Indian tribal population during the decades from 1951-1961 (33%), and 1961-1971 (26.2%) registered impressive increases over the figures estimated for the general population of the country. The state-wise and tribe-wise growth rates of the tribes ranged between 17.3% in Bihar to 30% in a number of states and 14.5% in Mundas to 35.3% in Bhils. In a number of tribes particularly those with small numerical strength, there is as yet no clear picture while in tribal groups of Andaman and Nicobar Islands the growth rate presents a decling trend. The different factors responsible for the growth rates are believed to be migration, and enumeration deficiency and migration together. Other causative factors particularly attributable to tribes which are either declining or are growing at a slow rate may be their simple economy, malnutrition and low fertility, etc which are required to be investigated and identified to understand their role in the population structure and to take necessary steps to solve the problem for the well being of the tribes particularly those leading nomadic to semi-nomadic life depending on food gathering and/or hunting economy.

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GENETIC DIFFERENTIATION OF TRIBAL POPULATIONS IN INDIA

A.K.Roychoudhury

Introduction

The tribes constitute seven percent of the Indian population and they are distributed in five regions: (1) north eastern India comprising Sikkim, north Bengal, Arunachal, Assam, Meghalaya, Mizoram, Manipur, Nagaland and Tripura, (2) sub-Himalayan region of northern and northwestern India comprising northern districts of Uttar Pradesh and Himachal Pradesh, (3) eastern and central India comprising West Bengal, Bihar, Orissa, eastern Madhya Pradesh and Andhra Pradesh, (4) western India comprising Gujarat, Rajasthan, western Madhya Pradesh and Maharashtra, and (5) southern India comprising Tamil Nadu, Karnataka and Kerala (Roy Burman, 1972). The tribes living in different regions are distinguishable from one another in language, culture and physical characteristics. About 90 percent of the tribal populations are engaged in agriculture and the rest in activities like household industries, mining, quarrying, animal husbandry, forestry, fishing and hunting (Chandra, 1968).

According to Guha (1937, 1944) the Indian tribes represent three distinct racial types namely (i) the Negrito, (ii) the Proto-Australoid and (iii) the Mongoloid. The tribes living in the Andaman and Nicobar Islands are called Negrito because they have short stature, black complexion and frizzled hair. The presence of some frizzled hair individuals among the Kadar, Pulayan and Irula tribes living in south-western India leads one to speculate that they belong to Negrito. But Sarkar (1954) is of the opinion that the frizzled hair is not a general feature of these tribes. The whole of the central and southern Indian tribes are termed as Proto-Australoid, for they are closely akin to the Australian Aboriginals in stature, shape of the head, protrusion of the facial parts, broad flat nose, fleshy everted lips and skin colour. Recent studies show that there is no evidence of genetic affinity of the tribes of southern India and Sri Lanka with those of Australia (Kirk, 1976; Simmons, 1976; Roychoudhury, 1984). Lastly, the tribes with mongoloid racial elements are found in northeastern India as well as in the sub-Himalayan regions of northern and northwestern India.

For many years anthropologists have studied the problem of differentiation in Indian populations by archaeological or linguistic evidence as well as by fossil records and morphological characters. The conclusions reached by all these evidences are not in complete agreement. Fossil records are fragmentary and not always available. On the other hand morphological characters such as skin colour, stature, shape of head or nose etc. are subject to change by environmental factors.

An alternative approach to study the differentiation of human populations is to use genetic markers. They are stable and not susceptible to environmental factors. Availability of gene frequency data of many blood groups, proteins and enzymes for different human populations and that of new methodology for handling the data are of great help in studying their genetic differentiation.

Gene frequency data of a number of genetic markers are used to determine the genetic distance between two populations. It is obvious that if two populations have the same gene frequencies for all genetic markers, they will be considered to be zero distance apart. The larger the differences in gene frequencies, the greater the genetic distance between two populations. Using gene frequency data of blood groups, proteins and enzymes, a number of anthropologists and population geneticists have already studied genetic differentiation of Indian tribal populaitons. The results obtained are summarised in the following lines.

Genetical Characteristics of Tribal Populations

The absence of A_2 gene in ABO system in the Paite, Hmar and Kuki tribes in Manipur, the Riang in Tripura, the Lepcha in Sikkim, the Nepalese-Rai in Darjeeling and the Kanet tribe of Kinnaur District in Himachal Pradesh is in conformity with the characteristic of mongoloid populations. But its presence in the Khasi in Meghalaya and the Angami Naga in Nagaland indicates admixture with caucasian racial elements. Besides absence of A_2 these populations show high incidence of A over B.

The Rh negative gene, *i.e.*, *r(cde)* is absent not only in the Lepcha in Sikkim, Nepalese-Rai and Tamang in Darjeeling, Bhutanese in Bhutan, Gorkha in Nepal, the Riang in Tripura and the Kanet tribe in Puh region of Himachal Pradesh but also in the Santal, Desi Bhumij and Oraon tribes in Bihar. A small incidence of this gene is observed in Bado Gabada, Pareng Gabada and Konda Paroja in Orissa, and Rajgond, Naikpod and Pardhan in Andhra Pradesh. An appreciable frequency of *cde* is observed among the tribes of Gujarat and southern India (Vyas *et al.* 1962; Bhasin *et al.* 1985; Kirk *et al.* 1962 b).

The Diego blood group factor, a mongoloid characteristic, is present with low frequency in the Oraon tribe in Bihar but it is completely absent in the Irula and Kurumba tribes of the Nilgiri Hills of southern India. The Js^a antigen of Sutter system and V antigen of Rh system are entirely confined to the peoples of Africa and African ancestry. But no positive reactions were found with anti-Js^a and-V in the Irula and Kurumba (Kirk *et al.* 1962a, b).

The tribes in northeastern India namely the Kachari in upper Assam and the Toto at the border of Assam and West Bengal are distinguished by high incidence of abnormal haemoglobin gene *HbE*. But it is completely absent among the tribes in northwestern India.

Sickle-cell trait refers to a condition when an individual inherits an abnormal haemoglobin gene HbS from one parent. This trait is considered to be an important genetic marker for differentiating the tribes from non-tribes. It is absent among the tribes in northeastern and sub-Himalayan regions of northern and northwestern India. This trait is generally confined to the tribes in south Gujarat, Dhulia and Nagpur region of Maharashtra, Malwa and Baster area of Madhya Pradesh, Adilabad, Warangal and East Godavari districts of Andhra Pradesh and koraput district of Orissa. Its incidence varies from 15 to 30 percent among the Irula, Kurumba and Paniyan tribes of the Nilgiri Hills but it is conspicuously absent in neighbouring tribes namely, the Kota, Kadar and kurichia. Similarly the tribes in Bihar namely Munda, Desibhumij, Oraon, Dudh Kharia and Santal differ from most of the tribes in Orissa and Madhya Pradesh in lacking the sickle cell trait. Considering this phenomenon one wonders whether tribes in Bihar are of different racial origin from others (Saha and Banerjee, 1973; Sukumaran, 1975).

The Indian tribal populations have low frequencies of Gm^{1} and $Gm^{1,2}$ and high frequency of $Gm^{1,5}$ in Gm system compared to the non-tribal populations. With respect to Inv system, there is not much difference in the incidence of Inv^{1} allele between tribal and non-tribal populations (Walter *et al.* 1980a). Excepting high value of $Gm^{1,5}$ in the Tharu tribe in Kumaon region of Uttar Pradesh, the tribes studied in Andhra Pradesh and West Bengal show low frequency. The Lambadi tribe in Andhra Pradesh are distinguished by low incidence of $Gm^{1,5}$ compared to two tribes, *viz.*, Koya Dora and Konda Kammara of the same State. This allele is completely absent among the Toda, Irula and kurumba of the Nilgiri Hills in southern India.

The distribution of $Tf^{C}1$, allele of transferrin is generally high in the tribes of Gujarat and eastern India and low in their counterparts of southern India. The only exception is the Lambadi of Andhra Pradesh who migrated recently from the northern parts of India (Walter *et al.* 1978, 1981, 1983). The distribution of $Tf^{C}2$ allele shows opposite direction. Its high incidence is observed in the Soliga, an isolated tribe in southern Karnataka. The Indian tribal populations have in general lower incidence of $Tf^{C}1$ and higher incidence of $Tf^{C}2$ than the Malays, Indonesians, Australian Aboriginals, Melanesians and Micronesians (Kamboh and Kirk, 1983; Tan *et al.* 1982). But the presence of D_{Chi} variant of transferrin in the Oraon in Bihar, the Koya Dora and Naikpod in Andhra Pradesh indicates that this variant might have been introduced from south-eastern Asia where its incidence is quite high (Goud and Rao), 1980; Kirk, 1968). A rare variant of transferring, Tf^{Gond} is found with polymorphic frequency in the Raj Gond tribe in Andhra Pradesh.

With respect to third complement system (C_3), the tribes have characteristically low frequency of

C_3^F as compared to non-tribal populations (Paphia, 1981). As expected the tribes in general have lower incidence of defective colour vision, i.e., red-green colourblindness than non-tribal populations. The incidence is 2.4 percent in the tribes but it varies 3.4 to 4.7 percent among different castes of the Hindus (Dutta, 1966).

Genetic Differentiation by Genetic Distance Analysis

Using gene frequency data of four polymorphic loci Walter (1983) studied the genetic relationships of Indian tribal populations in broad perspective and showed that the tribes in western and southern India and those in northern and eastern India are genetically close to southwestern and southeastern Asian populations respectively.

The tribes living in sub-Himalayan regions of northern and northwestern India possess many genetical traits similar to those of mongoloid populations. Besides their mongoloid features and Buddhist faith, the Kanet tribe of the Kinnaur District in Himachal Pradesh are clearly distinguishable from neighbouring scheduled caste, Koli in six genetic system, i.e., ABO, Duffy, Kell, PGM, AK and 6PGD. They have higher *A* over *B*, high Fy^a and $6PGD^C$ and low AK^2 genes, thus showing genetic affinity with the mongoloid populations. The Kanet living near the border of Tibet are separated at a long distance from the Koli in comparison with other Kanets living in the interior of the Kinnaur District (Papiha et al. 1980, 1984). The absence of Gm^5 in the Gm system in the Tharu tribe of the Kumaon region of Uttar Pradesh indicates that they have mongoloid affiliations. The genetic distance analysis reveals that the Tharu stand out quite apart from non-tribal populations (Chopra, 1970).

Among the tribes living in eastern India, the Santal are the largest in number. They are mainly concentrated in Bihar, Orissa and West Bengal and speak Muṇdari dialect, a branch of Austro-Asiatic language family. Munda, another tribe speaking same dialect as that of the Santal live in the neighbourhood. The Oraon tribe living mostly in the Ranchi District of Bihar are believed to have migrated from the south. Linguistically and ethnologically they are a Dravidian tribe (Roy, 1915). The Oraon are genetically closer to the Santal than to the Munda, although later two tribes belong to same linguistic group (Kumar and Mukherjee, 1975; Roychoudhury, 1982). This result indicates that the genetic distance between populations is influenced more by geographic proximity than by language affinity. It seems probable that the exchange of genes has occurred more often between neighbouring tribes of different linguistic groups than between tribes of same lang-age living apart.

A dendrogram (Fig. 1) constructed from the genetic distances (Table 1) among three tribes each from Bihar (Santal, Oraon and Munda), Orissa (P.Gabada, O.Gabada and K.Paroja) and Madhya Pradesh (Dorla, Dhurwa and Bhil) and two tribes each from Gujarat (Dhanka and Gamit) and Union Territory of Dadra & Nagar-Haveli (Warli and Dhodia) reveal that the tribes who are close geographically are separated by small genetic distances. The tribes in Bihar, Orissa and eastern Madhya Pradesh cluster separately according to their respective States. On the other hand the Bhil living in western Madhya Pradesh have strong genetic affinity with the tribes in Gujarat, and Dadra & Nagar-Haveli (Roychoudhury, 1982).

It is speculated that all smaller tribes of western India are the subdivisions of the Bhils who are one of the largest tribal groups in India. The Bhil are believed to be the earliest settlers in this country (Doshi, 1971) and are scattered over a wide area comprising western Madhya Pradesh, Rajasthan, Gujarat and Maharashtra. The Bhil of Maharashtra have greater degree of genetic affinity with the Pawara tribe than with the Katkari tribe and all of them are distantly related to non-tribal populations (Mukherjee *et al.* 1979).

Genetic studies of seven tribes in Gujarat namely, the Bhil, Naika, Dubla, Dhodia, Koli, Gamit and Dhanka and three tribes of Dadra & Nagar-Haveli, namely the Warli, Dhodia and Konkona reveal that they are racially much in common and as a group they differ from non-tribal populations more than they do from each other (Roychoudhury, 1982). Similar view was expressed earlier by Mazumdar and Fuchs who studied anthropometric measurements of five of seven tribes of Gujarat mentioned above (c.f. Shah, 1962). The only exception is the Koli who are genetically close to non-tribal populations. In their genetic studies on four tribes in the Surat District, Bhasin *et al.* (1985) observed that the Vasava and Kotwalia are closer to each other than either is to the chaudhuri or the Gamit.

According to Raghaviah (1969) two Telegu speaking tribes in Andhra Pradesh, namely, the Chenchu and Yanadi are similar with respect to their food habits, religious beliefs and culture. The Chenchu live in Amarabad plateau in Mahabubnagar and Kurnool districts, while the principal habitat of the Yanadi lies between river Ponneri in the extreme south end river Godavari in the north. Its western border is the eastern Ghats and the eastern boundary is the Bay of Bengal. Genetically the Chenchu and Yanadi are more closely related to each other than either is to the Irula tribe of the Nilgiri Hills, nullifying the hypothesis that all of them were originated from same ethnic stock (Reddy *et al.* 1982).

The genetic distances and the dendrogram for three tribes of Andhra Pradesh (Chenchu, Yanadi and Koya Dora) and two tribes of Maharashtra (Bhil and katkari) are given in Table 2 and Fig. 2 respectively.

The Koya Dora have smaller genetic distances from the Katkari and Bhil than those from the Chenchu and Yanadi. The degree of genetic affinity between last two tribes is not as strong as that among first three tribes (Roychoudhury, 1982). The Lambadi found in various districts of Andhra Pradesh are believed to have come from the north especially Rajasthan and Gujarat. They are distinguished from other tribes of this State by low incidence of Gc^{1F} and $Gm^{1,5}$ in group specific and Gm system respectively, high incidence of Tf^{C1} and Tf^{C2}, near absence of Tf^{D} and Tf^{Dchi} in transferrin and presence of a new variant in albumin. A dendrogram shows that the Lambadi are separated at along distance from the Koya Dora and Konda Kammara and they cluster with two low caste populations, namely Mala and Madiga (Walter *et al.* 1980a,b, 1981, 1984; Goud and Rao, 1980). A separate investigation has been made to study genetic relationships among 11 major tribal populations in Andhra Pradesh including the Savara and Jatapu in Srikakulum District, the kolam, Rajgond and Pardhan in Adilabad District, the Koya and konda Reddi in the Khamman District and the Yerukula and Lambadi in Mahabubnagar and Kurnool Districts. Because of their geographical contiguity the Savara and jatapu cluster together, so do the Kolam, Koya and Rajgond. The Chenchu and Pardhan and Lambadi are deviants. They have large genetic differences from each other as well as from other tribes (Blake *et al.* 1981).

The Toda tribe in the Nilgiri Hills are believed to have migrated from north India, for their language has some affinities with the Brahui dialect in Baluchistan. Another tribe living in the neighbourhood is the Kota whose social hierarchy is lower than that of the Toda. The Kota are genetically distinct from neighbouring tribes by extremely low frequency of A_1 and complete absence of A_2 in ABO system, *r(cde)* in Rh system and absence of abnormal hemoglobin. Their genetic distinctiveness is reflected when they are genetic distinctiveness is reflected when they are compared with other tribes. Using gene frequency data of 11 polymorphic and 9 monomorphic loci, the genetic distances for five tribes, namely Irula, Kurumba, Toda, Kota and Kadar have been determined (Table 3). The Kota stand apart from four other tribes as shown in Fig. 3.

The estimates of average heterozygosities and genetic distances of five tribal populations of the Nilgiri Hills and Kerala in southern India, namely, Irula, Kurumba, Kadar, Toda and kota, and four neighbouring non-tribal populations, namely, Brahmin, Nadar, Reddiyar and Thevar studied by using nine polymorphic loci and one monomorphic locus are given in Table 4. The dendrogram constructed from the genetic distances is shown in Fig.4. The Toda and Kota have greater genetic affinity with non-tribal populations that with neighbouring tribal populations, namely, Irula, Kurumba and Kadar (Roychoudhury, 1982). Similar observation was made earlier by Ghosh *et al.* 1977. This observation is consistent with the results obtained by anthropometric and somatoscopic studies (Basu and Gupta, 1962).

As mentioned earlier there is a controversy about the origin of the Kadar tribe in Kerala, for some of them have hair characteristics similar to those of the Negroes in Africa. But there is no genetic evidence to support their African origin. The P^{R} allele in acid phosphatase and Tf^{D1} allele in transferrin which are found in the black Africans are not present in the Kadar. Similarly unique alleles like PGD^{K} in 6-phosphogluconate dehydrogenase and $Pep\ B^{K}$ in peptidase B respectively present in the Kadar are not found in the African (Saha *et al.* 1974). Figure 3 shows that the Kadar are closer to the Toda than to the Irula and Kota. In an earlier study the Kadar are shown to have greater genetic affinity with the Malayarayan than with other tribes in the neighbourhood (Ghosh *et al.* 1977).

To sum up the tribes in different regions of India are in general genetically different from neighbouring non-tribes. This result indicates that despite their living in the neighbourhood of non-tribes, the tribes remain isolated in most of the regions. Again the tribes living in different regions are not genetically similar. Their genetic differentiation is influenced more by geographic proximity than by other factors. The tribes who are close geographically have smaller genetic distnces than those living apart. For example, the tribes in Bihar and Orissa are genetically closer to each other than they are to the tribes in Gujarat. The genetic distance between tribes is correlated more with geographic contiguity than with linguistic affinity implying that exchange of genes occurs more often between neighbouring tribes than between tribes of same language group living at a distance.

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Legend to the Figures

Fig. 1. Dendrogram for three tribes each from Bihar (Santal, Oraon and Munda, Orissa (P. Gadaba, O. Gadaba and K. Paroja) and Madhya Pradesh (Dorla, Dhurwa and Bhil) and two tribes each from Gujarat (Dhanka and Gamit) and Dadra & Nagar-Haveli (Warli and Dhodia).

Fig. 2. Dendrogram for three tribes of Andhra Pradesh (Chenchu, Yanadi and Koya Dora) and two tribes of Maharashtra (Bhil and Katkari).

Fig. 3. Dendrogram for five tribes of southern India.

Fig. 4. Dendrogram for five tribes and four non-tribes of southern India.

TABLE - 1

Average heterozygosities and genetic distances ($D \times 10^2$) for 13 tribes of Bihar, Orissa, Madhya Pradesh, Gujarat, Dadra and Nagar-Haveli (based on gene frequency data of five polymorphic loci: A, A, BO, MN, Rh, ABH secretor and Hb). The figures on the diagonal are the average heterozygosities per locus in per cent.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
(1) Santal	37.97 ±10.69												
(2) Oraon	0.09 ±0.04	37.02 ±10.80											
(3) Munda	0.48 ±0.24	0.68 ±0.37	37.82 ±10.69										
(4) P.Gadaba	1.79 ±1.10	2.13 ±1.45	1.31 ±0.42	39.16 ±8.70									
(5) K.Paroja	1.22 ±0.58	1.37 ±0.78	1.01 ±0.61	0.30 ±0.12	39.39 ±8.28								
(6) O.Gadaba	2.18 ±1.47	2.35 ±1.41	2.14 ±1.90	1.04 ±0.55	0.58 ±0.29	36.59 ±9.89							
(7) Dorla	0.92 ±0.34	0.81 ±0.25	0.92 ±0.45	1.50 ±0.69	0.88 ±0.37	1.64 ±0.91	38.41 ±7.73						
(8) Dhurwa	1.52 ±0.89	1.75 ±1.09	1.16 ±0.68	1.50 ±0.92	1.25 ±0.91	1.44 ±0.76	0.79 ±0.52	42.50 ±9.88					

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
(9) **Bhil**	0.99	0.96	1.28	3.66	2.88	4.47	1.37	1.88	43.79				
	± 0.20	± 0.28	± 0.67	± 2.16	± 1.55	± 2.76	± 0.68	± 0.92	± 7.57				
(10) **Dhanka**	0.94	0.68	1.69	3.02	2.03	3.22	1.09	2.09	0.60	43.45			
	± 0.15	± 0.12	± 0.80	± 2.47	± 1.54	± 1.71	± 0.73	± 1.10	± 0.36	± 6.88			
(11) **Gamit**	2.41	2.03	2.89	4.49	3.31	5.52	2.21	3.55	1.28	0.87	45.42		
	± 0.82	± 0.62	± 0.94	± 2.69	± 1.66	± 1.80	± 0.80	± 1.15	± 0.44	± 0.43	± 4.58		
(12) **Warli**	1.34	1.00	2.29	4.44	3.29	4.76	1.60	2.76	0.47	0.23	0.79	42.86	
	± 0.55	± 0.33	± 1.49	± 3.47	± 2.35	± 2.72	± 1.33	± 1.67	± 0.16	± 0.09	± 0.32	± 6.71	
(13) **Dhodia**	2.59	1.97	3.83	6.60	4.77	6.14	2.35	4.18	1.37	0.92	1.19	0.46	
	± 1.23	± 0.89	± 2.35	± 4.80	± 3.64	± 3.64	± 2.20	± 2.60	± 0.46	± 0.43	± 0.62		

TABLE - 2

Average heterozygosities and genetic distances ($Dx10^2$) for five tribes of Andhra Pradesh and Maharashtra (based on gene frequency data of nine polymorphic loci: ABO, MN, Rh(D), Hp, Tf, ACP, PGM-1, Hbs and LDH). The figures on the diagonal are the average heterozygosity per locus in per cent.

	(1)	(2)	(3)	(4)	(5)
(1) Chenchu	28.35 ± 7.21				
(2) Yanadi	1.39 ± 0.85	22.49 ± 6.14			
(3) Koya Dora	‹.39 ± 0.52	0.84 ± 0.46	23.67 ± 6.20		
(4) Bhil	1.42 ± 0.85	0.73 ± 0.34	0.70 ± 0.40	27.38 ± 6.94	
(5) Katkari	1.68 ± 0.78	1.36 ± 0.62	0.52 ± 0.25	0.50 ± 0.24	25.16 ± 7.48

TABLE - 3

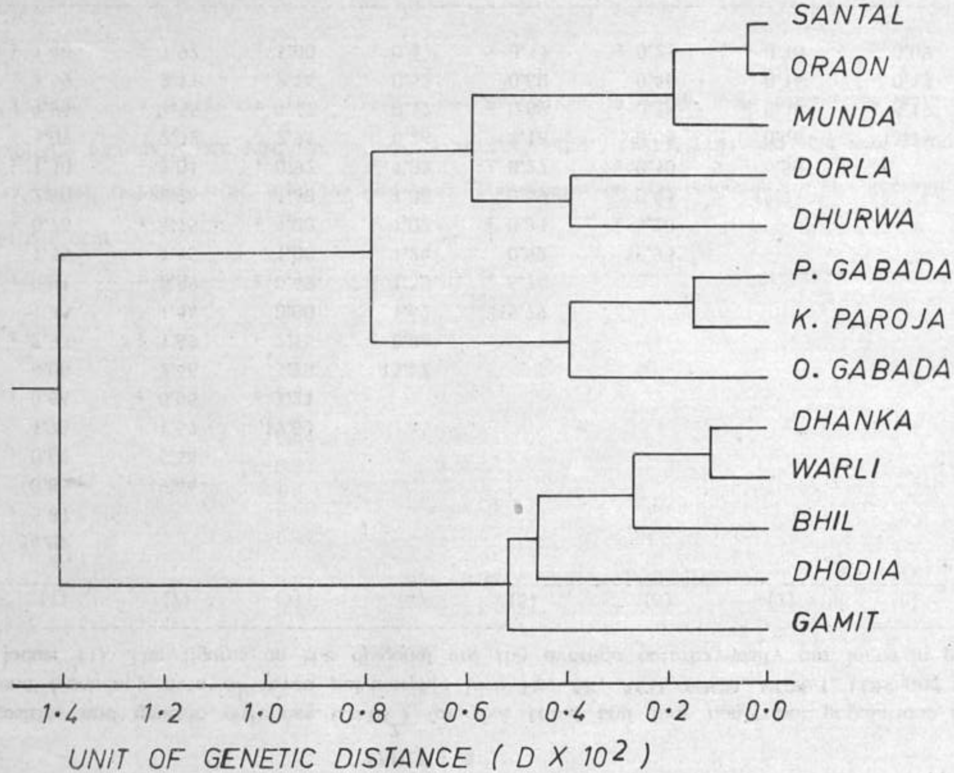
Average heterozygosities and genetic distances ($D \times 10^2$) for five tribes in South India (based on gene frequency data of 11 polymorphic loci: A_1A_2BO, MN, Rh, In, Hp, ACP, AK, PGM1, 6PGD, LDH and Hbs and 9 monomorphic loci: Cp, Tf, PGM2, MDH, Oxidase, PGK, ICD, NP and PHI). The figures on the diagonal are the average heterozygosity per locus in per cent.

Population	(1)	(2)	(3)	(4)	(5)
(1) Irula	15.74 ± 4.98				
(2) Kurumba	0.44 ± 0.23	15.85 ± 4.63			
(3) Toda	0.89 ± 0.44	1.03 ± 0.47	12.82 ± 4.49		
(4) Kadar	1.65 ± 0.73	0.99 ± 0.41	0.87 ± 0.45	12.50 ± 4.02	
(5) Kota	2.06 ± 0.90	1.37 ± 0.70	1.24 ± 0.66	1.31 ± 0.79	10.51 ± 3.65

TABLE - 4

Average heterozygosities and genetic distances ($D \times 10^2$) for five tribal and four non-tribal populations of south India (based on gene frequency data of seven polymorphic loci: Hp, AK, ACP, 6PGD, PGM-1, LDH and Hbβ and one monomorphic locus: Tf). The figures on the diagonal are the average heterozygosity per locus in pei cent.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
(1) Irula	14.02								
	± 5.87								
(2) Kurumba	0.85	19.44							
	± 0.62	± 5.44							
(3) Kadar	1.73	1.57	19.83						
	± 0.86	± 0.55	± 7.21						
(4) Kota	4.08	2.46	3.28	15.42					
	± 2.93	± 1.69	± 2.15	± 6.96					
(5) Toda	1.70	1.44	0.80	1.62	15.79				
	± 0.81	± 0.89	± 0.49	± 1.30	± 6.74				
(6) Nadar	1.35	1.49	1.80	1.24	0.92	12.93			
	± 0.76	± 1.19	± 1.00	± 1.07	± 0.83	± 5.28			
(7) Reddiar	2.20	2.26	1.68	1.08	0.39	0.43	12.75		
	± 1.30	± 2.01	± 0.92	± 1.02	± 0.27	± 0.30	± 5.50		
(8) Thevar	3.07	2.32	2.91	0.26	1.18	0.55	0.46	13.75	
	± 1.95	± 1.95	± 1.37	± 0.17	± 0.69	± 0.38	± 0.36	± 6.19	
(9) Brahmin	2.59	2.11	2.14	0.52	0.60	0.46	0.14	0.13	14.87
	± 1.48	± 1.92	± 1.00	± 0.47	± 0.33	± 0.23	± 0.10	± 0.09	± 5.98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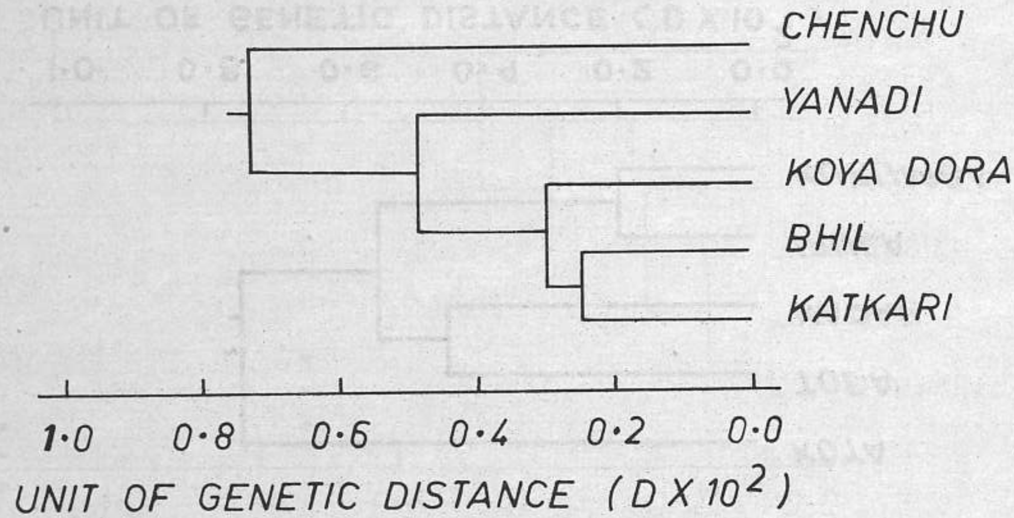
ORAON
MUNDA
DORLA
DHURWA
P. GABADA
K. PAROJA
O. GABADA
DHANKA
WARLI
BHIL
DHODIA
GAMIT
1·4
1·2
1·0
0·8
0·6
0·4
0·2
0·0
UNIT OF GENETIC DISTANCE (D X 10^2)

Fig.1


CHENCHU
YANADI
KOYA DORA
BHIL
KATKARI
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0·8
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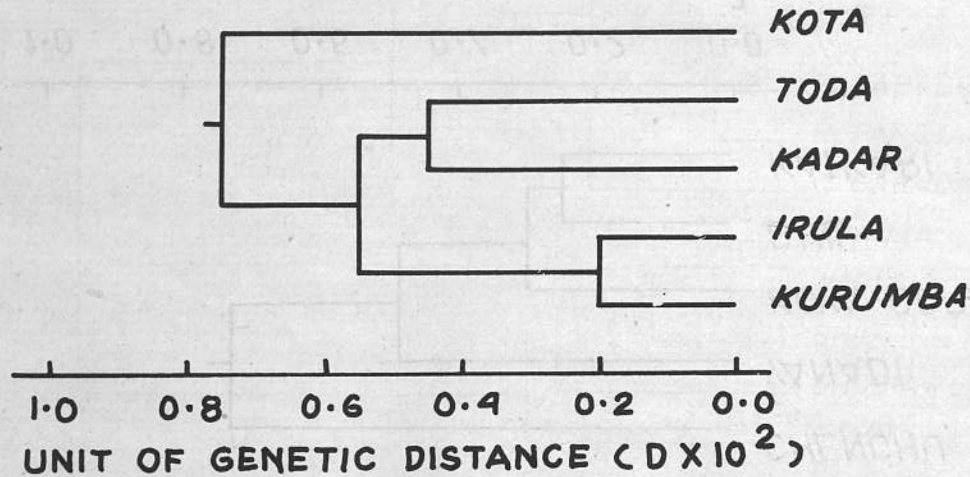
Fig.2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TODA
KADAR
IRULA
KURUMBA
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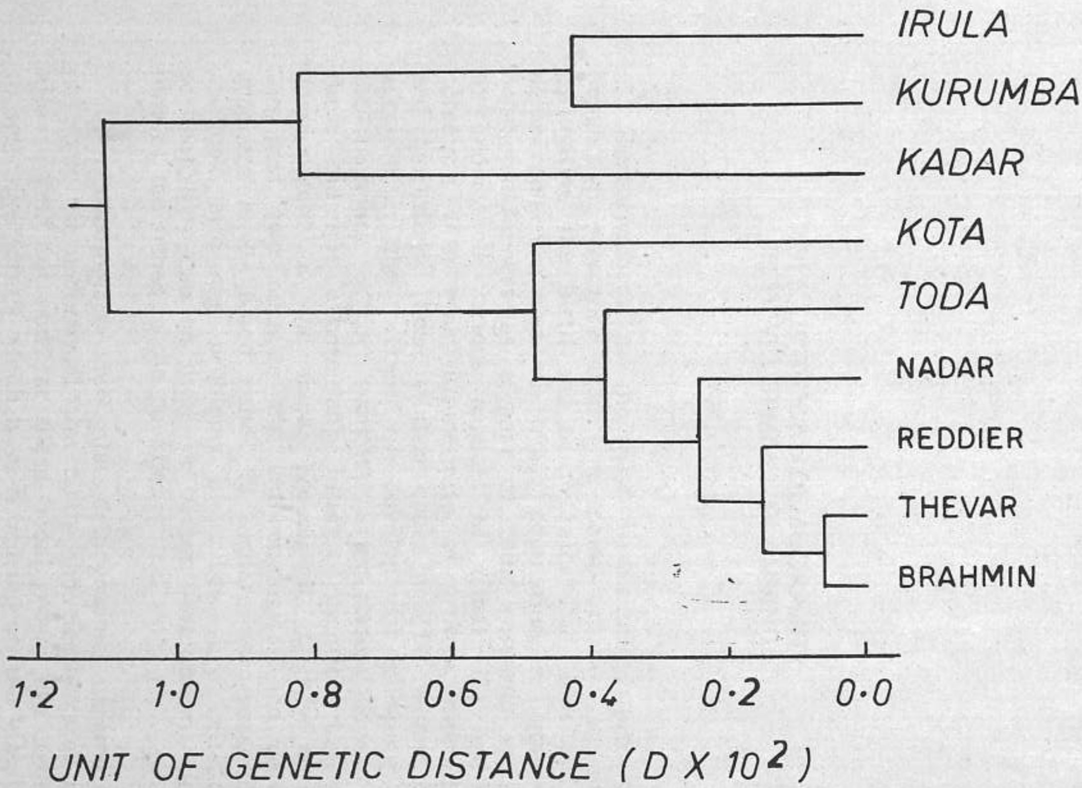
Fig.3


IRULA
KURUMBA
KADAR
KOTA
TODA
NADAR
REDDIER
THEVAR
BRAHMIN
1·2
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0·4
0·2
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UNIT OF GENETIC DISTANCE (D X 10²)

Fig.4

ROLE OF TRIBAL DEMOGRAPHY IN DEVELOPMENT PLANNING

R.K.Gulati

Demographers in the past have looked into the population structure from the point of view of only estimating the birth and death rate. One finds a few demographic studies of tribal population in India by non-demographers as a part of their research studies to understand various aspects of tribal life and to correlate with their future rate of growth, morbidity and mortality. These studies could not be taken into account in the process of development planning by the planners of our country after independence as these did not expose any future projection for the development of the tribal groups. It is only during the past two decades the anthropologists and demographers have joined hands to explore the possibility to look into the problems of tribes very critically so that they can be used for better development planning of the tribes in the country.

Anthropologists view the demographic parameters not only to understand the birth and death rate, but also to find out how far these tribal groups are subject to selective forces which have a bearing on the viability of the group. Selection intensity is a measure by which one can understand whether the group would sustain the selective forces in future and could survive to the best of its capability by keeping the death and the fertility rates either at par or fertility exceeding the morbidity rate. One more point to be emphasised is that anthropologists can not seek coordination from the demographers and other scientists working in the field of population studies, as they do not give a serious thought while designing the projects. It is only a recent trend that population studies are looked into from their applications point of view. Thus in general, demographic studies play a very important role and in particular are very vital in the present context when we talk in terms of development planning applicable to tribal groups. It is obvious that a uniform tribal development programme should be launched for the betterment of the tribes as envisaged in the 20 - point programme. But this issue of uniform application of development programmes in tribal groups in India, would be discussed at a later stage when I take into account the various problems faced by the tribal groups in India living under the varied ecological conditions and with certain constraints.

One can think of development planning very meticulously when the design of the tribal development programme in tribal demography is chalked out keeping in view the problems of the tribal groups whose life is regulated by social norms and values. Reasons are obvious in relation to their survival in harsh and unfavourable surroundings.

However, tribal demographic studies have to be considered seriously for the consideration of development planning by the planners in this country. It would be advisable that all coordinative approach should be brought to the fore.

Tribal populaitons in India, estimated to be 7 to 8% is of immense significance from the point of view of anthropological research because they are distinctly divided into endogamous units having their own social regulations and maintaining their ethnic identity as well as biological identity. Stabilizing these two identities at the cost of their survival has definite purpose as one would like to maintain one's biological fitness, the basis of survival. Though the population of some of the tribal groups is small,, yet they have the desire to procreate and maintain the continuity of their germ-plasm. They do not misceginate with other tribal groups under any conditions. We have quite a number of example of such tribal groups in South India, in North Eastern India and Andaman and Nicobar Islands. Anthropologists have always kept in view the process of biological fitness while undertaking the tribal demographic studies whereas the demographers have neither thought of this nor other issues regarding the survival of the groups. Thus a close collaborative interaction between the demographers and the anthropologists would be very fruitful solution in understanding the tribal demography in relation to the development programme in Indian situation.

As discussed earlier the tribal problems are varied and many in different eco-systems and one is concerned about this variability problem. Since tribal groups have a social pivot around which the life revolves and keeps them in a close-knit groups by their values and other social norms.

The social rules play a very important role in bringing the group very close for its survival at length. The superstitions and beliefs which make the mind of the tribal more fearful and having close interaction with its environments play an important role in the maintenance of the viability of the group as well as its functions both social and biological. Tribal economy is a vital component which makes the wheel of life move in the tribal group lead to more variability in the social system and have a bearing on the demographic aspects of life, for example; in Bhils of Maharashtra the rich tribes can afford to have more wives who are also responsible to promote the fertility rate. Thus more people in a family would look after the property as well as land. On the other hand the tribes who are poor cannot afford to feed even one wife, and remain unmarried which contributes to the low rate of fertility. However, there are tribes like those of Korkus of Maharashtra who follow a social custom with a sanctity to maintain the fertility rate by not solemnising the marriage, but by selecting the mate and living as husband and wife. This system called 'PEN' is very vital and dear to these people, because they can observe their biological duties and help the group to maintain its biological fitness as well as survival. This help them to maintain their fertility equilibrium even when they are under the conditions of selective pressure. Directional selection forces motivating the adaptative changes in the demographic structure of these people. Directional selection also brings about changes in the gene pool on which it acts.

In addition to the changes occurring in the demographic structure on account of economic reasons the primitive economy of these tribes has a bearing on the community size. A feature of the characteristic of the primitive size and ecological system is worth to be considered of community structure as well as their settlement patterns. For example; Overgrazing on lands leads to the degradation of the soil, erosion, and succession to noxious plants; overhunting may wipe out the supply of game animals by reducing their population to the point where they can no longer reproduce; overgathering may wipe out the supply of roots or fish in a particular locality; planting swiddens too frequently, with insufficient fallow period for recovery of soil fertility, leads to degradation of soil and fallow cover and succession to grass which cannot be utilised under primitive swiddening techniques. Under these technologies, it is uneconomic to concentrate human population in large communities in bounded, limited environments beyond a certain point. It leads to destruction of the resources on which the population depends. In these circumstances, large size may give a temporary advantage to the household by concentrating productive labour and power. Constraints on household size include the economic drain of dependent children before they become economically productive, and the limitation of resources within the household's grasp. While this strategy is successful it probably always leads to community growth, territorial expansion, and eventual community fission under primitive economic conditions. Limitation of land resources needed to produce food, has often been viewed as the determinant of size and density of settlement (Carneiro, 1961), but these limits do not automatically limit population growth.

Another very important aspect which have a colossal bearing on the demogrpahic structure and to be kept in mind in the process of development planning is; population ageing, and pattern of fertility and mortality. There are views which furnishes that patterns of fertility and mortality are related to the ageing of a population. Basic to this discussion is the finding that high fertility rates are associated with high infant mortality and vice-versa (United Nations, 1953). During the period of early demographic transition, infant mortality shows the decline (Heer, 1966). Initially this may result in an increase in fertilty under conditions of improving child and maternal care, although the long-range prospects are for fertility decline. The dynamics of fertility and mortality patterns produce significant population growth. The effect of fertility on the age distribution is clear when a population continuously subject to high fertility is compared to one continuously subject to low fertility. The high fertility population has a larger proportion of children relative to adults of parental age as a direct consequence of the greater frequency of births. The increase in average age and the swollen proportion of old people in the industrialised countries are the product of the history of falling birth rates that all such countries have experiences. The reduction of the death rate may produce a younger population. Someother demographic correlates of the dynamics of ageing now become apparent. The dependency load for children tends to be extremely high in the high fertility populations.

Can this also be called as dependability for keeping the balance on account of selective forces. No doubt the tribes whether smaller or larger in number are helped by normalising the selection which keeps the gene-pool constant and does not disturb very much their demographic make-up. Genetic load a quantitatively measure of the loss of fitness in a popualtion due to selection is one of the important attribute which helps to understand the viability of the demographic make-up of the population. This would help in the final processing of the development welfare plans as mortality rate is extensively used for assessment. Environments effects on genetic load is also accounted for a value of fitness is always a function of the environments.

Specifically normalising selection counteracts the accumulation of deleterious mutants in a population. A steady state is achieved when the average number of mutants arising per unit time for example per generation, equals the number eliminated by selection. The elimination has been called by Muller (1950) 'Genetic death'. This emotion laden phrase has taken root in the literature, although a 'genetic death' need not produce a cadaver. For example, a gene for achondroplasia is removed by 'genetic death' when a dwarf carrying this gene fails to find a mate. A sort of genetic 'half death' occurs when a couple of parents has, for genetic reasons, a single child instead of two. Such changes of 'genetic death' in the tribal communities who are highly inbred groups, are the least as the number of deleterious genes arising by mutation must be equal to the number eliminate. All genetic deaths will then remain balance in their gene groups. Such bio-social predictions are to be taken into consideration while planning for the development of the tribes.

Ecological view point is one of the most important attribute in relation to the life-style as well as demographic structure of the tribes needs mention, since ecological parameters reveal many changes of effects, how ecology effects soils, agriculture practices, population distribution, density and settlement patterns and how these factors themselves influence other demographic characteristics and components of biological and social structure. Social organisation is related to technological level, technological level effects agriculture on the soils. Soils determine vegetational cover, and such cover or lack of it have significant effects on climates and so on. There is no end to ecological interactions, and quite subtle alterations in the environments or in the organisation and activity of human populations can have ramifying ecological consequences. It is all too easy to upset the so-called 'balance of nature'. Ecosystems involving man have rerely been in anything like long-term balance since the end of the Palaeolithic, except perhaps, in those cases where an economy of gathering and hunting still persists. Indeed, it may be doubted whether even simple agricultural economies are compatible with the long-term persistence of habitats capable of supporting human or other forms of life.

In most ecosystems economy and level of technology are by far the most important factors determining population growth and size. It is only in a few of the more inhospitable regions such as deserts, mountains, and arctic areas that natural factors still function as primary limiters. But at any one time, there are always some limits to a system and clearly these limits cannot be expanded indefinitely. Already many populations survive only because they can draw on resources far distant from the regions they inhabit. Many more basic issues are raised on account of view points and these issues have a bearing on the tribal populations. Such view points and issues are taken into account at the time of making policies for development of tribals. It gives a better shape of the comprehension to the policy makers for chalking out programmes under varied ecological conditions. Since India is a land of various eco-systems and problems of adaptations are many and varied subject to the strong selective forces operating on the population level, it is very important field for anthropological investigations for better understanding the demographic structures which will ultimately help in the better planning of the tribals welfare.

In a nutshell it can be argued that chalking out policy matters for the welfare of the tribes should be at the grass-root level i.e., by taking into account the demographic structure which are basic attributes of the bio-social functions in a society. We would thrust upon the social values and norms having the bearing on biological needs. Thus, it would be worthwhile to design projects of these dimensions by coordinating with the policy makers. The anthropologists could emphasise the formation of an additional cell attached to the tribal cell in the Ministry of Home Affairs for the tribal demographic studies and their applications to development planning. This would be a good break-through and in the real sense our anthropological researches would become more meaningful.

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CULTURAL AND ECOLOGICAL DETERMINANTS OF ENDOGAMY AND BIOLOGICAL CONSEQUENCES

Aloke K. Ghosh and Pranab K. Das Gupta

Introduction

With the introduction of the terms "exogamy" and "endogamy" by McLennan (Fox, 1968), many scholars have suggested various causes regarding origins of these two important social institutions. No serious attempt has so far been made to put together all the probable reasons, scattered institutions. Livingstone (1959) has made an attempt to review some of the existing hypotheses about origins of incest and exogamy and proposed a modified version of origins of incest and exogamy. Many other scholars like Aberle *et al.* (1963), Slater (1959), Ember (1962), and others have suggested various reasons for origins of incest and exogamy.

In this paper we shall try to deal with the probable causes for origin of endogamy, and also discuss some possible biological effects on populations owing to formation of new endogamous units. We shall not touch upon the other social institution, i.e., exogamy here.

Lowie (1963) says "Society everywhere limits the choice of partners biologically possible. The rule prescribing marriage within one's own group is called endogamy, insistence on marriage outside of one's group, exogamy". So, the endogamy, as per definition given by Lowie, is a social practice which regulates marriage within one's own group. Here the group is a socially defined category, which may be a tribe or a sub-tribe, a caste or a sub-caste, a 'deme' etc. Murdock (1949) defines 'deme' as an endogamous local group in the absence of unilateral descent, and it is regarded as a kin group rather than as a community. Westermarck (1901) in his book *The History of Human Marriage*, has described various types of endogamous groups, which are found in human populations all over the world. But our endeavour would be to find out the specific reasons which lead to the formation of an endogamous unit, more precisely the deme.

It is fairly known that there are two particular processes, known as 'fission' and 'fusion', which bring about splitting of an endogamous group and amalgamation of some endogamous units respectively. But there are some specific cultural/geographical determinant(s) behind every splitting off in an endogamous group or amalgamation of two or more endogamous groups into a bigger endogamous unit. Let us try to chart some of the possible determinants of the two processes mentioned above.

1. Right on Landed Property

It is generally accepted that there is a universal association between matrilocal residence and local endogamy in sedentary communities (Murdock 1949). To explain this phenomenon both Linton (1936) and murdock (1949) have tried to argue that a woman may utilize without handicap her domestic technical skills in her husband's family and requires no special familiarity with the locale. But the matrilocal and local exogamous marriage implies that a man goes to a new community and faces an entirely new environment, where he has to utilize with serious handicap his knowledge and skills in hunting, fishing, etc.

Das Gupta (1964) suggests that the environmental knowledge does not seem to be the dominant factor in regulating local endogamy among the War Khasi (a matrilineal group of Meghalaya) because the two distant villages in the War country do not ecologically differ much from each other. He further suggests that among the War Khasi the rule of inheritance is the prime factor, which regulates this phenomenon of marriage alliance. Among the War Khasi, residence is matrilocal and children of both sex inherit family property. As such, it becomes extremely difficult for a man to exert his right on the family property, if he moves out of his village due to marriage alliance. In some cases a man even loses his proprietary right on land or some objects like limestone, if he leaves his village after marriage. About six miles to the south-west of Cherranpunji, there is a common land *ri-lai seng* or land of three *Sengs* (cognatic groups). According to the resolution passed in the *Seng* council, only the heirs, who live in the villages of Tyrna, Nongwar, Mustoh and Nongkroh, would have the right on that land. Anybody, living elsewhere due to matrimonial alliance or any other cause, loses his or her right on the *ri lai seng*.

So, it shows that maintenance of right on landed property is the most vital reason here for practising local endogamy in a society, where residence is matri-local. In Shella and Tyrna (two War Khasi villages) the percentage of intra-village marriage alliance is about 83 and 72 respectively.

2. Barrier of Distance

According to Nakane (1967) the village endogamy is the intrinsic pattern among the khasis. Her argument that owing to the prevalence of duolocal residence among some sections of the Khasi (if a husband's house was in another village) 'visiting marriage must have been a great inconvenience', appears to be convincing.

3. Leadership and Succession

Kloos (1963) is of opinion that 'leadership and the succession to the position of influence' is a crucial factor in regulating the local endogamy. In justifying his above proposition he has given examples of Garo, Mimika and a few others, among whom, though social practice is matrilocal residence, some of the male members in order to keep authority and leadership marry within their own village. Kloos, however, has not clearly pointed out how such marriages within the village may give rise to local endogamy.

4. Migration

Migration is certainly a very important factor from both demographic and cultural points of view. Due to various reasons a section of a population or the entire population may be forced to migrate from one place to other. It may happen that the migrated population is completely absorbed in the local populations in the new environment or it may keep its separate identity intact due to linguistic, cultural or some other reasons. In Indian situation it is well known that some sub-castes were formed due to splitting off from the larger groups. But sometimes it also happened that a group moving from one place to another after being separated from the parental group,assumed a position for itself without fusing into any other group. Karve (1958 a,b,c) and Karve and Malhotra (1968) described this type of situation as 'lack of fusion' from which many sub-castes, particularly in Maharashtra state, had eventually emerged. But these are all possible conjectures, which are mostly made on the basis of some cultural data and physical measurements. Similarly it is also assumed on the basis of some cultural materials and genetic data that both the Toda and kota of Nilgiri Hills (Tamil Nadu) must have migrated from Northern India; and the dendogram constructed on some genetic markers also indicates that initially these two separate endogamous units belonged to the same population and subsequently one got separated from the other (Ghost *et al.*, 1977). The exact reason behind such migration, separation and formation of separate endogamous units, are not known, nor can be conjectured due to lack of sufficient information. But there cannot be any denial that migration, though in most cases social, cultural, or political reasons behind such migrations are not known, is one of most important factors which leads to the emergence of a new endogamous group.

5. Religion

Religion plays a great role in determining the endogamous boundary of a population. There are innumerable examples to show how religion is an important consideration in selecting mate. People of one religion do not normally marry the people of other religions. But the point that we like to make here is that when a section of a particular population is converted to some other religion, the converted section generally tends to form a separate deme by giving up all marital relations with the rest of the parent population. Such situations can be seen among the tribal and caste populations of India and also elsewhere in the world. One very specific case of 'endogamy by religion' may be cited here to impress upon you the point that we have been trying to make. The Purum (Chote) are distributed in only nine villages in the southern part of Manipur valley and comprised of 1464 souls only (Basu, 1985). One of these villages is Lumlanghupi, situated in the north-western extremity of this valley. Barring this particular village, the inhabitants of all other eight Purum villages accepted Christianity. Consequently, what happened is that Lumlanghupi became isolated from the other eight villages. Virtually there was no marital relation between Lumlanghupi and other Purum villages tilll late 1940s. It may be noted here that on the basis of the existing cultural norms and marriage rules the entire Purum population, belonging to those nine villages, should be considered as a single population unit, whereas the marriage links between Lumlanghupi and other eight Purum villages clearly demonstrate that the entire Purum population should now be considered as two separate demes. So, it shows that religion is a very powerful cultural determinant, which leads to the practice of endogamy.

6. Social Hatred

Though religion is a strong determinant in formation of an endogamous group, yet in some cases it is found that social hatred or apathy, coupled with religious sentiment towards some individuals or group of individuals, is instrumental in the formation of a new breeding isolate i.e., an endogamous unit. An example may clarify the above contention. Mirpur is a small village in Midnapore district of West Bengal. It is solely inhabited by the Christians, numbering only 320 individuals (Basu *et. al.*, 1980). This village is surrounded on all sides mostly by Hindu villages as well as by some Muslim villages. Some published reports and oral tradition show that Rani Janaki of Mahisadal Raj brought twelve Portugese gunmen sometime in the middle or late eighteenth century with a view to protecting her own estate. In course of time those twelve Portuguese gunmen abducted some local women and eventually married them (at least in biological sense) and finally established this Christian village (O'Malley, 1911; Campos, 1919; Basu; Ghosh, 1957; Karan, 1958). The Raj family gifted some land to those gunmen, and they settled there. Initially, these Portuguese gunmen, while trying to set up a village for themselves, met with a lot of opposition from both the Hindus and Muslims of that area. The reasons behind such opposition were presumably religious sentiment and social hatred towards those Portuguese gunmen, who abducted women from the local Hindu and Muslim communities. Another possible reason for such hatred towards those Portuguese gunmen might be due to the fact that the Hindu and Muslims subjects of the Raj family were deprived of their land, which was taken away by the Raj family in order to make the gift. Many other examples may also be cited to show that religion mixed with some sort of social hatred or apathy is sometimes the prime factor for the emergence of a new endogamous group. If one scans through social history of india, one would find how the apathy or intolerance of the high caste Hindus towards not only so-called low castes but also the people of other religions, created tensions among various communities and helped forming rigid endogamous groups.

7. Ecological Adaptation

Adaptation is a continuous biological process and all living organisms have constantly been trying to adapt themselves to the environment in which they live. But it is interesting to find that ecological adaptation in some cases brings about splitting off in a population, and one splinter group, taking advantage of a particular ecological condition and safeguarding its interest, forms a new endogamous unit by breaking off all relation with the parental group. Such a situation can be better understood if we study the case of the Semsa. The Semsa is a splinter group of the Dimasa tribe of North Cachar Hills district in Assam (Danda and Ghatak, 1985). The Semsa is completely restricted in one village named Shemkhor and still having all traditional cultural traits, including the language of the Dimasa tribe. There are several stories about the migrational history of the Semsa tribe to Shemkhor village and their settlement there. But there is a complete consensus that the Semsa originally belonged to the Dimasa tribe. In Shemkhor village there were five (at present only three) saline pits. In olden days the ancestors of the present day Semsa migrated to this village and gradually got used to cooking with saline water. Once in remote past a few families left *Shemkhor* village and tried to settle at Guilung village. But eventually they had to come back to *Shemkhor* village after realising that they just could not survive in any other place where there was no saline pit (Danda and Ghatak, 1985). It shows that some sort of adaptation to a particular environmental condition compelled the ancestors of the present day Semsa to be restricted to one village and they did not like to share that ecological advantage, which they had in *Shemkhor* village, with the other sections of the population i.e., the non-Shemkhar Dimasa people. Eventually they had to give up all social relations with the parental group i.e., 'the Dimasa' and have virtually become an isolated endogamous group for last 200 years, though they are surrounded by the Dimasa and the other neighbouring populations like the Naga and others. Sometime in the past a stray instance of marriage between a Semsa boy and a Dimasa girl occurred. But the Semsa boy was forced to leave *Shemkhar* village. The case above illustrates how the drive to safeguard the ecological advantage gives rise to the origin of a new deme.

8. Social Rivalry

Social rivalry at times between various segments/villages of a population may lead to splitting off within the population, and subsequently it may lead to the formation of separate demes within the population, when each of them starts practising endogamy. Behind such rivalry there may be some reasons like social, political, economic, demographic, etc. Let us discuss here the case of the Kota.

The Kota distributed only in seven villages, is a small culturally as well as biologically isolated tribe in the Nilgiri Hills. Though there are still some marital relations among the seven Kota villages, there is a strong tendency for village endogamy due to increasing inter-village rivalries (Ghosh, 1976). Such inter-village rivalry takes place due to various types of differences of opinion between the members of Kota villages. Such differences of opinion occur around marriage disputes, money lending, land dispute, bride-price, etc. The tendency for village endogamy is much more perceptible in cases of numerically more dominant villages than in small ones. It is due to the fact that the members of numerically bigger villages can procure mates within their respective villages, whereas the members of numerically smaller villages do not always get suitable mates in their respective villages. But there is a very clear and strong tendency in Kota villages to get a mate within one's own village (For example, of all marriages the percentage of village endogamy is 69.75 in *Trichigadi*, 60.42 in *Sholur*, 52.52 in *Kollimalai*, 52.63 in *Kundah* etc., (Ghosh, 1976). It has been found that generally the members of bigger villages always try to dominate and impose their views and wishes on the members of smaller villages, which lead to inter-village rivalry and strengthen village endogamy.

How such rivalry between villages, leads to the emergence of separate endogamous units within a population, can be better understood, if one examines the case of Yanomamo Indians of Venezuela and Brazil. "The Yanomamo like tribesmen everywhere, are organised into small communities, in this case villages. But unlike most remaining tribes, the Yanomamo are still a sovereign people and retain their aboriginal warfare pattern. This is particularly important, for most tribal institutions are structured in such a way that they make sense only in a political milieu that includes of not actual warfare, the threat thereof"

(Chagnon, 1975). Inter-village rivalries are constant phenomena among the Yanomamo Indians. The tension in inter-village rivalries varies in intensity and magnitude from centre to periphery. Small villages, situated at periphery, generally live in more or less isolation; and the members of such small villages try to adapt themselves to the threats from their neighbours by constantly moving away from them. This process leads to the geographical separation between the members of two such conflicting villages. Such separation eventually leads to micro-differentiation among the people of various Yanomamo villages. Such micro-differentiations are found at various socio-cultural levels, e.g. a lot of distinct dialects, etc. among the Yanomamo Indians. There are some cultural determinants which constantly set on the processes of fission and fusion among the Yanomamo Indians, which, in turn, lead to micro-differentiations, both cultural and biological, among the Yanomamo villages. But the question is that what are the precise cultural determinants that bring about such fission and fusion among the Yanomamo Indian villages. It is known that the residents of one village generally do not trust and are rather afraid of the residents of the other neighbouring villages. Again one may ask "why such distrust and fear"? There are several socio-cultural reasons for such distrust and fear among the Yanomamo Indians. The members of one village are always apprehensive that any death, occurring in that village, is supernaturally caused by the members of the other villages since one group is involved in chronic warfare with the other groups. Besides, it is a very common phenomenon among the Yanomamo Indian villages that the members of one group all on a sudden treacherously attack the members of the other group, who are believed to be friends, with a view to killing the men and abducting the women of the former group. Moreover, the social system and the political organisation among the Yanomamo Indians is just not capable of organizing more than 150-200 individuals in one village and consequently a constant process of village fission is there among them.

From the above discussion it is clear that a new endogamous unit i.e., deme, comes into existence through operation of either of the two processes i.e., fission and fusion, owing to various socio-cultural determinants, which initiate either of those two processes. But which socio-cultural factor/factors will initiate which process is entirely dependent on specific social situation and/or specific society. So, it may be safely concluded that none of the socio-cultural determinants is really universal, but to a great extent it is society and/or situation specific.

Biological Consequences

Whenever there is a change in mating pattern caused by one or the other cultural factor, some changes in the biological structure of the newly emerged population, are expected to occur since cultural evolution and biological evolution always take place simultaneously, though at varying rates. When a group of individuals branches out from the parental population or when two or more populations amalgamate together, the genetic structure of the newly emerged mating group i.e., deme, will be different from that of the parental group, and such differences, which can be measured, occur due to the actions of various biological forces; and intensities of such biological forces are largely dependent upon various cultural norms of the newly emerged population.

One striking feature of the split off group is that they are demographically smaller in size than their parental group. Consequently the probability for non-random mating will be greater in the former than that in the latter since the number of prospective mates will be smaller in the former than in the latter. So, the mean marriage distance will, with all probability, be lower in the former than in the latter; lower the mean marriage distance, greater is the probability for inbreeding. Inbreeding as such does not bring about changes in gene frequencies, but it certainly does bring a good deal of homozygosity in the population, which means that there will be decay in heterozygosity, which, in term, means loss of genetic variability in the population. In a survey of 17 protein enzyme loci among the Kota of Nilgiri Hills (Ghosh *et.al.*, 1977; Chakravorty and Ghosh, 1981) it is seen from the observed and expected distributions of the number of heterozygous loci, the observed mean is generally smaller than the expectation. It suggests the deficiency of heterozygous individuals among the Kota. The probable reason for this is the high degree of inbreeding (mean inbreeding co-efficient is 0.042; Ghosh, 1972) among the Kota and not due to any linkage disequilibrium (Chakravorty and Ghosh, 1981). Another point may be noted here, as mentioned earlier, that though there is a strong tendency for village endogamy among the Kota, still about 45% of all marriages are between villages (Ghosh, 1976). Consequently the small value of F_{st} (0.018 with standard error of 0.002) suggests that gene differentiation between the Kota villages is very little till now (Chakravorty and Ghosh, 1981). But along with the time gene differentiation between the Kota villages will be greater as the tendency for village endogamy is now on increase. In our recent study among some migrant tribes of Andaman islands it is found that as in the Kota the average heterozygosity levels among the Munda, Oraon and Kharia are found to be fairly low, (Majumdar and Ghosh, 1986). The reason for such low level of heterozygosity is either bottleneck or inbreeding or both. In this connection it may be recalled that these three tribes were brought to Andaman islands from Ranchi district (Bihar) by the then British administrator at the end of last century with a view to employing them as forest labourers (Vidyarthi, 1971). Subsequently each of these three tribes started practising endogamy in their new habitat and lost almost all connections with their respective parental groups in the mainland. So, what we want to drive home by giving the above two examples, is that with emergence of new endogamous group the level of heterozygosity will gradually become lower i.e., the level of homozygosity will increase and some amount of genetic variability will be lost in the populaiton.

The rate of increase in homozygosity level to a large extent depends on socio-cultural behaviour of the particular population. With the practice of inbreeding, rare, recessive or deleterious genotypes will appear in greater frequency in the population. Consequently, the frequency of congenital malformations and rare genetic diseases may also increase in the population (Johnstone, 1973). Among the Amish of Pennsylvania, as reported by McKusick, the frequencies of polydactyly and Ellis-van Crevekd Syndrome are greater than those found in general population (cited by Johnstone, 1973). Since through inbreeding the frequency of rare, recessive and deleterious homozygotes increase the genetic load is bound to decrease because those homozygates can speedily be removed by selection. In this connection it may be recalled what Hussien (1971) has suggested "..... consanguinity is the main determinant of the observed excess mortality in the offspring of related parents. This excess may be attributed to inbreeding being brought about by the higher frequency of congenital abnormalities and disease, appearing as a result of recessive genetic components made manifest through the increased homozygosity that the mating pattern would bring about."

When a population becomes smaller in size by fission, the possibility for genetic drift increases. Among the Kota it is found that A_2 gene in the ABO system, r(cde) in the Rh system, LDH Cal-1 among the enzyme systems and Hbs are completely absent (Ghosh *et al.*, 1977). It may be recalled that from physical features (Basu and Gupta, 1962) and dermatoglyphic traits (Chakravartti and Mukherjee, 1964) the Toda and Kota resemble each other. Those genes are present not only in the Toda but also in the other Nilgiri tribes.

The absence of those genes in the Kota can only be explained by the founder effect (Ghosh et al., 1977). Even the coefficient of breeding isolation (1.01) in the Kota indicates a strong tendency towards genetic drift (Ghosh, 1976).

Mukherjee *et al.*, (1980) have suggested that there is a positive relationship (r= ± o.973) between coefficient of inbreeding and village endogamy. So it indicates that with the practice of village endogamy mate selection will be more and more within closer relations. Such situation has also been reported in Egyptian Nubia by Hussien (1971). He says that "endogamy is the social reflection of biological inbreeding ....." However, it shows that all depend on social norms and systems of the particular population.

From the above discussion what we like to impress upon is that there may be many cultural determinants for endogamy and with practice of endogamy there will be some biological changes in the population. It is fairly well known that endogamy, which is one of the major components in maintenance of ethnic boundary, is in fact not always a fixed entity. Populations often reorganise their ethnic boundaries as and when social situation demands and such situation occurs due to various cultural reasons. So, it is true that no single cultural determinant is really universal in nature but these cultural determinants are either situation specific i.e., varying from one particular situation to other, and/or society specific i.e., varying from one society to other.

Due to diverse cultural reasons, as stated above, the old ethnic boundary breaks up and the new ethnic boundary comes into existence. Both fission and fusion are very much universal phenomena, which always bring some amount of changes in genetic make-ups of the newly emerged populations through the actions of some natural forces like selection, drift, etc. It is of course, true that the amount and intensity of changes in genetic make-up vary from one endogamous population to other and largely depend on social systems and cultural norms of a particular population. In spite of that it is also true that all natural forces like selection, drift, etc. are constantly active on all populations and their modes of actions are certainly universal. So, the biological consequences of endogamy caused by such natural forces, are quite similar in nature and character, though they are very much dissimilar in intensity and magnitude.

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POPULATION PLANNING AND TRIBES - A CASE STUDY OF IRULAS OF NILGIRIS

T.S.Natarajan and K.N.Reddy

Introduction

During the World Population Conference held at Bucherest in 1974, one of the theoretical foundation in Demographic Transition emerged was that "Development is the best contraceptive." This was based on the interpretations of the 18th and 19th century European experience when both fertility and mortality rates remained high and constant over thousands of years. But during the Industrial Revolution in Europe, mortality began to decline as a result of improved living standard and advances made in the areas of sanitation and medicine. The fertility, however, remained constant. As a result, population growth was accelerated. The continued socio-economic development further declined both mortality and fertility. This was attributed to the realization on the part of the individual couples that with the lower mortality fewer children were needed to attain the desired family and societal goals. This theory was challenged in recent years when numerous cases were found which did not fit into the above argument. There were areas in which fertility decline began before the mortality declined and fertility decline occurred in some areas before the socio-economic development (Brachett J.W. 1976).

India initiated population control programme as an integral part of the national efforts for socio-economic development through the Five Year Plans from 1952 based on the realisation of the rapid reduction in death rate and the upsurge in population growth. The 1961 census gave a rude shock to the planners when it was found that the birth rate was as high as 41.7 and death rate 22.8 with an annual geometric growth rate of 2% which had tendencies to increase in view of the anticipated further decline in death rate with the provision of massive disease control and health programme. The resource allocation was recast and Family Planning Programme was given priority. The programme was reorganised and expanded to cover the entire nation with the objectives of creating awareness and social acceptance for small family size norm, imparting knowledge about conception and contraception and by providing the contraceptive services within easy reach of the eligible couples. The programme became time bound and target oriented with a cafeteria approach. As the programme was gaining momentum with large number of acceptors for the male and female sterilisation, IUD and conventional contraceptives, the Government exempted the tribal population from the programme on the ground that they are already small in size.

Case Study: Irulas of Nilgiris - A Study on Anthropological Demography

The study on "Anthropological Demography among Irulas of Nilgiris" (Reddy, K.N. 1985) reveals that the population structure, fertility and mortality patterns and their determinants are very similar to that of the main stream population. The population pyramid of Irulas depicts the usual pattern of the general population with broad base and narrow apex by which the tribe is identified as a high fertility group. However, the high fertility is balanced by high mortality in general and infant mortality in particular. Despite being a traditional community, "the joint family system is on the verge of extinction" and couples immediately after marriage are encouraged to set up nuclear families. Further, the mean family size of the Nilgiri Irulas is 3.65 which is rather lower than that of the country's family size. The small family size of this population may be taken as an indication that families are preferentially opting to maintain smaller and smaller households and such structural trends may be due to the changes in the social and economic landscape of the population (Reddy, K.N. 1985).

Maintenance of an optimal family size in many of the communities appears to be either culturally determined or naturally controlled. Similarly voluntary reduction of family size seems to be a cultural pattern of great antiquity (Polgar, S. 1971). Demographers and population planning experts are concerned with creating a balance between population growth with socio-economic progress and advocate Neo-Malthusian approaches to the population problem by which several countries have mounted National Family Planning Programmes at enormous cost. These approaches have shown positive results where fertility decline is associated with the vigour of Family Planning Programme implementation in different countries. However, the association of fertility decline to the vigorousness of the Family Planning Programmes are not conclusive.

The case of the Nilgiri Irulas maintaining a population and family size commensurate with the national expectation without any financial commitment to the Government (though exempting them from the Family Planning Programme) is commendable though the process by which this population trend is attained may not be agreeable to the Neo-Malthusian advocates. But the policies relying on positive incentives and negative sanctions which many countries, including India, resort to are morally unacceptable and might be counter productive in the long run besides their doubtful cost-benefit and cost-effectiveness of such programmes.

Conclusion

Under the circumstances, it is very important to study in depth the determinants of fertility among tribes which may throw some light to evolve a population planning strategy for tribes and other population.

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RESUME OF THE SEMINAR

K.N.Reddy

Prof. Subba Reddy, Prof. Amitabha Basu and members of the house, I shall present before you very briefly the various aspects covered in the present seminar on 'Population Structures Among Tribes'. I believe that more view points could be heard from Prof. Amitabha Basu.

We had five full sessions in the spread of three days and all days have gone-by in no time. In the first session of the first day five papers were presented, followed by a special lecture on 'Population size and sub-division' by Prof. Amitabha Basu. There was lively discussion on all papers and especially on the special lecture which continued more than an hour over the scheduled time. The populations covered in this session were Nilgiri Irulas, Coimbatore Irulas, South India Irulas, and Naik Gonds of Maharashtra. What did we get from these papers and the special lecture? It appears to me that a clear trend is now emerging with regard to demographic studies; they are no longer mere descriptive ones: we now see the real academic use of such studies and their relevance for development purposes. The attention is being given now to take up studies at micro level of a population and interpret

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its culture and biology. How cultural divisions of a population like lineages, clans, phratries and moities, are acting as factors affecting the random mating and the extent of deviations from panmixis were observed from the above populations. Dialectical variations are also leading to divisions within the population resulting in reproductive isolation. A greater need is now felt for the unification of methodology in demographic studies which is necessary to make the data fit for cross-cultural comparisons.

The second day papers and special lecture on 'Approaches to the study of population structures with special reference to Indian Tribes' have received good attention and discussion under the chairmenship of Prof. Rami Reddy and Prof. Subba Reddy. The populations covered in the first session of the second day were Todas of Nilgiris, the Bhotia tribe of Kumaon-Himalayas, the Kinners of North-Western Himalayas and the Sherpas of Nepal. The biolgoy and culture of these populations though interesting, we could not arrive at any definite scientific conclusions for their slow growth and low fertility rates. Time seems ripe to bestow keen interest in tackling these issues and taking up of problem oriented studies.

In the afternoon session of the second day we had been educated on the populations like Orans of Orissa, Sugalis and Konda Kammaras of Andhra Pradesh, Narikoravas of Andhra Pradesh and Tamil Nadu, the Cholanaickan of Kerala, and the Kolams of Andhra Pradesh. More attention was given to small populations like Cholanaickan and Narikoravas in terms of their problem of extinction and how best development programmes could be implemented among such populations. The special lecture presented by Prof. Rami Reddy reviewed the tribal demographic situation in India, the importance of population structures, factors contributing to such structures and further development strategies to be made on populations.

The third day we had papers on population structures of tribes from both social and physical anthropologists under the chairmenship of Dr. U.P.Sinha and Dr. M.Suryanarayana. Earlier at the outset the special lecture delivered by Prof. N.S.Reddy on 'Social demography in India: Need for microlevel studies' was well taken and appreciated by the gathering. The populations covered in these sessions were, Chenchus, Saoras, Jatapus and Yerukulas of Andhra Pradesh; and the Garasia of Rajasthan. In these two sessions of the last day, i.e., today, much attention was paid on demographic variables like fertility and mortality. All the members of the house expressed their keen desire that the result of sustained researches should help the studied populations. And thus, the exercise is now over. And we have to follow it up to maintain vigorous, health in our academics. Let us hope we meet again somewhere like this and continue the academic exercise together.

I would like to express my deep felt thanks to each one of you for your kind participation and deliberations in this National Seminar. My sincere thanks are to: (1) Calcutta team: Prof. Amitabha Basu and Dr. Ranjan Gupta; (2) Bombay team: Dr. U.P.Sinha and Dr. V.R.Rao; (3) Madras team: Prof. Subba Reddy and Dr. Ramesh; (4) Vizag team: Dr. Narahari, Dr. Jaikishan and Dr. V.L.N. Rao; (5) Tirupati team: Prof. Rami Reddy, Dr. Suryanarayana, Dr. Govinda Reddy, Dr. Gangadar, Dr. Deep Kumar and Mr. Ramachandra Reddy; (6) the team of members representing Government of India; Dr. Srivastava, Trivandrum; Dr. Lalit Kumar Kashyap, Delhi; and Dr. T.S.Murthy, Madras; besides, Dr. Sahu, Sambalpur University, Dr. Ramesh Chandra, Anthropological Survey of India, Udaipur and Dr. A.P.Singh, Lucknow University. The very fact that you have come all the way from your places, knowing fully well about the Ooty climate in this December, makes us deeply appreciate your academic interest. I sincerely thank all of you once again for the same.

VALEDICTORY ADDRESS

Amitabha Basu

Mr. Chairman Sir, and gentlemen. It is a pleasure and pleasant task to deliver the valedictory address for the National Seminar on 'Population Structures Among Tribes.' I shall however be very brief and shall not speak for a long time. What one really wants to do in a valedictory address is to bring up the major points that emerge from the presentation of papers and the deliberations of the seminar and then perhaps, at the end I may present a few points of my own.

The first and the foremost point I would like to make is that I am very much impressed by the amount of data presented and the enthusiastic and sharp reactions of the participants, especially from the younger generations which is a very happy sign indeed. This is probably one of the very few seminars of this kind in India, I can think of, in which the average age of the participants is well below 40 and much of the instantaneous reactions came from the younger generations. The younger generation have come out with sharp reactions; we may not agree with all of them. It is a very healthy sign in any gathering of this kind that disagreements do crop up and through these disagreements, probably, we progress much more than through agreements. If we all agree on every point, then we would not have made any progress at all.

Apart from several other things, I would like to mention the following major points that have emerged from the deliberations of the seminar.

1. We have now examined population structures of several groups, though not all the groups in the country. From this, we now realise that the population structures of different groups in the country are exceedingly complicated and complex. There are various dimensions to the problem. There are various aspects that apparently may seem unimportant and irrelevant but which may contribute to the formulation of population structures. These aspects we must study from the population genetical point of view as well as from the view point of human well-being which I mentioned in my special lecture. This point has raised a lot of controversy but nevertheless, this point came up repeatedly during the discussions.

2. The second important point that emerged in the seminar is assigning priorities to our studies keeping in view the overall social context, social needs and things of that kind in the country. Question of priorities have come up again and again. We are nowhere near resolution of this problem. Even then, if we look back to anthropology as it was practised some 25 years ago or even 10 years back by most of us, this question of priorities, question of ethics, question of what we should do in the national context never occurred to us. But these days especially in this seminar, most of the participants, speakers, directly or indirectly, talked about priorities which means to me that anthropology in India is coming of age. It is natural and it is time to look at its own social responsibilities in the context of national problem. It is very important to say that this problem has come up not only from the representatives of the Government, but also from

the academic people. It means, I would repeat, that anthropology in India is coming of age.

3. Thirdly, we are now becoming more and more aware of the limitations of our techniques in the field of demography or in any other field. We have here fortunately a competent demographer with us who has very rightly and repeatedly pointed to us the errors and limitations of our techniques. Although the dialogue is not over, we are grateful to demographer-cum-statistician-cum-anthropologist, Dr.U.P.Sinha, International Institute for Population Studies, Bombay, for reminding us our limitations. It is not only in the field of demography but in very many other fields, the techniques are not very sharp. We have to sharpen them.

4. Then, the question of micro-level studies has come up and also in the special lecture by Prof. N.S. Reddy. It is very important that this question has come up in a special lecture categorically and this point also came in some form or the other in several papers presented. As I see it, micro-level study is the speciality of anthropology. And now that we are thinking of how to apply this special methodological tool of anthropology to the wider social contexts, priority studies; we are nearing the successful achievement of our target. The question of micro-level study, of course, comes up in any anthropological study, but here I suppose Prof. Reddy with some very clear illustrations showed us how micro-level studies could be of considerable importance in a wider context.

5. Finally, I would repeat because I am very much impressed that the younger generation has made its mark in a conference of this kind and we the older people should be thankful to them.

I have very little to add to the points already made, except that we should follow up the point that has been said in the seminar to sharpen our tools as well as formulate our questions and hypotheses in testable forms. We may have many questions but the training of anthropology unfortunately has been, atleast when I was a student, of a very vague nature. I went to the field to study a population without knowing what I was trying to look at. We did not know what questions we were asking. I was told to go to the field and collect data. So, collected some data and I did not know what to do with that data. But now I tell my students that before you go to the field you select your area of interest and then prepare yourself through library work and then go to the field, live with the people so that you have the feel of the problem; then come back to the lab or department and formulate the problem in a manner that you can test your hypothesis, approach your problem with some testable hypothesis. We have to do like this and as very correctly pointed out by speakers who preceded me. We have to do this in collaboration with especially demographers. Demography and anthropology are very close. We have already borrowed several demographic methods and we shall be doing this more and more in future. In the field of biological anthropology we have to do this in collaboration with medical scientists, for instance, epidemiologists and others; in the field of cultural anthropology in collaboration with linguists, historians etc; eventually we have to reformulate anthropology. The whole approach of anthropology as a multidisciplinary discipline in which the inputs from very many different disciplines, biochemical, molecular biology on the one hand, linguistics, folklore, history on the other, and statistical techniques, for instance, on the other.

With these few words, I thank the organisers on my personal behalf and on behalf of all of you for taking care of us very well. A lot of hard labour has gone into the organisation of this seminar. I thank them for organising this seminar so well and hope that we shall keep doing such exercises in the future and that the Centre would be a host to bring us back here again.

CONCLUDING REMARKS

N.Subba Reddy

I congratulate the organisers of this seminar who could collect so many scholars from different parts of the country, from Calcutta in the east, Bombay in the west, Delhi, Lucknow and Dehra Dun in the north and Trivandrum in the south. I find several institutions and universities represented here by a team of enthuşiastic participants. A common sight in a seminar is that about 50% of the delegates absent themselves and about 50% of the delegates present are found sleeping in the course of a seminar. I am very happy to state that very enthusiastic and committed participants have gathered here and I have not found a single person absenting or sleeping during the course of the seminar.

The participants have covered the seminar subject from many angles and covered several ethnic groups, Bhotias, Kinners in the north; Pahiras and Sherpas in the east, right up to Cholanaickan in the South, and so many communities of Andhra Pradesh. The papers as well as the deliberations of the seminar have clearly brought out the multi-disciplinarity of the subject-ecological, environmental, food resources, economic, demographic and genetical dimensions of the subject. As Prof. Basu was indicating, we have to take, and we have already been taking, the approaches and findings from the other disciplines. This seminar clearly demonstrated how we have been trying to integrate different disciplines for clear understanding of the objects of our study.

Going back into the history in time and space; I should congratulate the dynamic Vice-Chancellor of the Tamil University who has filled a great gap and answered the pressing need by organising the Tribal Research Centre here. While almost all the State governments have started Tribal Research Centres, the Tamil Nadu government was playing hide and seek in starting a Tribal Research Centre in the State. In the face of this evasion and even possible resistance, the dynamic Vice-Chancellor of the Tamil University has taken upon himself the task of organising the Tribal Research Centre with assistance from the Central Government.

When I first heard about the Tamil University, I thought that it would be a very old fashioned university teaching and doing research only in Tamil language, literature, grammar, linguistics and perhaps Tamil history. But the imaginative Vice-Chancellor has thought of so many other subjects and gave special importance to anthropology and anthropological research and stationed this centre at Ooty which is a varietable scene and a living museum of cultures.

Coming to the organisers, I am very happy that Dr.D.V.Raghava Rao, who very soon after his taking over as Director of this Centre, could organise this National Seminar successfully, placing this Centre on the all India map of anthropology. I could see how the whole team worked in good co-operation. It could augur very well for the future progress of the TRC as could be seen from the full co-operation and dynamism of all the academic and administrative staff of the Centre. I hope, as I said in the very beginning, that this kind of seminars would be repeating themselves every year and I congratulate the organisers for the successful conduct of the seminar.

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